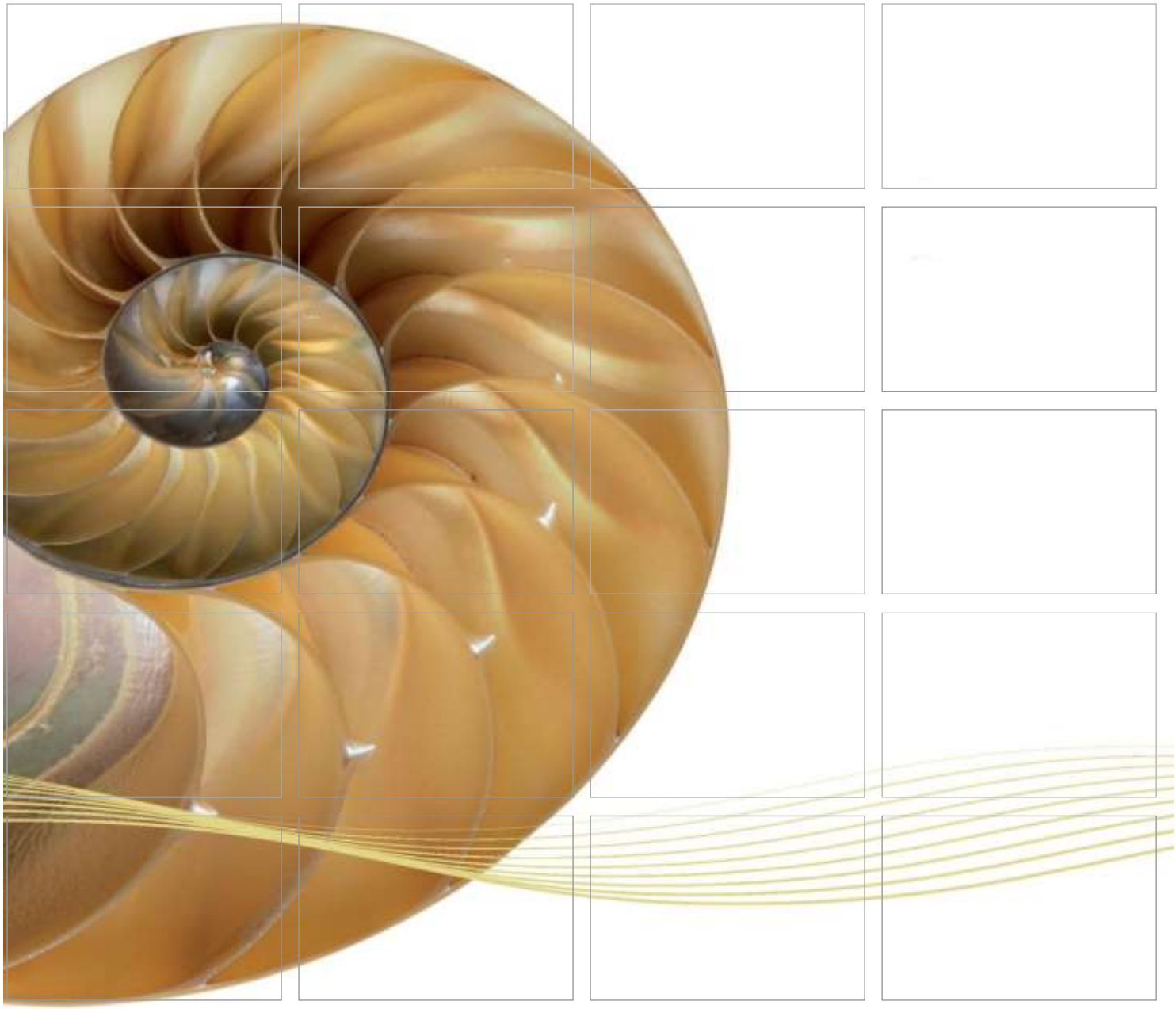
Report



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

Second Annual Environmental Monitoring & Audit (EM&A) Report

07 July 2016

Environmental Resources Management
16/F, Berkshire House
25 Westlands Road
Quarry Bay, Hong Kong
Telephone 2271 3000
Facsimile 2723 5660

www.erm.com

ERM

The business of sustainability

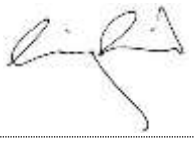
Contract No. HY/2012/07
Tuen Mun – Chek Lap Kok Link – Southern Connection Viaduct Section

Environmental Resources Management

16/F, Berkshire House
25 Westlands Road
Quarry Bay, Hong Kong
Telephone: (852) 2271 3000
Facsimile: (852) 2723 5660
E-mail: post.hk@erm.com
http://www.erm.com

Second Annual Environmental Monitoring & Audit (EM&A) Report

Document Code:
0215660_2nd annual EM&A_20160707.docx

Client: Gammon	Project No: 0215660
Summary: This document presents the Second Annual EM&A Report for Tuen Mun – Chek Lap Kok Link Southern Connection Viaduct Section.	Date: 07 July 2016 Approved by:  *Mr Craig Reid* *Partner* Certified by:  *Mr Jovy Tam* *ET Leader*

Revision	Description	By	Checked	Approved	Date
	2nd Annual EM&A Report	MM	JT	CAR	07/07/16

Distribution

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☒ Public

☐ Confidential

RAMBOLL ENVIRON

Ref.: HYDHZMBEEM00_0_4358L.16 14 July 2016

AECOM By Fax (3691 2899) and By Post
Supervising Officer's Representative's Office
780 Cheung Tung Road, Lantau, N.T.

Attention: Mr. Daniel Ip

Dear Mr. Ip,

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

Contract No. HY/2012/07 TM-CLKL Southern Connection Viaduct Section
Second Annual EM&A Report

Reference is made to the Second Annual Environmental Monitoring and Audit (EM&A) Report (Nov. 2014 – Oct. 2015) (ET's ref.: 0215660_2nd annual EM&A_20160707.docx dated 7 July 2016) certified by the ET Leader and provided to us via e-mail on 13 July 2016.

Please be advised that we have no further comment on the captioned Annual EM&A Report at this stage. However, we would like to draw your attention that the ET shall supplement the Report with respect to the following observation:

1. Detailed review, analysis and evaluation of dolphin monitoring data covering annual period as per sections 1.5.1.6 and 12.9.1.1 (vi) of the EM&A Manual for TM-CLKL with level of details not less than the same part in your submitted quarterly EM&A Report and AFCD's annual marine mammal monitoring reports applicable to the dolphin monitoring.

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

Yours sincerely,

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

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Ramboll Environ Hong Kong Limited 英環香港有限公司
Room 2403, 24/F., Jubilee Centre, 18 Fenwick Street, Wanchai, Hong Kong Tel: 852.3465 2888 Fax: 852.3465 2899
www.Ramboll-Environ.com

RAMBOLL ENVIRON

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

Internal: DY, YH, ENPO Site

TABLE OF CONTENTS

List of Appendices

EXECUTIVE SUMMARY

Under *Contract No. HY/2012/07*, Gammon Construction Limited (GCL) is commissioned by the Highways Department (HyD) to undertake the design and construction of the Southern Connection Viaduct Section of the Tuen Mun – Chek Lap Kok Link Project (TM-CLK Link Project) while AECOM Asia Company Limited was appointed by HyD as the Supervising Officer. For implementation of the environmental monitoring and audit (EM&A) programme under the Contract, ERM-Hong Kong, Limited (ERM) has been appointed as the Environmental Team (ET). Ramboll Environ Hong Kong Ltd. was employed by the HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO) in accordance with *Environmental Permit No. EP-354/2009/A*. Further applications for variation of environmental permit (VEP), *EP-354/2009/B*, *EP-354/2009/C* and *EP-354/2009/D*, were granted on 28 January 2014, 10 December 2014 and 13 March 2015, respectively.

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

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

This is the second annual EM&A report presenting the EM&A works carried out during the period from 1 November 2014 to 31 October 2015 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:

Marine-based Works

- Additional marine ground investigation (GI) and laboratory testing;
- Construction of pile caps;
- Installation of pier head and deck segment;
- Launching gantry assembly;
- Marine piling;
- Marine platform installation and uninstallation; and
- Pier construction.

Land-based Works

- Additional land GI, trial pits & lab testing;
- Channel re-construction at Area 1;
- Construction of pile caps;
- Drainage works;
- Installation of pier head segment;
- Land piling;
- Pier construction;
- Pre-drilling works;
- Re-alignment of Cheung Tung Road;
- Relocation of MTR fence;
- Slope works;
- Tree survey, felling and transplanting; and
- Utility surveys.

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

24-hour TSP monitoring	4 sessions at ASR8
	70 sessions at ASR8A
	64 sessions at ASR9
1-hour TSP monitoring	4 sessions at ASR8
	70 sessions at ASR8A
	64 sessions at ASR9
Noise monitoring	4 sessions at NSR1
	64 sessions at NSR1A
Water quality monitoring	153 sessions
Dolphin monitoring	24 sessions
Joint Environmental site inspection	52 sessions

Breaches of Action and Limit Levels for Air Quality

No exceedance of Action and Limit Levels was recorded for 1-hour or 24-hour 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

One (1) exceedance of Action Level in depth-averaged SS was recorded for impact water quality monitoring in the reporting period. The exceedance was considered not related to the construction works of this Contract upon further investigation.

Impact Dolphin Monitoring

Two (2) Action Level and three (3) Limit Level exceedances were recorded for four (4) sets of quarterly dolphin monitoring data between November 2014 and October 2015. No unacceptable impact from the construction activities of the TM-CLKL Southern Connection Viaduct Section on Indo-Pacific humpback dolphin *Sousa chinensis* (i.e. Chinese White Dolphin) was noticeable from general observations during the dolphin monitoring in this reporting period.

Daily marine mammal exclusion zone monitoring was undertaken during the period of marine works under this Contract. Passive Acoustic Monitoring (PAM) was also implemented for the detection of marine mammal when marine works were carried out outside the daylight hours under this Contract. No sighting of the IChinese White Dolphin was recorded during the exclusion zone monitoring in the reporting period.

Environmental Complaints, Non-compliance & Summons

Two (2) complaints were referred by EPD and followed-up timely in the monitoring period. No non-compliance was observed upon further investigation.

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

Reporting Change

There was no reporting change in this reporting period.

Future Key Issues

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

1 INTRODUCTION

1.1 BACKGROUND

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

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

Under *Contract No. HY/2012/07*, Gammon Construction Limited (GCL) is commissioned by the Highways Department (HyD) to undertake the design and construction of the Southern Connection Viaduct Section of TM-CLKL ("the Contract") while AECOM Asia Company Limited was appointed by HyD as the Supervising Officer. For implementation of the environmental monitoring and audit (EM&A) programme under the Contract, ERM-Hong Kong, Limited (ERM) has been appointed as the Environmental Team (ET). 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*.

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

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

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

1.2 SCOPE OF REPORT

This is the Second Annual 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 November 2014 to 31 October 2015.

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 Ramboll Environ Hong Kong Ltd.)	ENPO Leader	Y.H. Hui	3547 2133	3465 2899
	IEC	F.C. Tsang	3547 2134	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

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

Marine-based Works

大小磨刀
THE BROTHERS

鹿頸灣
LUK KENG BAY

鹿頸村
Luk Keng Tsuen

陰仔灣
YAM TSAI WAN

欣澳灣
YAN O WAN

陰仔
Yam Tsai

打棚埔
Ta Pang Po

欣澳篤
YAN O TUK

Site Office WA5

匙羹洲
TSZ KAN CHAU

東葉坑
Tung Yip Hang

深水角
Sham Shui Kok

四白坳
SZE PAK AU

犁壁山
LAI PIK SHAN

三白坳
SAM PAK AU

大輋峒
TAI CHE TUNG

濾水廠
Water Treatment Works

污水處理廠
Sewage Treatment Works

小蠔灣
SIU HO WAN

三白
Sam Pak

三白灣
SAM PAK WAN

牛頭灣
NGAU TAU WAN

鐵路車廠
Railway Depot

二白坳
YI PAK AU

時峰
Neo Horizon

尚堤
Chianti

津堤
Amalfi

海澄湖畔
Siena

頤峰

大白灣
DISCOVERY BAY
(TAI PAK WAN)

榴花峒
LAU FA TUNG

二白灣
YI PAK WAN

Greenvale Village

明翠台
Parkridge Village

蟹鉗咀
Hai Kam Tsui

蔚陽
Headland Village

愉景灣
Discovery Bay

老虎頭
LO FU TAU

碧濤

畔峰
Midvale Village

Beach Village

大白咀
Tai Pak Tsui

菜園灣
TSOI YUEN WAN

海堤居
La Costa

寶峰
Parkvale Village

大蠔灣
TAI HO WAN

白芒
Pak Mong

大蠔

海蝶居
La Vista

Hillgrove Village

海鄰居
La Serene

N

Kilometers
0 0.5 1

Key
Site Boundary

Figure 1.1

General Layout Plan of the Project

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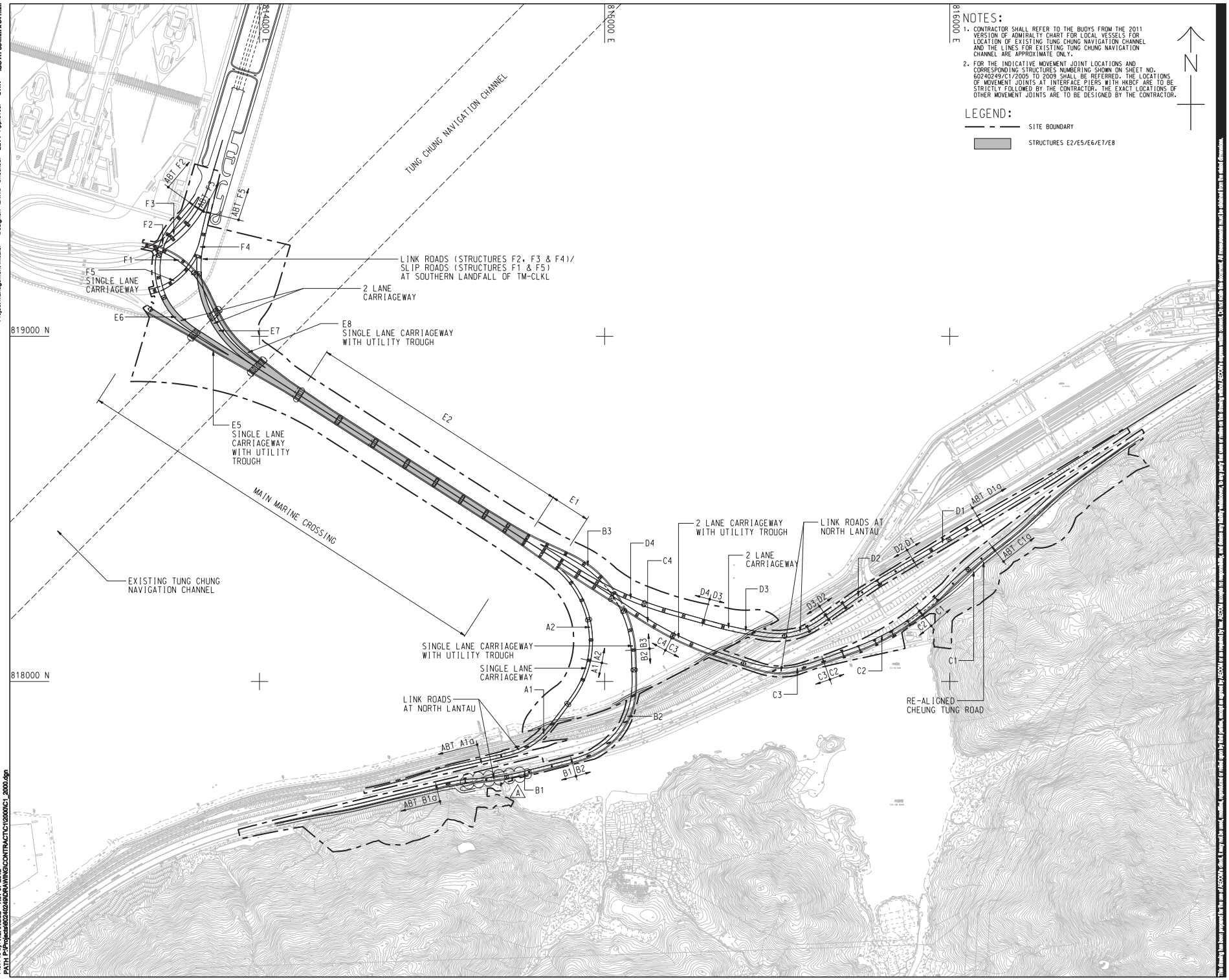
Environmental Resources Management

ERM



AECOM

PROJECT
TUEN MUN - CHEK LAP KOK LINK

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

CLIENT
路政署 HIGHWAYS DEPARTMENT
港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

CONSULTANT
AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS

Figure 1.2a

ISSUE/REVISION

IR	DATE	DESCRIPTION	CHK.
A	NOV. 12	TENDER ADDENDUM NO. 1	CWN
-	OCT. 12	TENDER DRAWING	CWN

STATUS

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DIMENSION UNIT: METRES

KEY PLAN

PROJECT NO.: 60240249
CONTRACT NO.: HY/2012/07

SHEET TITLE
SOUTHERN CONNECTION GENERAL LAYOUT PLAN

SHEET NUMBER
60240249/C1/2000A

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

Plot File by: HUANGC2 Nov-07-2012
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KEY PLAN

NOTES

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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				
C	SUBMISSION	RC	09/13				

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Checked: DS — Approved: DOP
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Client: 路政署 HIGHWAYS DEPARTMENT, Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

Supervising Officer: AECOM

Contractor: Gammon

Originator: ARUP

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

Drawing title: **Figure 1.2b**

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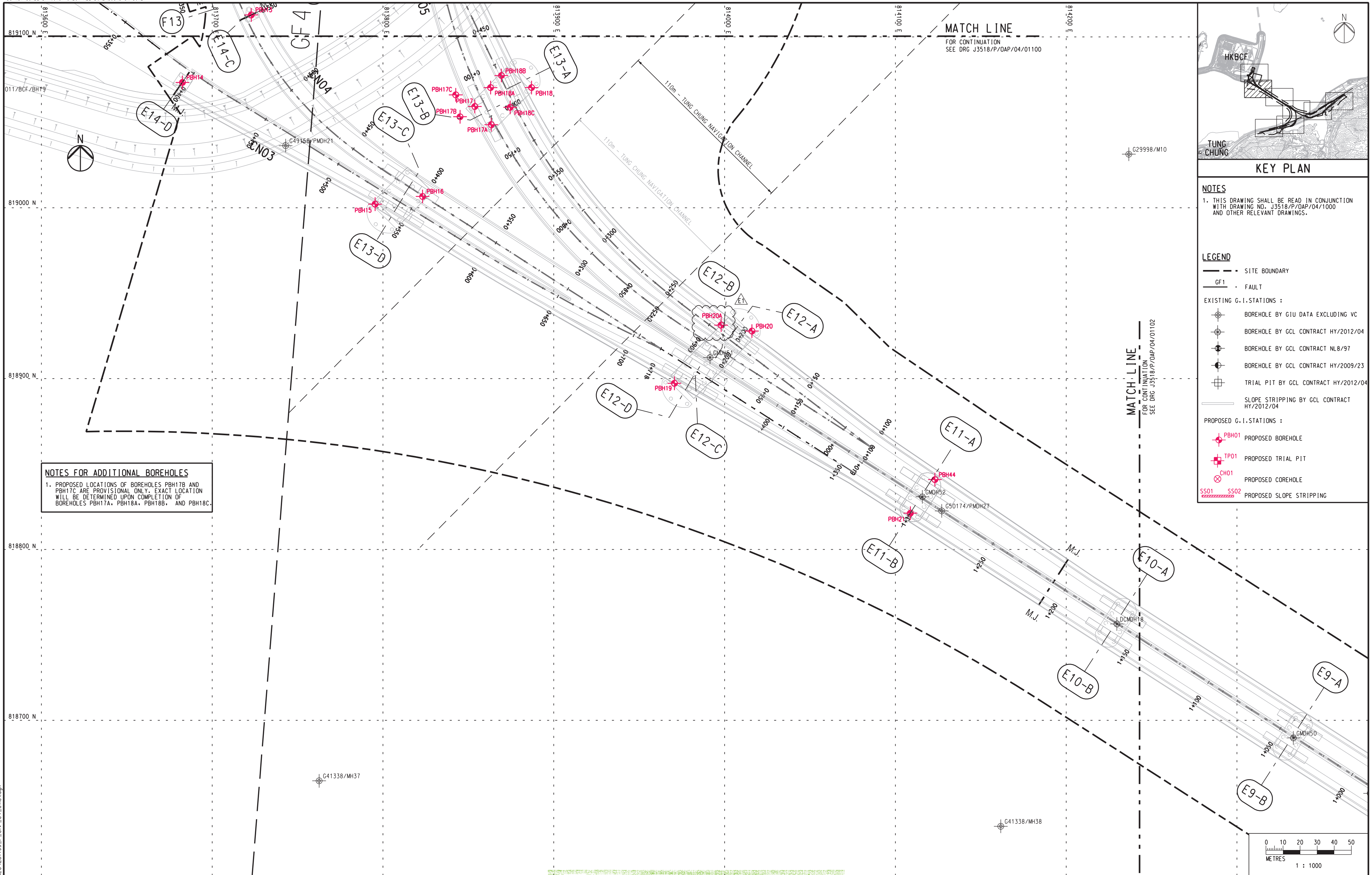

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LEGEND

- SITE BOUNDARY
- GF1 — FAULT

EXISTING G.I.STATIONS :

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

PROPOSED G.I.STATIONS :

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

NOTES FOR ADDITIONAL BOREHOLES

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

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B	SUBMISSION	RC	07/13				
C	SUBMISSION	RC	09/13				
D	SUBMISSION	RC	10/13				
E1	FOR INTERNAL REVIEW	RC	11/13				

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Client: 路政署 HIGHWAYS DEPARTMENT 港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

Supervising Officer: AECOM

Contractor: Gammon

Originator: ARUP

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

Drawing title:

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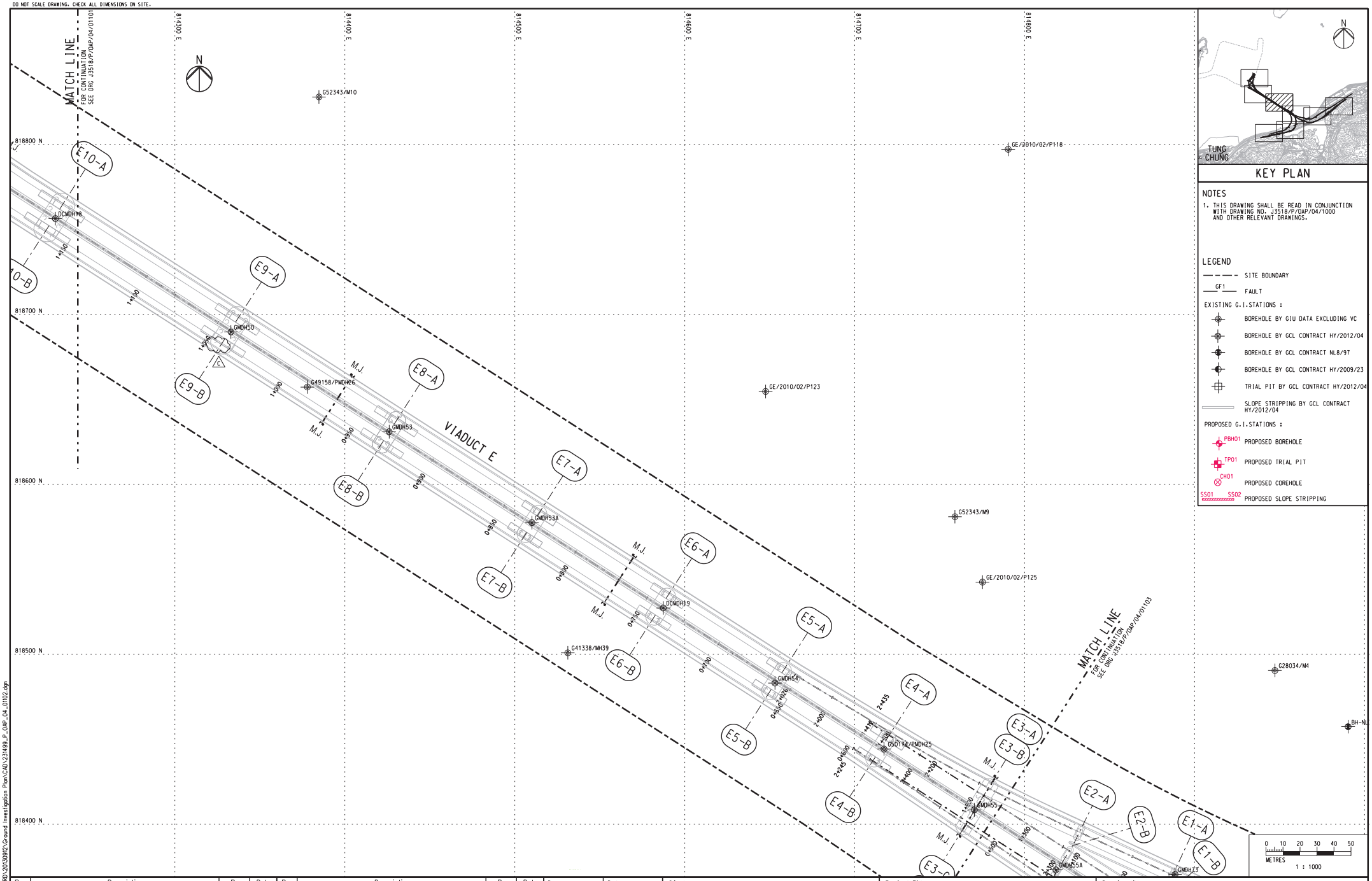

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Client: 路政署 HIGHWAYS DEPARTMENT 港珠澳大橋香港工程管理處 Hong Kong-Zhuhai-Macao Bridge Hong Kong Project Management Office

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

Supervising Officer: AECOM
Contractor: Gammon
Originator: ARUP

Drawing title: **Figure 1.2d**

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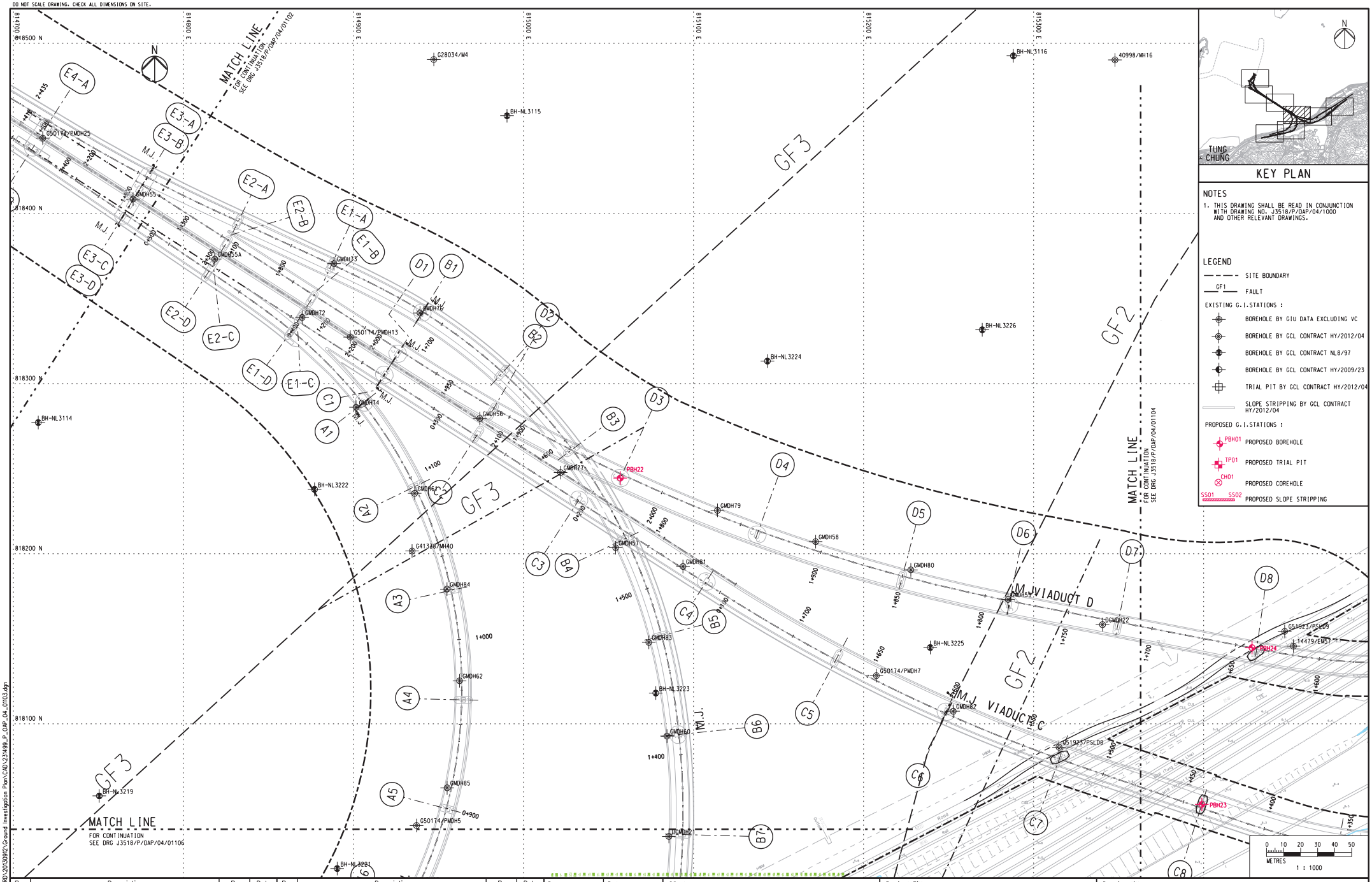

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C	SUBMISSION	RC	09/13				

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Client: 路政署 HIGHWAYS DEPARTMENT 港珠澳大橋香港工程管理處 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

Supervising Officer: AECOM
Contractor: Gammon
Originator: ARUP

Drawing title: **Figure 1.2e**

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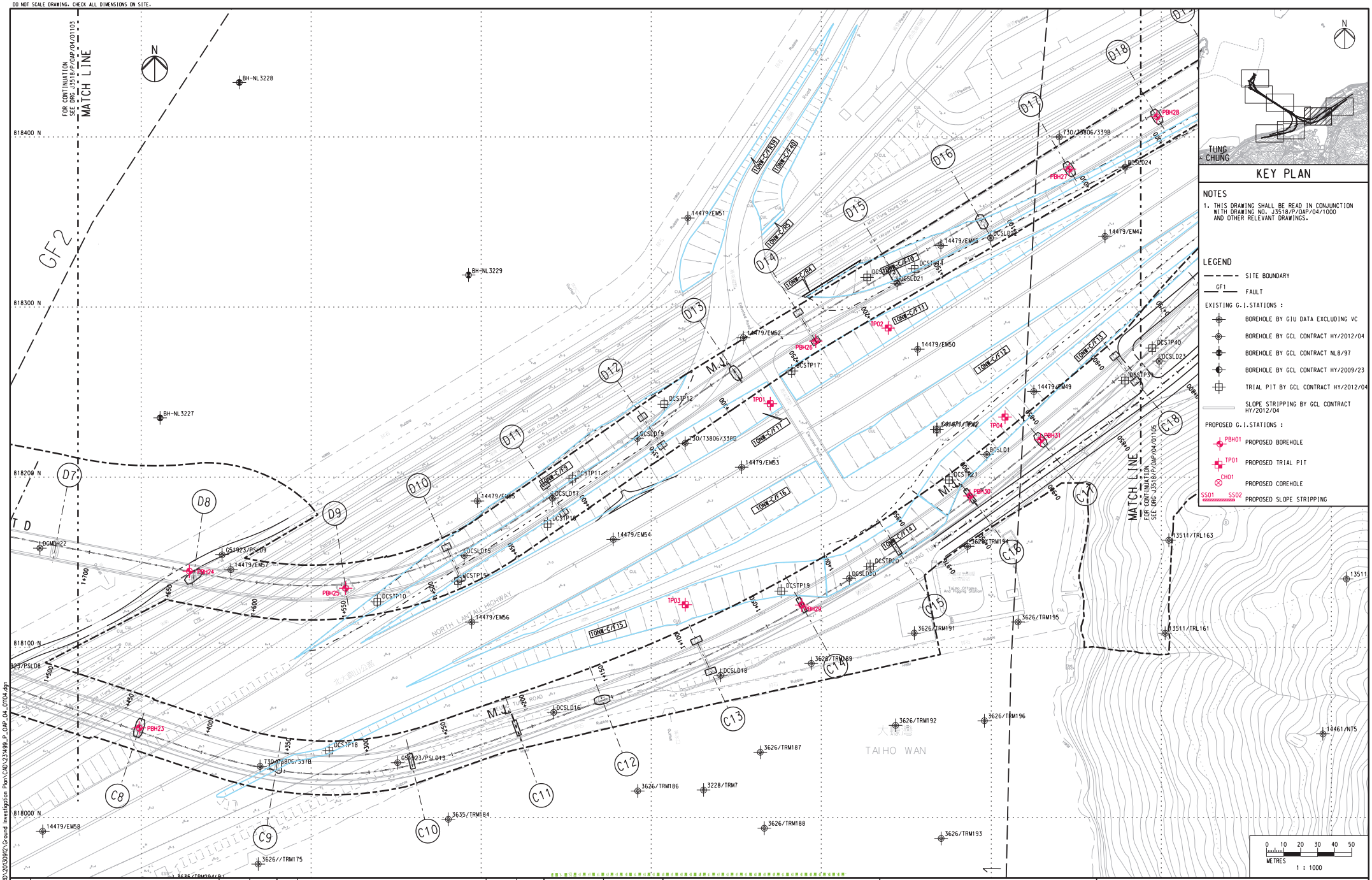

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Date	07/13
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Approved	DOP
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Client: 路政署 HIGHWAYS DEPARTMENT 港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

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

Supervising Officer: AECOM

Contractor: Gammon

Originator: ARUP

Drawing title: **Figure 1.2f**

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

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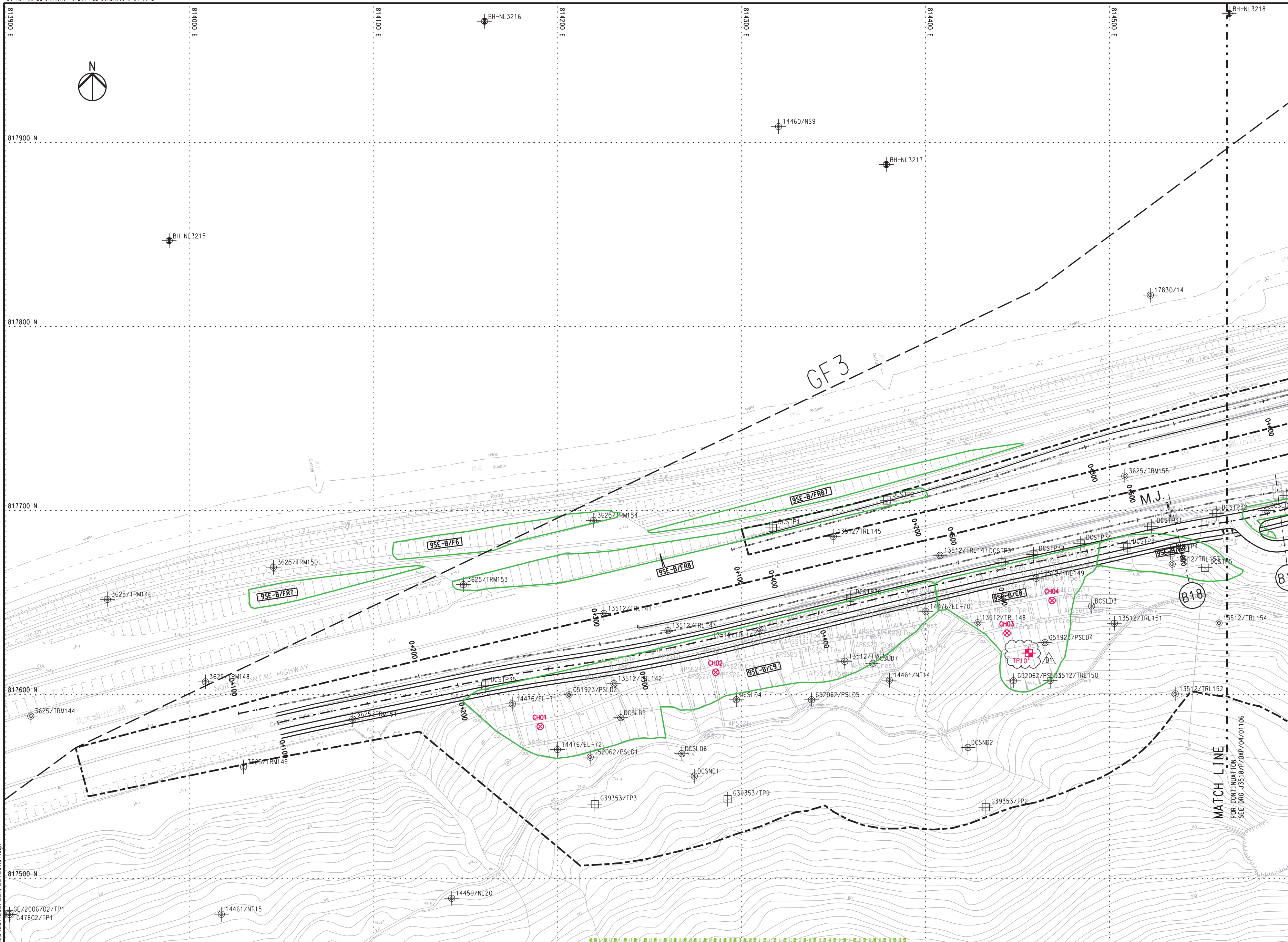

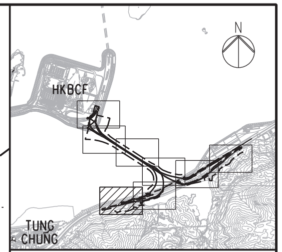

KEY PLAN

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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

Rev	Description	By	Date
A	SUBMISSION	RC	07/13
B	SUBMISSION	RC	07/13
C	SUBMISSION	RC	09/13
D1	FOR INTERNAL REVIEW	RC	11/13

Drawn: RL | Date: 07/13
Checked: DS | Approved: 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處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

Supervising Officer: AECOM
Contractor: Gammon
Originator: ARUP

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

Drawing title:

Figure 1.2g

Drawing no. J3518/P/OAP/04/01107 Rev. D1

Printed by : 07/11/2013
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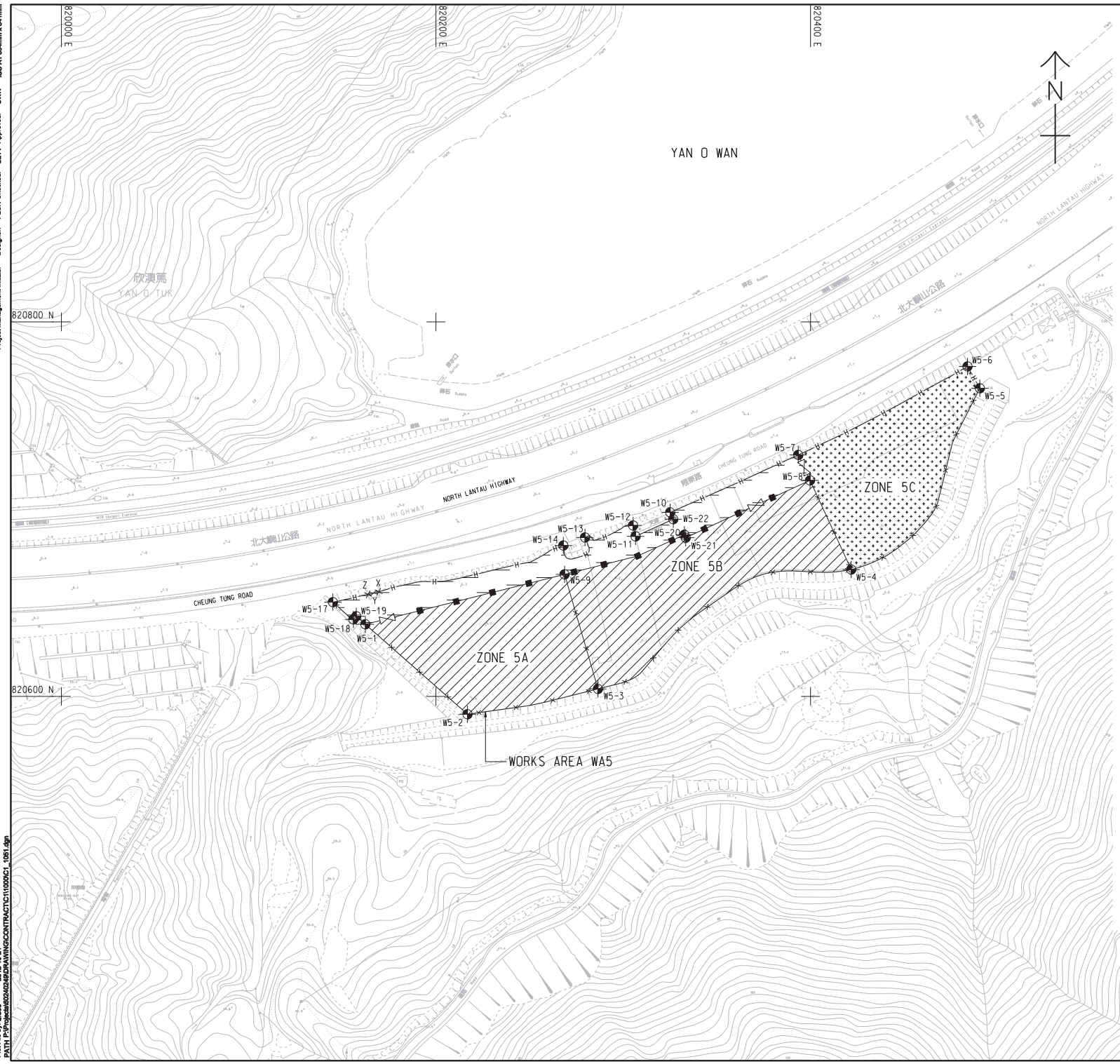

NOTES:

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. TIS 619. 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. H6110 AND H6111 FOR DETAILS OF HOARDING.
5. REFER TO HIGHWAYS DEPARTMENT STANDARD DRAWING NOS. H6121 AND H6122 FOR DETAILS OF CHAIN LINK FENCE.
6. REFER TO HIGHWAYS DEPARTMENT STANDARD DRAWING NO. H6121 FOR DETAILS OF GATE.
7. 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.
8. THE LOCATION AND WIDTH OF GATE SHOWN ARE INDICATIVE ONLY AND SHALL BE CONFIRMED BY THE SUPERVISING OFFICER.
9. 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.
10. THE TENTATIVE OCCUPATION PERIOD SHALL BE REFERRED TO EMPLOYER'S REQUIREMENTS PART 2 AND PART 14 SECTION 1 CLAUSE 1.45A.
11. 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.
12. THE COMMON AREA SHALL BE CONCRETE PAVED BY THE CONTRACTOR.

LEGEND:

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

SETTING OUT COORDINATES OF WORKS AREA WA5

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

AECOM

PROJECT
TUEN MUN - CHEK LAP KOK LINK

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

CLIENT
HIGHWAYS DEPARTMENT
路政署
Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

CONSULTANT
AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS

ISSUE/REVISION

VR	DATE	DESCRIPTION	CHK.
-	OCT. 12	TENDER DRAWING	CWN

STATUS

SCALE: A1 1 : 1000
DIMENSION UNIT: METRES

KEY PLAN

Figure 1.2h

PROJECT NO.: 60240249
CONTRACT NO.: HY/2012/07

SHEET TITLE
WORKS AREA AND HOARDING PLAN

SHEET 1 OF 2

SHEET NUMBER
60240249/C1/1051

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

Plot File by: LIUJ3 2012-10-24
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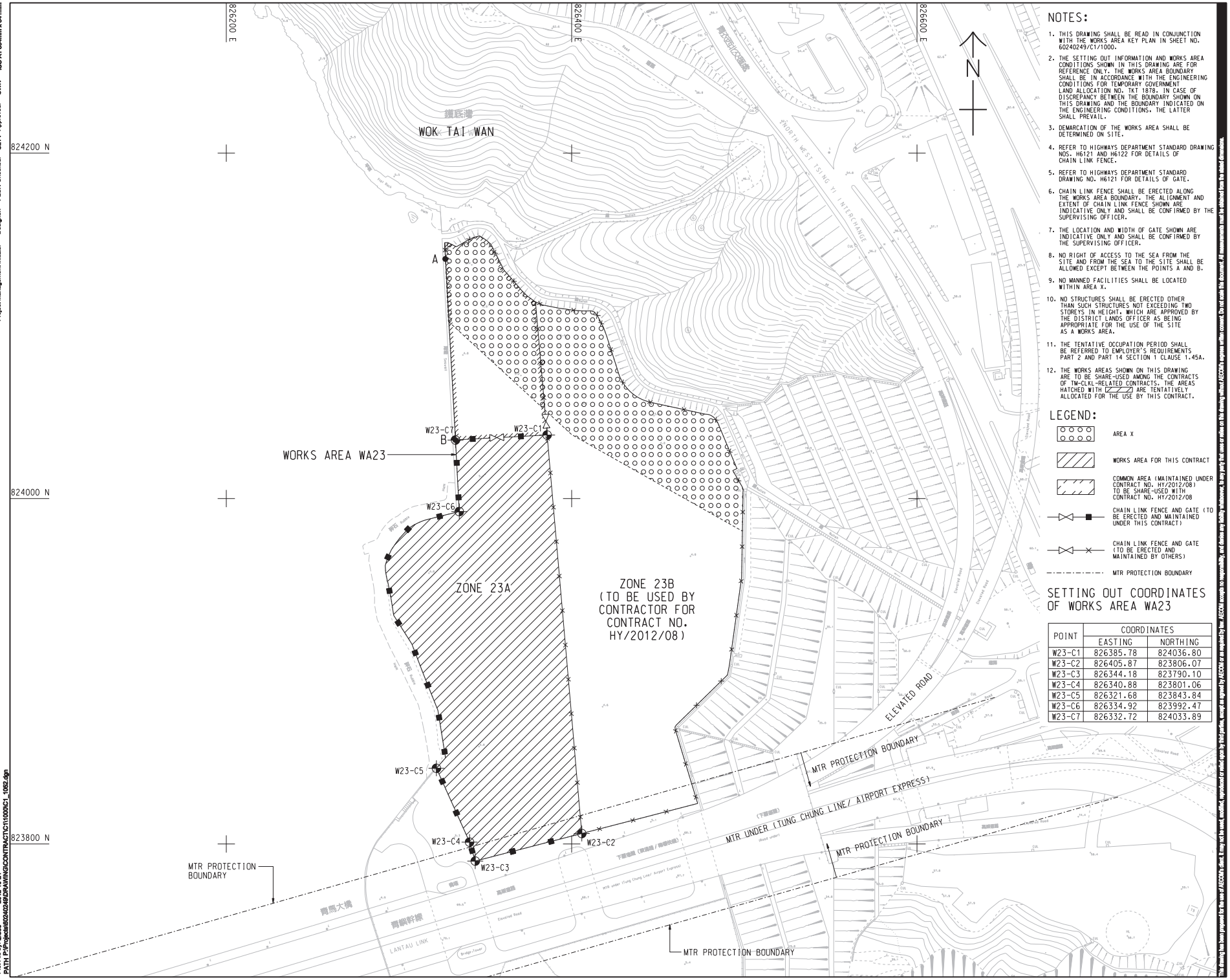

NOTES:

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 WORKS AREA WA23

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

AECOM

PROJECT
TUEN MUN - CHEK LAP KOK LINK

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

CLIENT
HIGHWAYS DEPARTMENT
Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

CONSULTANT
AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS

ISSUE/REVISION

VR	DATE	DESCRIPTION	CHK.
-	OCT. 12	TENDER DRAWING	CWN

STATUS

SCALE: A1 1 : 1000
DIMENSION UNIT: METRES

KEY PLAN

Figure 1.2i

PROJECT NO.: 60240249
CONTRACT NO.: HY/2012/07

SHEET TITLE
WORKS AREA AND HOARDING PLAN

SHEET 2 OF 2

SHEET NUMBER
60240249/C1/1052

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

Plot File by: LIUJ3 2012-10-24
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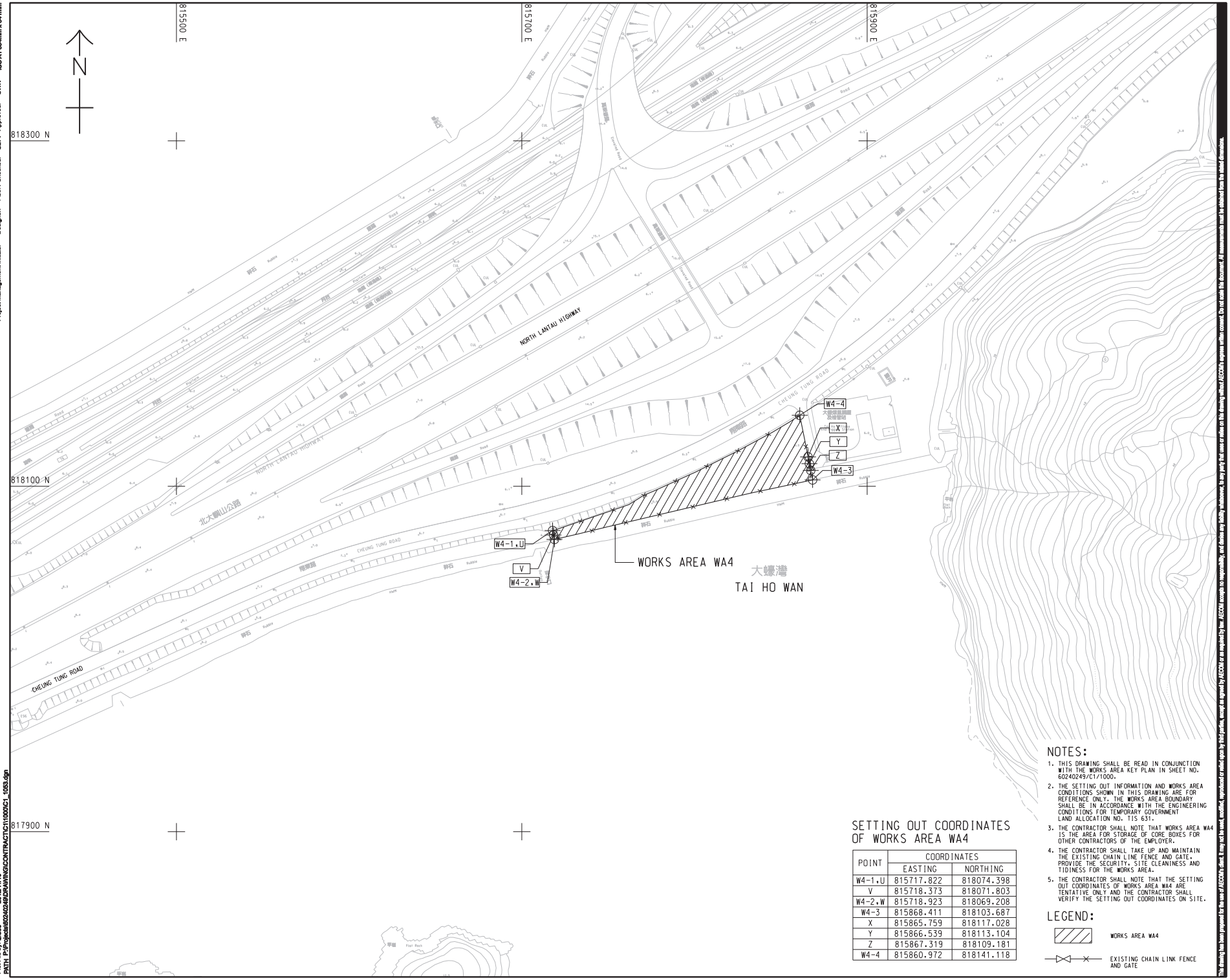


SETTING OUT COORDINATES OF WORKS AREA WA4

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

NOTES:

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. TIS 631.
3. THE CONTRACTOR SHALL NOTE THAT WORKS AREA WA4 IS THE AREA FOR STORAGE OF CORE BOXES FOR OTHER CONTRACTORS OF THE EMPLOYER.
4. THE CONTRACTOR SHALL TAKE UP AND MAINTAIN THE EXISTING CHAIN LINE FENCE AND GATE. PROVIDE THE SECURITY, SITE CLEANINESS AND TIDINESS FOR THE WORKS AREA.
5. THE CONTRACTOR SHALL NOTE THAT THE SETTING OUT COORDINATES OF WORKS AREA WA4 ARE TENTATIVE ONLY AND THE CONTRACTOR SHALL VERIFY THE SETTING OUT COORDINATES ON SITE.

LEGEND:

WORKS AREA WA4

EXISTING CHAIN LINK FENCE AND GATE

AECOM

PROJECT
TUEN MUN - CHEK LAP KOK LINK

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

CLIENT
HIGHWAYS DEPARTMENT
Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office

CONSULTANT
AECOM Asia Company Ltd.
www.aecom.com

SUB-CONSULTANTS

Figure 1.2j

ISSUE/REVISION

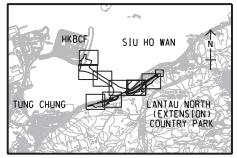
VR	DATE	DESCRIPTION	CHK.
-	NOV. 12	TENDER ADDENDUM NO. 1	CWN

STATUS

SCALE: A1 1 : 1000

DIMENSION UNIT: METRES

KEY PLAN



PROJECT NO.: 60240249

CONTRACT NO.: HY/2012/07

SHEET TITLE
WORKS AREA WA4

SHEET NUMBER
60240249/C1/1053

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

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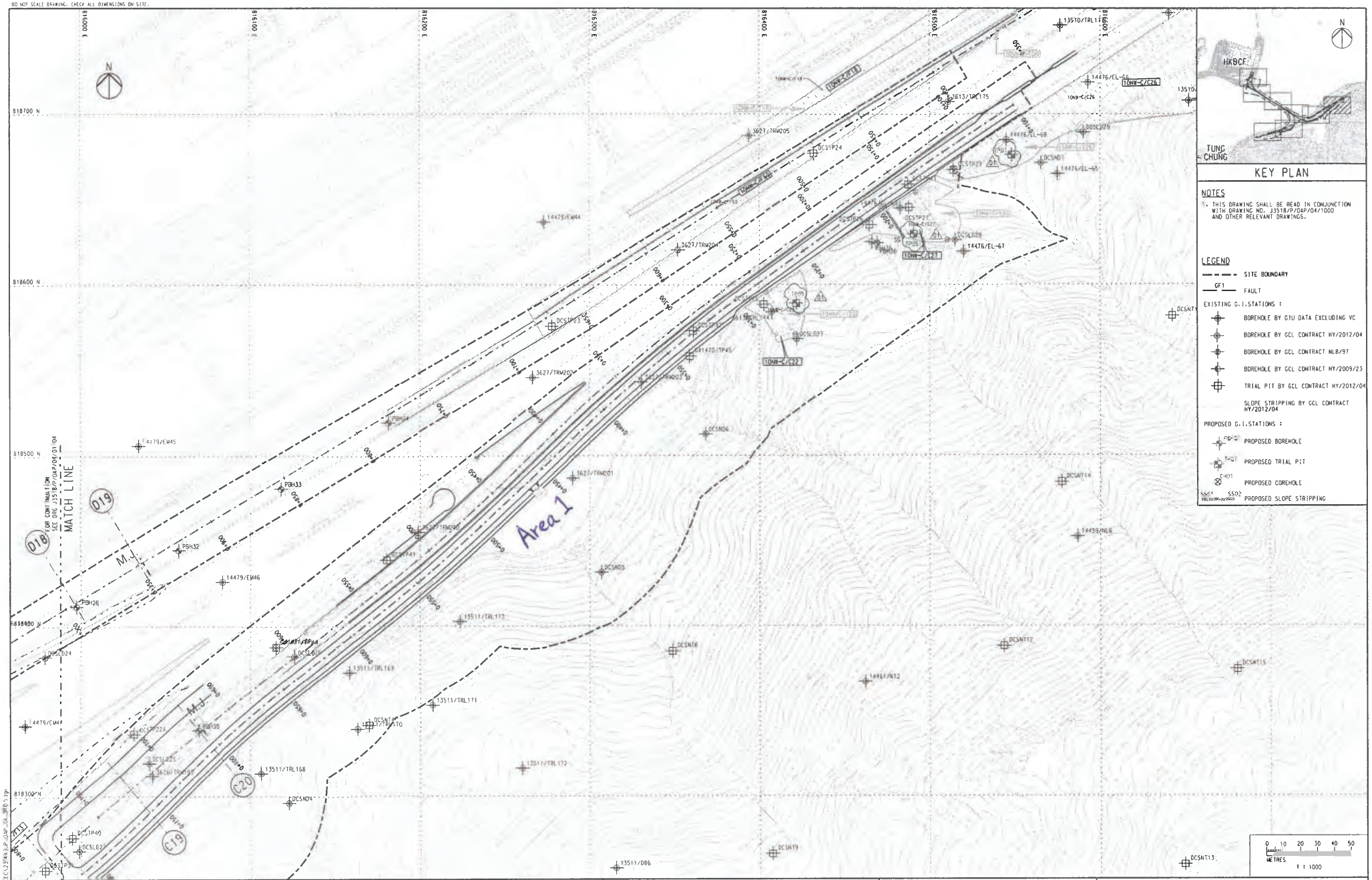

Rev.	Description	By	Date	Rev.	Description	By	Date
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B	[illegible]	RL	07/13				
C	[illegible]	RL	09/13				
D1	ETA INTERNAL REVIEW	RL	10/13				

Drawn: RL	Date: 07/13
Checked: DS	Approved: 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處 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

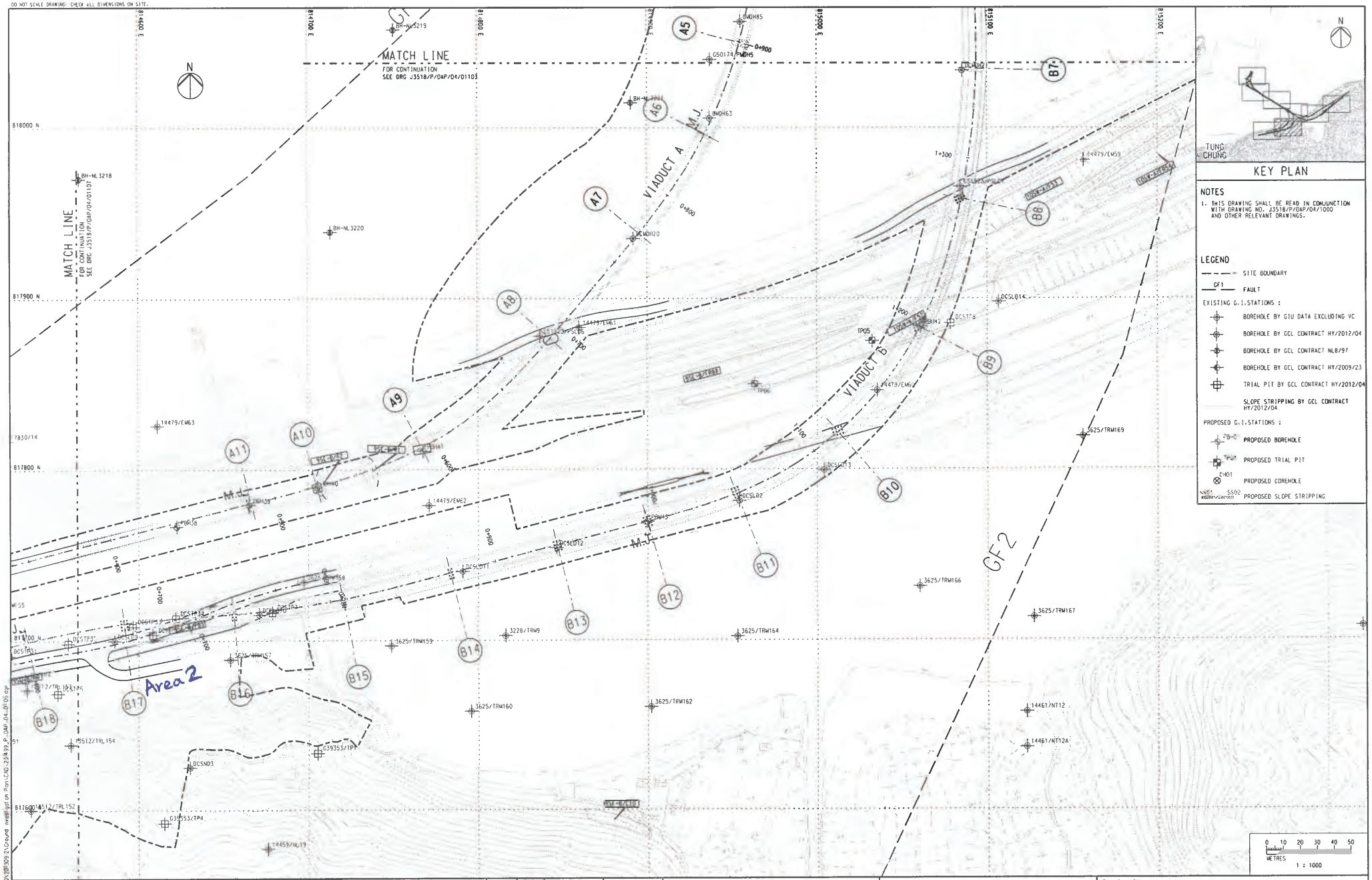
Supervising Officer: AECOM

Contractor: Gammon

Originator: ARUP

Drawing title: **Figure 1.2k**

Drawing no. J3518/P/OAP/04/01105 Rev. D1



Rev	Description	By	Date
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B	[illegible]	RC	07/13
C	[illegible]	RC	09/13

Drawn	RL
Date	07/13
Checked	DS
Approved	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處 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

Supervising Officer: AECOM

Contractor: Gammon

Originator: ARUP

Drawing title: **Figure 1.2I**

Drawing no. J3518/P/OAP/04/01106 Rev C

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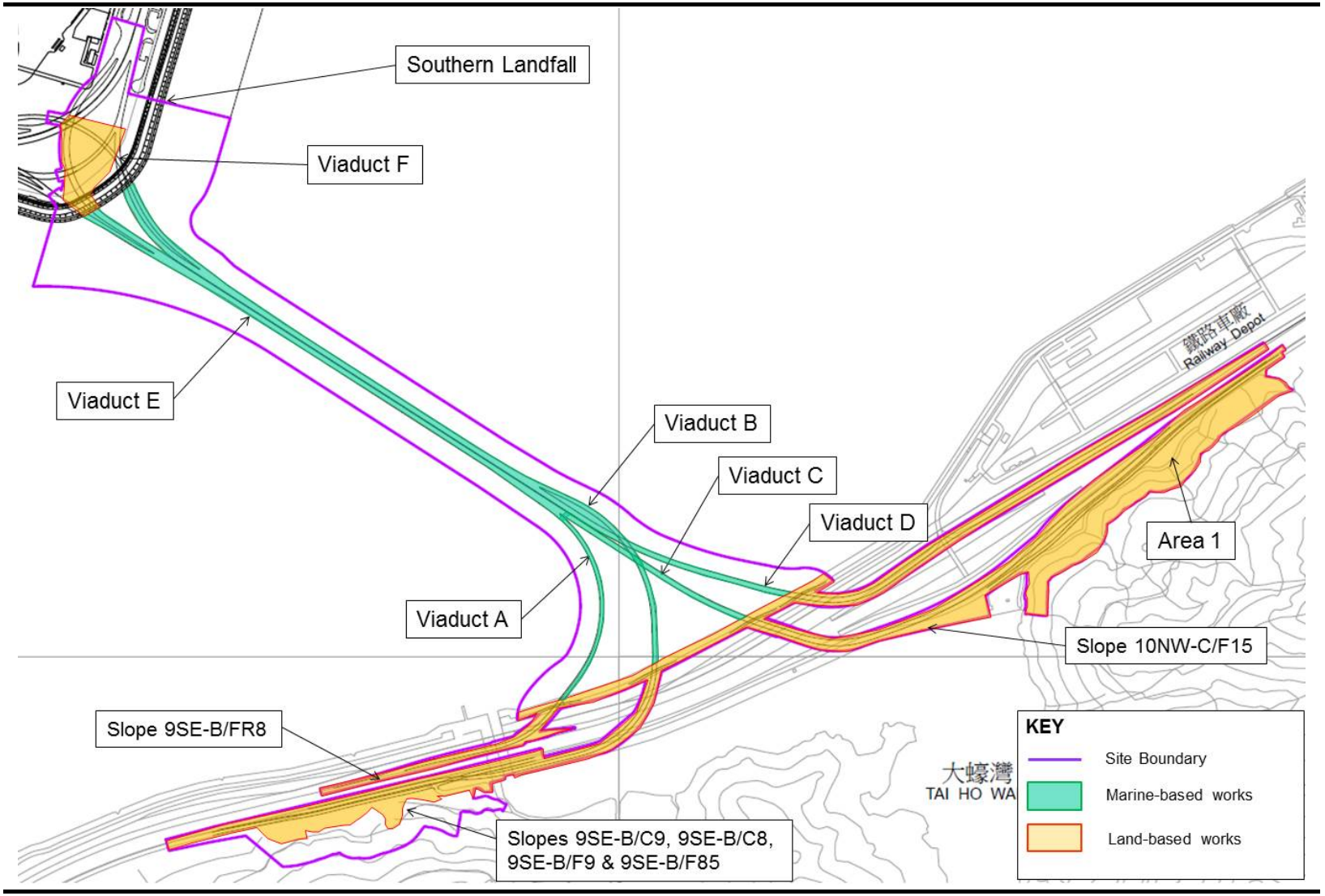
- Additional marine ground investigation (GI) and laboratory testing;
- Construction of pile caps;
- Installation of pier head and deck segment;
- Launching gantry assembly;
- Marine piling;
- Marine platform installation and uninstallation; and
- Pier construction.

Land-based Works

- Additional land GI, trial pits & lab testing;
- Channel re-construction at Area 1;
- Construction of pile caps;
- Drainage works;
- Installation of pier head segment;
- Land piling;
- Pier construction;
- Pre-drilling works;
- Re-alignment of Cheung Tung Road;
- Relocation of MTR fence;
- Slope works;
- Tree survey, felling and transplanting; and
- Utility surveys.

The locations of the construction activities are shown in *Figure 1.3*. The Environmental Sensitive Receivers in the vicinity of the Project are shown in *Figure 1.4*. The environmental mitigation measures implementation schedule is presented in *Appendix B*.

Figure 1.3 Locations of Construction Activities in the Reporting Period



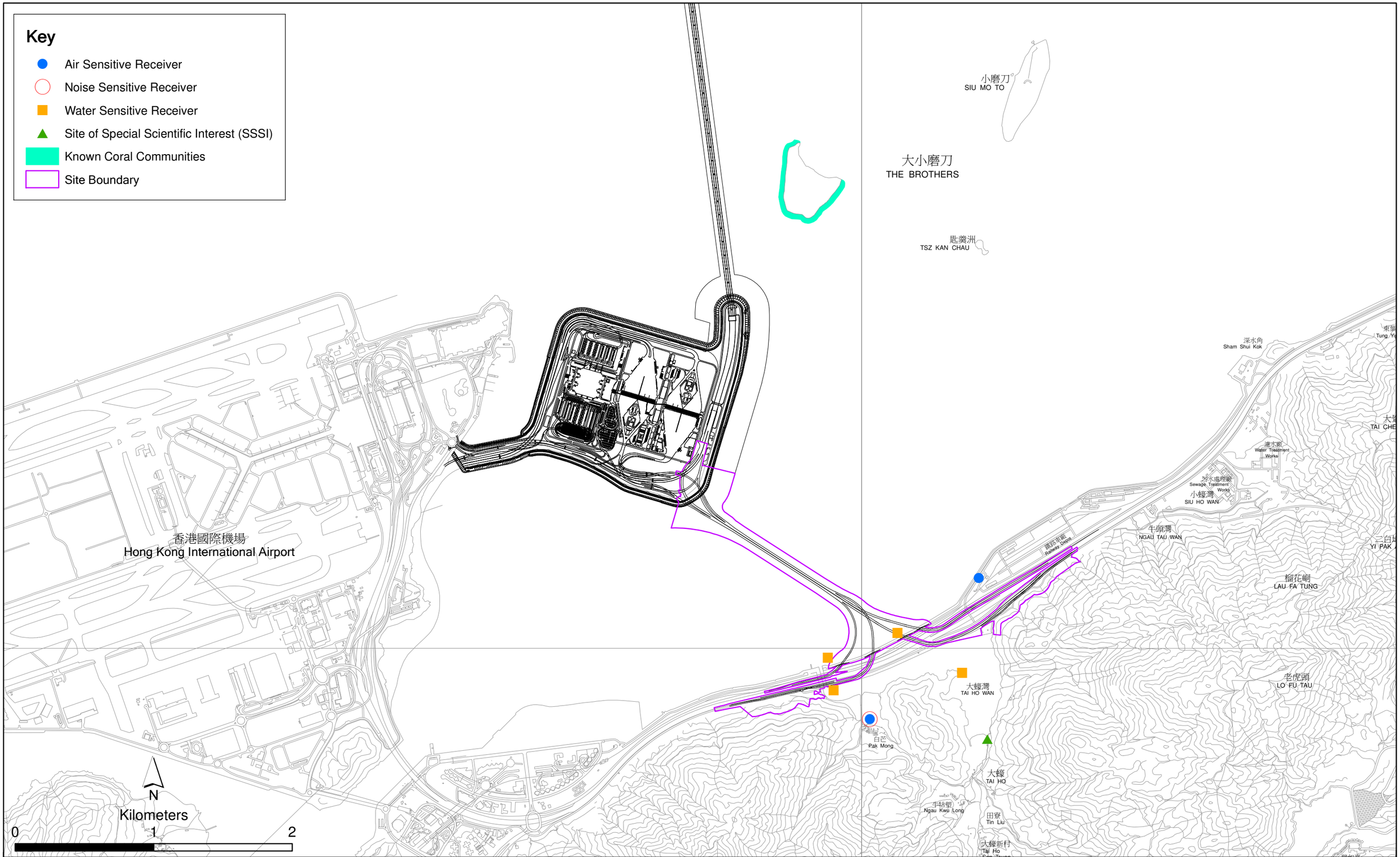


Figure 1.4

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

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Date: 18/5/2015

Environmental Resources Management

ERM

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;
- Action and Limit levels for all environmental parameters;
- Event Action Plan;
- Tested environmental impact hypotheses;
- Environmental mitigation measures, as recommended in the approved EIA Report; and
- Environmental requirement in contract documents.

2 *EM&A RESULTS*

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 included the two monitoring stations ASR9A and ASR9C for this Project[1] . Thus, the baseline monitoring results and Action/ Limit Level presented in HKZMB Baseline Monitoring Report [2] are adopted for this Project.

2.1.1 Monitoring Requirements and Equipment

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

Since authorization of getting access into Siu Ho Wan MTRC Depot was not granted for the impact monitoring of the EM&A programme, air quality monitoring stations ASR9A and ASR9C in Siu Ho Wan MTRC Depot proposed in Updated EM&A Manual were relocated to air quality monitoring stations ASR8A (Area 4) and ASR8 (rooftop of Pak Mong), respectively, in November 2013. The wind sensor at ASR9A was relocated to ASR8 at the same time. Due to the rejection of access to Pak Mong Village, monitoring

[1]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.

data of 1-hour TSP and 24-hour TSP at ASR 8 and meteorological data were not collected on 26 November and 2 December 2014. *The Proposal of Alternative Dust and Noise Monitoring Stations* [1] was submitted to EPD on 2 December 2014, in which the HVS at ASR 8 was proposed to be relocated to entrance of MTR Depot (ASR9) and the wind sensor was proposed to be relocated to ASR 8A in accordance with the requirements of the Updated EM&A Manual. The proposal was subsequently approved on 4 December 2014**.** Same baseline and Action/Limit 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 monitoring locations (*Figure 2.1*; *Table 2.1*).

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

The wind sensor was setup 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 [1]	Monitoring Period	Location	Description	Parameters & Frequency
ASR8A	From 1 November 2014 to 31 October 2015	Area 4	On ground at the Area 4	• 1-hour Total Suspended Particulates (1-hour TSP, µg/m^3), 3 times per day every 6 days
ASR8	From 1 November 2014 to 2 December 2014	Pak Mong Village Watch Tower	Rooftop of the premise	• 24-hour Total Suspended Particulates (24-hour TSP, µg/m^3), daily for 24-hour every 6 days

[1] The *Proposal of Alternative Dust and Noise Monitoring Stations* with the agreement letter from IEC and SOR was submitted to EPD on 2 December 2014, and subsequently replied with no objection on 4 December 2014.

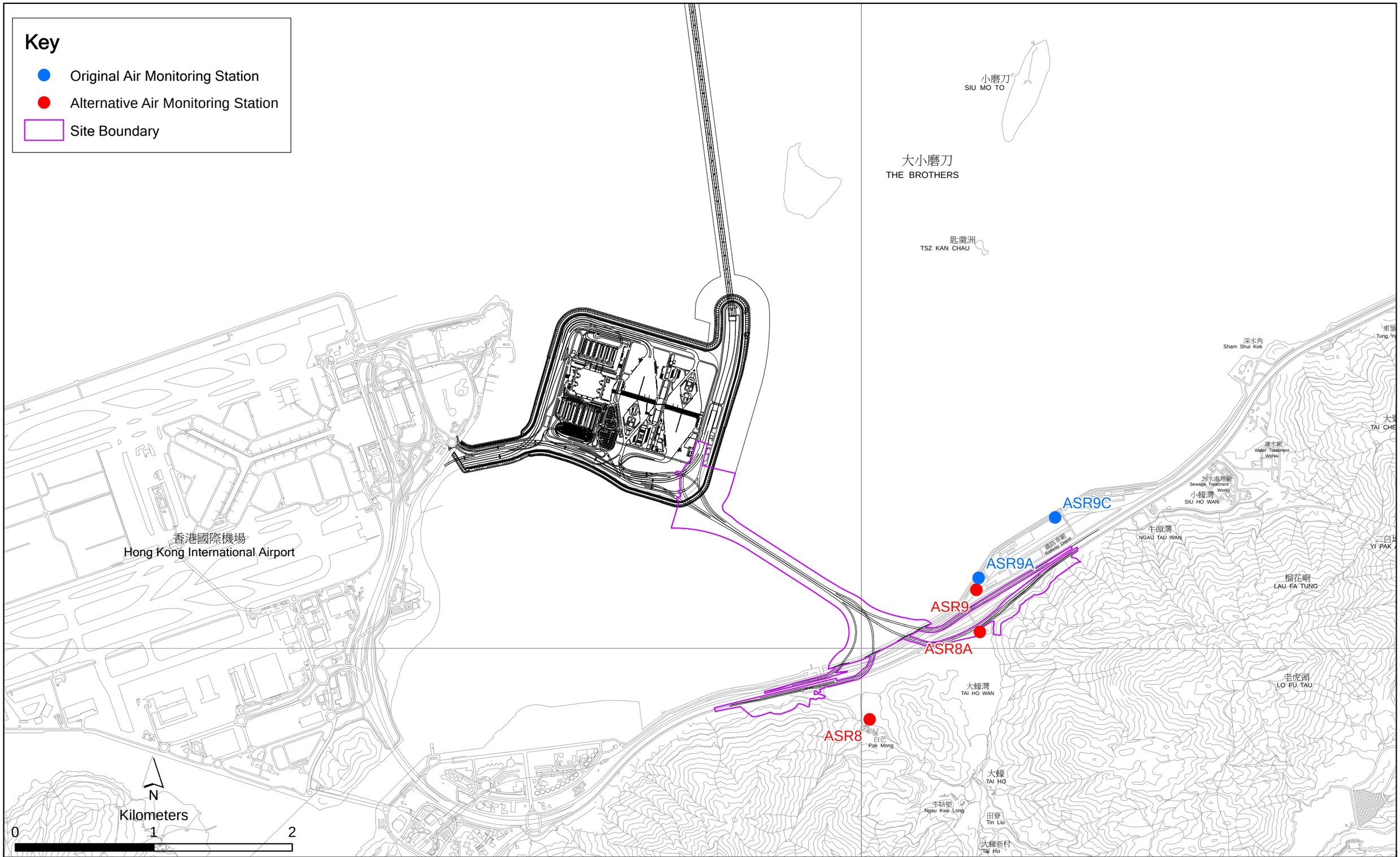

Figure 2.1

Locations of Air Quality Monitoring Stations

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Date: 15/6/2016

Environmental Resources Management

ERM

Monitoring Station (1)	Monitoring Period	Location	Description	Parameters & Frequency
ASR9	From 3 December 2014 to 31 October 2015	Entrance of MTRC Depot	On ground at the entrance	

Note:

(1) Air Quality Monitoring Station ASR8 at Pak Mong Village was relocated to ASR9 at the entrance of MTRC Depot since December 2014.

Table 2.2 Air Quality Monitoring Equipment

Equipment	Brand and Model
High Volume Sampler (1-hour TSP and 24-hour TSP)	Tisch Environmental Mass Flow Controlled Total Suspended Particulate (TSP) High Volume Sampler (Model No. TE-5170)
Wind Sensor	Global Water (Wind Speed Sensor: WE550; Wind Direction Sensor: WE570)
Wind Anemometer for calibration	Lutron (Model No. AM-4201)

2.1.2 Action & Limit Levels

The Action and Limit Levels of the air quality monitoring are provided in *Appendix C*. The Event Action Plan is presented in *Appendix H*.

2.1.3 Monitoring Schedule for the Reporting Period

The schedules for air quality monitoring in the reporting period were presented in the approved *Thirteenth to Twenty-fourth Monthly EM&A Reports*. TSP monitoring at ASR8 was suspended on 26 November and 2 December 2014 due to rejection of access to the monitoring station.

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 D*. The detailed monitoring result and meteorological information were reported in the *Thirteenth to Twenty-fourth Monthly EM&A Reports*.

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

Month	Station	Average (μg/m³)	Range (μg/m³)	Action Level (μg/m³)	Limit Level (μg/m³)
Nov 2014	ASR 8A	88	56 - 152	394	500
	ASR 8	106	54 - 235	393	500
Dec 2014	ASR 8A	122	63 - 298	394	500
	ASR 9	137	96 - 232	393	500
Jan 2015	ASR 8A	109	73 - 176	394	500
	ASR 9	148	77 - 217	393	500
Feb 2015	ASR 8A	118	68 - 211	394	500
	ASR 9	132	68 - 241	393	500
Mar 2015	ASR 8A	88	58 - 156	394	500
	ASR 9	109	60 - 235	393	500
Apr 2015	ASR 8A	86	59 - 124	394	500
	ASR 9	112	59 - 217	393	500
May 2015	ASR 8A	64	49 - 149	394	500
	ASR 9	77	53 - 119	393	500
Jun 2015	ASR 8A	59	41 - 95	394	500
	ASR 9	71	48 - 119	393	500
Jul 2015	ASR 8A	63	41 - 139	394	500
	ASR 9	73	41 - 116	393	500
Aug 2015	ASR 8A	88	58 - 148	394	500
	ASR 9	104	60 - 165	393	500
Sept 2015	ASR 8A	86	43 - 188	394	500
	ASR 9	86	58 - 173	393	500
Oct 2015	ASR 8A	74	43 - 145	394	500
	ASR 9	84	45 - 172	393	500

Note:
Monitoring station ASR 8 was relocated to ASR9 since December 2014.

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

Month	Station	Average (μg/m³)	Range (μg/m³)	Action Level (μg/m³)	Limit Level (μg/m³)
Nov 2014	ASR 8A	63	46 - 83	178	260
	ASR 8	69	56 - 80	178	260
Dec 2014	ASR 8A	75	63 - 99	178	260
	ASR 9	98	68 - 133	178	260
Jan 2015	ASR 8A	76	57 - 99	178	260
	ASR 9	97	64 - 123	178	260
Feb 2015	ASR 8A	72	54 – 104	178	260
	ASR 9	89	51 – 117	178	260
Mar 2015	ASR 8A	57	43 – 76	178	260
	ASR 9	77	54 – 101	178	260
Apr 2015	ASR 8A	56	50 - 60	178	260
	ASR 9	65	56 – 72	178	260
May 2015	ASR 8A	48	43 – 52	178	260
	ASR 9	56	46 – 71	178	260
Jun 2015	ASR 8A	45	42 – 47	178	260
	ASR 9	47	45 – 49	178	260
Jul 2015	ASR 8A	51	44 – 75	178	260
	ASR 9	56	47 – 89	178	260
Aug 2015	ASR 8A	61	48 – 85	178	260
	ASR 9	68	51 – 101	178	260

Month	Station	Average (μg/m³)	Range (μg/m³)	Action Level (μg/m³)	Limit Level (μg/m³)
Sept 2015	ASR 8A	59	46 – 91	178	260
	ASR 9	60	50 – 73	178	260
Oct 2015	ASR 8A	59	43 - 82	178	260
	ASR 9	71	41 - 112	178	260

Note:
Monitoring station ASR 8 was relocated to ASR9 since December 2014.

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

For the impact air quality monitoring, a total of 70 events at ASR8A, 64 events at ASR9 and four (4) events at ASR8, were undertaken in the reporting period. Neither Action nor Limit Level exceedance was recorded for 1-hour TSP and 24-hour TSP monitoring, thus no action was required to be taken in accordance with the Event Action Plan.

As shown in *Table 2.5*, the annual average 1-hour TSP and 24-hour TSP levels in the reporting period were lower than the corresponding average baseline levels at all monitoring stations.

In order to determine any significant air quality impacts caused by construction activities from this Contract, One-way ANOVA (with α set at 0.05) was conducted to examine any significant difference in average TSP levels between the impact monitoring in this reporting period and the baseline monitoring before commencement of construction activities. For 1-hour TSP at both stations and 24-hour TSP at ASR8A, the levels of the reporting period were significantly lower than the baseline levels at both monitoring stations (1-hour TSP at ASR8A: $F_{1, 250} = 229$, $p < 0.01$ and 1-hour TSP at ASR8 / ASR9: $F_{1, 244} = 153$, $p < 0.01$; 24-hour TSP at ASR8A: $F_{1, 82}$, $p < 0.01$). There was no significant difference in 24-hour TSP levels at ASR8 /ASR9 between baseline and impact monitoring ($F_{1, 80} = 0.27$, $p = 0.60$).

Table 2.5 ***Summary of Average Levels of TSP Level of Baseline Monitoring and Reporting Period (in μg/m³)***

Monitoring Station	Average Baseline Monitoring	Average Impact Monitoring
ASR8/ASR9 (1-hour TSP)	220	103

Monitoring Station	Average Baseline Monitoring	Average Impact Monitoring
ASR8/ASR9 (24-hour TSP)	74	71
ASR8A (1-hour TSP)	222	87
ASR8A (24-hour TSP)	74	60

In addition, linear regression was conducted to examine any relationship between TSP levels and time (i.e. number of days after construction works commencement) during this yearly monitoring period at each monitoring station. Linear regression analysis makes assumptions of equal variance and normal distribution of data. Therefore, the significance level of the test was set at 1 % (i.e. $p = 0.01$) to reduce the chance of committing a Type 1 error. If a significant regression relationship was found between TSP level and time (i.e. $p < 0.01$), r^2 value from the analysis would be further assessed. This value represents the proportion of the total variation in the dependent variable (i.e. TSP level) that is accounted for by the fitted regression line and is referred to as the coefficient of determination. An r^2 value of 1 indicates a perfect relationship (or fit) whereas a value of 0 indicates that there is no relationship (or no fit) between the dependent and independent variables. As there are no specific criteria to indicate how meaningful an r^2 value is, for the purposes of this EM&A programme a value of 0.60 was adopted to indicate a meaningful regression. If $r^2 < 0.60$ then it was considered that there was a weak relationship between TSP level and time or none at all. If the regression analysis indicated $r^2 > 0.60$ then it had been interpreted that there was in fact a strong relationship between the dependent and independent variables (i.e. a strong temporal trend of increasing / decreasing TSP level with time).

As shown in *Table 2.6*, results of the regression analysis indicated that there was no significant ($r^2 < 0.60$) relationship between TSP level and time during this yearly monitoring period. As such, it is considered that there is no apparent trend of increasing / decreasing TSP level since commencement of constructions works.

Table 2.6 Linear Regression Result of TSP Monitoring

Parameter	Station	R^2	F-ratio	p-value	Intercept	Coefficient
1-hour TSP	ASR8A	0.101	23.5	<0.001	151	-0.116
	ASR8 / ASR9C	0.178	43.7	<0.001	200	-0.175
24-hour TSP	ASR8A	0.126	9.8	0.003	89	-0.052
	ASR8 / ASR9C	0.191	15.6	<0.001	124	-0.096

Note:

1. Dependent variable is set as TSP levels (in μg/m3) and independent variable is set as number of day of construction works.

2. R^2 values of insignificant regression model are underlined.

3. By setting α at 0.01, insignificant intercepts and coefficients are underlined

2.2 NOISE MONITORING

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

2.2.1 Monitoring Requirements and Equipment

In accordance with the Updated EM&A Manual, impact noise monitoring should be conducted once per week during the construction phase of the Contract at NSR1.

Monitoring location was setup at NSR1 in accordance with the Updated EM&A Manual. Due to rejection of access to Pak Mong Village, *the Proposal*

[1] 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

of Alternative Dust and Noise Monitoring Stations [1] was submitted to EPD on 2 December 2014, in which noise monitoring at NSR1 was proposed to be relocated to Entrance of Pak Mong Village (NSR1A) in accordance with the requirements of the Updated EM&A Manual. The proposal was subsequently approved on 4 December 2014**.** Same baseline and Action/Limit Level for noise monitoring from NSR1 are applied. *Figure 2.2* shows the locations of the monitoring station. *Table 2.7* describes the details of the monitoring station and parameters.

Noise monitoring was performed by sound level meter in compliance with the International Electrotechnical Commission Publications (IEC) 651:1979 (Type 1) and 804:1985 (Type 1) specifications at each designated monitoring station. Noise monitoring equipment is summarized in *Table 2.8.*

Table 2.7 Location of Impact Noise Monitoring Station and Monitoring Dates in this Reporting Period

Monitoring Station	Monitoring Period	Location	Parameters & Frequency
NSR1	From 1 November to 3 December 2014	Pak Mong Village Watch Tower	• 30-mins measurement at each monitoring station between 0700 and 1900 on normal weekdays (Monday to Saturday). L_{eq}, L_{10} and L_{90} would be recorded. • At least once a week
NSR1A	From 4 December 2014 to 31 October 2015	Entrance of Pak Mong Village	

Table 2.8 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 C*. The Event Action Plan is presented in *Appendix H*.

[1] The *Proposal of Alternative Dust and Noise Monitoring Stations* with the agreement letter from IEC and SOR was submitted to EPD on 2 December 2014, and subsequently replied with no objection on 4 December 2014.

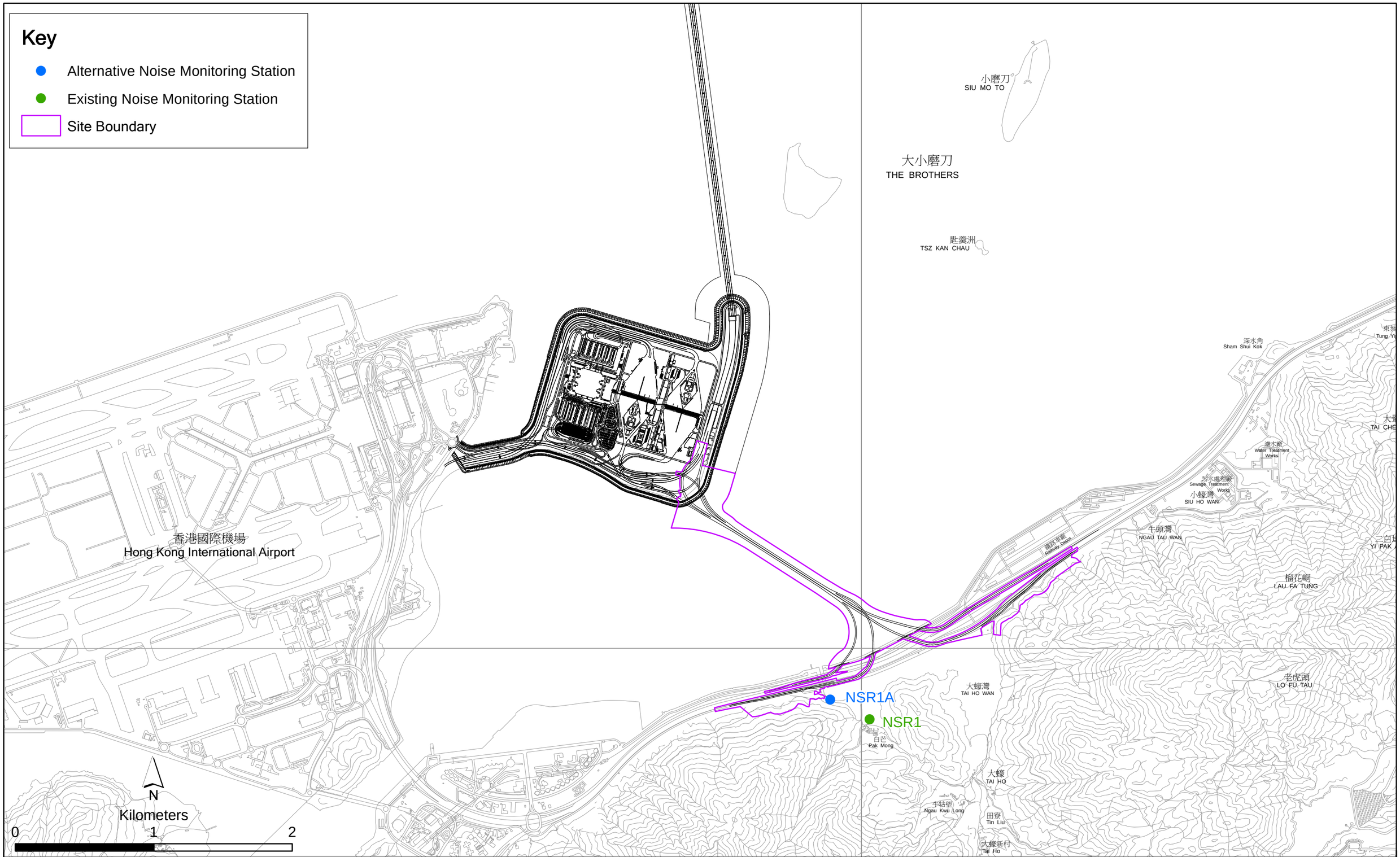

Figure 2.2

Locations of Noise Monitoring Stations

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Date: 15/6/2016

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2.2.3 *Monitoring Schedule for the Reporting Period*

The schedules for noise monitoring in the reporting period are provided in the *Thirteenth* to *Twenty-fourth Monthly EM&A Reports*. Since access to NSR1 was rejected, monitoring on 26 November and 2 December 2014 were cancelled.

2.2.4 *Results and Observations*

The monitoring results for noise monitoring are summarized in *Table 2.9*. Monitoring results are presented graphically in *Appendix E.* Detailed impact noise monitoring results are reported in the *Thirteenth* to *Twenty-fourth Monthly EM&A Reports*.

Table 2.9 Summary of Construction Noise Monitoring Results at NSR1/NSR1A in the Reporting Period

Month	Average , dB(A), L_{eq} (30mins)	Range, dB(A), L_{eq} (30mins)	Limit Level, dB(A), L_{eq} (30mins)
Nov 2014	58	57 – 59	75
Dec 2014	62	61 – 62	75
Jan 2015	61	59 – 62	75
Feb 2015	60	56 – 61	75
Mar 2015	60	57 – 61	75
Apr 2015	60	57 – 61	75
May 2015	60	57 – 61	75
Jun 2015	59	58 - 60	75
Jul 2015	60	53 - 61	75
Aug 2015	58	57 - 60	75
Sep 2015	59	58 - 59	75
Oct 2015	58	57 - 60	75

Note:
NSR1 was relocated to NSR1A since December 2014.

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

A total of sixty-eight (68) 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.

In order to determine any significant noise impacts caused by construction activities from this Contract, One-way ANOVA (with α set at 0.05) was conducted to examine any significant difference in average noise levels

between the impact monitoring in this reporting period and the baseline monitoring before commencement of construction activities. Difference of noise level between reporting and baseline monitoring periods was significant ($F_{1, 353} = 101$, $p < 0.01$), in which the annual-averaged noise level in the reporting period was slightly higher than average baseline level (statistically average results of baseline and reporting periods were 56dB(A) and 59dB(A) respectively). However, all monitoring results in the reporting period complied with the Action/Limit Levels.

In addition, linear regression was conducted to examine any relationship between noise levels and time (i.e. number of days after construction works commencement) during this yearly monitoring period. The method of data interpretation followed the same method as indicated in *Section 2.1.4* for TSP monitoring. As shown in *Table 2.10*, results of the regression analysis indicated that there was no significant ($r^2 < 0.60$) relationship between noise level and time during this yearly monitoring period. As such, it is considered that there is no apparent trend of increasing / decreasing noise level since commencement of constructions works. The ET will keep track on the future noise monitoring results during construction phase.

Table 2.10 Linear Regression Result of Noise Monitoring

Parameter	Station	R^2	F-ratio	p-value	Intercept	Coefficient
$L_{eq\ 30min}$	NSR1 / NSR1A	<u>0.187</u>	14.5	<0.001	63	-0.007

Note:

1. Dependent variable is set as Leq 30min (in dB(A)) and independent variable is set as number of day of construction works.

2. R^2 values of insignificant regression model are underlined.

3. By setting α at 0.01, insignificant intercepts and coefficients are underlined

2.3 WATER QUALITY MONITORING

The baseline water quality monitoring undertaken by the HKZMB Projects between 6 and 31 October 2011 included all monitoring stations except SR4a for the Project. Thus, the baseline monitoring results except for station SR4a

and Action/Limit Level presented in HKZMB Baseline Monitoring Report [1] are adopted for this Project. Baseline water quality monitoring was conducted at station SR4a from 29 August to 24 September 2013.

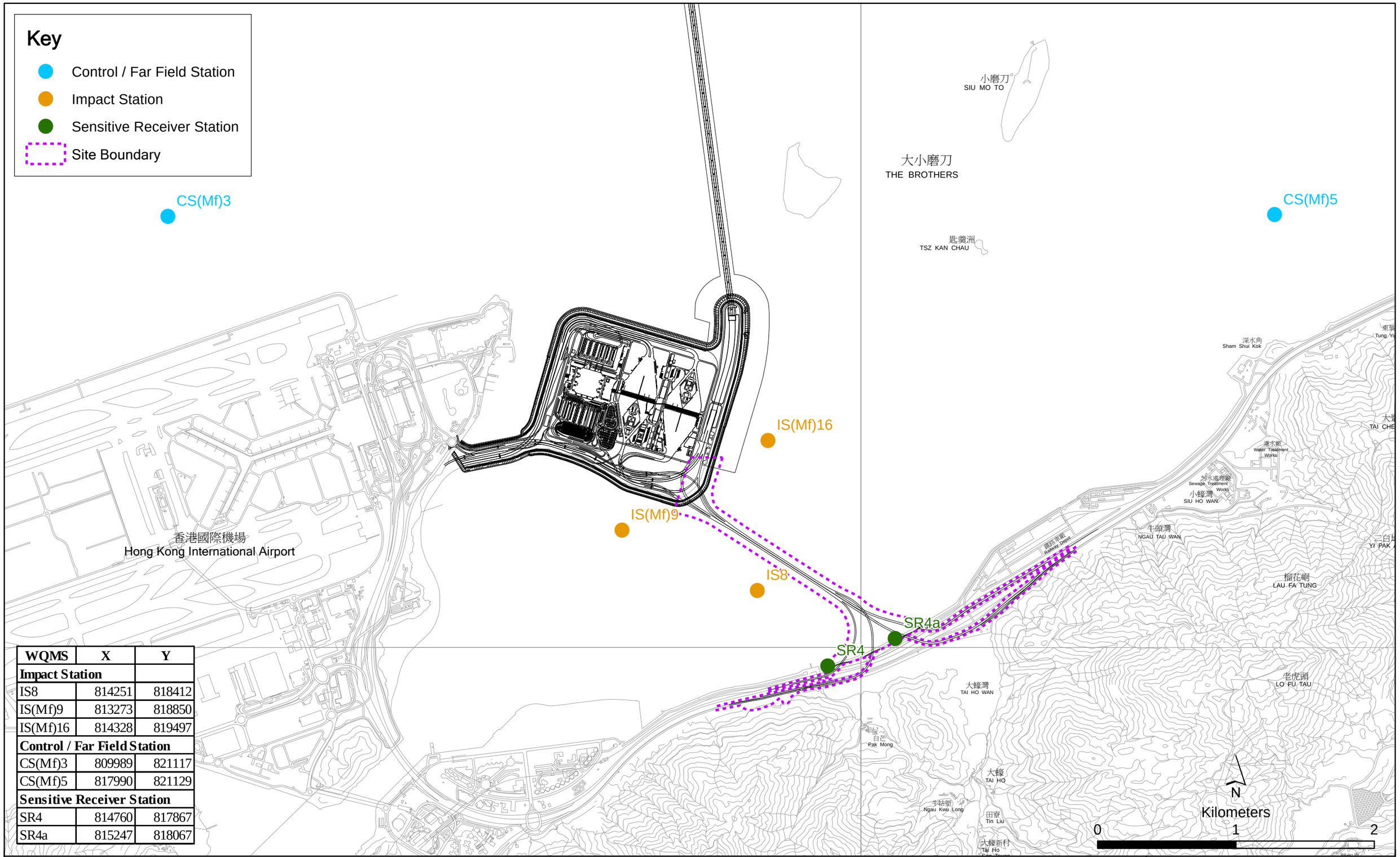
2.3.1 Monitoring Requirements and Equipment

Impact water quality monitoring was carried out to ensure that any deterioration of water quality was detected, and that timely action could be taken to rectify the situation. Impact water quality monitoring was undertaken three days per week during the construction period at seven water quality monitoring stations in accordance with the Updated EM&A Manual (*Figure 2.3*; *Table 2.11*).

Table 2.11 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	• Temperature(°C) • pH(pH unit) • Turbidity (NTU) • Water depth (m) • Salinity (ppt) • Dissolved Oxygen (DO) (mg/L and % of saturation) • Suspended Solid (SS) (mg/L)	3 water depths: 1m below sea surface, mid-depth and 1m above sea bed. If the water depth is less than 3m, mid-depth sampling only. If water depth less than 6m, mid-depth may be	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			
IS8	Impact Station(Close to HKBCF construction site)	814251	818412			

[1] 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.



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

Figure 2.3

Locations of Water Quality Monitoring Stations

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Date: 6/12/2013

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Station ID	Type	Coordinates		*Parameters, unit	Depth	Frequency
		Easting	Northing			
SR4	Sensitive receiver (Tai Ho Inlet)	814760	817867		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 2.12 summarizes the equipment used in the impact water quality monitoring programme.

Table 2.12 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 Levels of the water quality monitoring are provided in *Appendix C*.

2.3.3 *Monitoring Schedule for the Reporting Period*

The schedules for water quality monitoring in the reporting period are provided in the *Thirteenth* to *Twenty-fourth Monthly EM&A Reports*. Water quality monitoring on 19 and 21 February 2015 were cancelled due to suspension of marine works. Water quality monitoring on 7 July and 3 October 2015 were cancelled due to adverse weather.

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 F*. Detailed impact water quality monitoring results were reported in the *Thirteenth* to *Twenty-fourth Monthly EM&A Reports*.

In this reporting period, a total of 153 monitoring events were undertaken. One (1) depth-averaged SS Action Level exceedance was recorded on 19 May 2015. The corresponding *Notification of Exceedance* and investigation report were presented in *Appendix N* of the *Nineteenth Monthly EM&A Report*. Upon investigation, the exceedance was considered not related to this Contract and thus no action is required to be undertaken in accordance with the Event Action Plan presented in *Appendix H*.

In order to determine any significant water quality impacts caused by construction activities from this Contract, One-way ANOVA (with α set at 0.05) was conducted to examine any significant difference in average DO, Turbidity and SS levels between the impact monitoring in this reporting period and the baseline monitoring before commencement of construction activities. The annual average levels of DO, Turbidity and SS are presented in *Tables 2.13 to 2.15* and the statistical results are presented in *Tables 2.16* to *2.18*.

In the reporting period, most of the annual average DO levels during both mid-ebb and mid-flood tides at all depth of the impact monitoring stations were significantly higher than corresponding average baseline levels (see *Table 2.16*). For turbidity, there was no significant difference (i.e. $p<0.05$) between the results in the reporting period and baseline monitoring. For SS,

significant differences were only detected at stations IS(Mf)16 during mid-flood tide and SR4a during both mid-ebb and mid-flood tides. In general, DO, turbidity and SS levels varied across sampling months (see *Appendix F*) and these variations were, however, not consistent throughout the reporting period.

Table 2.13 ***Summary of Annual Means of DO Level of Baseline Monitoring and Reporting Period (in mg/L)***

Tide	Station	Depth	Annual mean of DO of baseline monitoring	Annual mean of DO of reporting period
Mid-ebb	IS(Mf)16	Surface	6.3	6.8
	IS(Mf)9	Surface	6.6	6.8
	IS8	Surface	6.4	6.8
	SR4	Surface	6.1	6.8
	SR4a	Surface	5.5	6.8
Mid-flood	IS(Mf)16	Surface	6.3	6.9
	IS(Mf)9	Surface	6.5	6.9
	IS8	Surface	6.4	6.9
	SR4	Surface	6.3	6.9
	SR4a	Surface	5.5	6.9
Mid-ebb	IS(Mf)16	Middle	6.3	6.7
Mid-flood	IS(Mf)16	Middle	6.1	6.8
Mid-ebb	IS(Mf)16	Bottom	5.9	6.5
	IS(Mf)9	Bottom	6.6	6.7
	IS8	Bottom	6.2	6.7
	SR4	Bottom	6.0	6.7
	SR4a	Bottom	5.3	6.7
Mid-flood	IS(Mf)16	Bottom	6.0	6.6
	IS(Mf)9	Bottom	6.7	6.7
	IS8	Bottom	6.3	6.8
	SR4	Bottom	6.2	6.7
	SR4a	Bottom	5.2	6.8

Table 2.14 Summary of Annual Means of Depth-averaged Turbidity Level of Baseline Monitoring and Reporting Period (in NTU)

Station	Station	Annual mean of depth-averaged turbidity of baseline monitoring	Annual mean of depth-averaged turbidity of reporting period
Mid-ebb	IS(Mf)16	8.9	10.5
	IS(Mf)9	8.2	10.4
	IS8	8.4	10.4
	SR4	8.9	10.4
	SR4a	8.9	10.3
Mid-flood	IS(Mf)16	11.3	10.1
	IS(Mf)9	10.2	10.1
	IS8	11.9	10.1
	SR4	10.3	10.2
	SR4a	7.8	10.0

Table 2.15 Summary of Annual Means of Depth-averaged SS Level of Baseline Monitoring and Reporting Period (in mg/L)

Station	Station	Annual mean of depth-averaged SS of baseline monitoring	Annual mean of depth-averaged SS of reporting period
Mid-ebb	IS(Mf)16	11.3	14.3
	IS(Mf)9	10.9	14.1
	IS8	11.3	14.2
	SR4	11.1	14.2
	SR4a	9.1	14.1
Mid-flood	IS(Mf)16	10.4	13.8
	IS(Mf)9	14.7	13.7
	IS8	13.5	13.9
	SR4	12.2	13.9
	SR4a	9.8	13.7

Table 2.16 One-way ANOVA Results for DO Comparison between Impact and Baseline Periods

Tide	Station	Depth	F ratio	p-value
Mid-ebb	IS(Mf)16	Surface	$F_{1,163} = 8$	**0.005**
Mid-ebb	IS(Mf)9	Surface	$F_{1,163} = 1.1$	0.303
Mid-ebb	IS8	Surface	$F_{1,163} = 4.7$	**0.032**
Mid-ebb	SR4	Surface	$F_{1,163} = 14.4$	**<0.001**
Mid-ebb	SR4a	Surface	$F_{1,163} = 53.2$	**<0.001**
Mid-flood	IS(Mf)16	Surface	$F_{1,163} = 14.2$	**<0.001**
Mid-flood	IS(Mf)9	Surface	$F_{1,161} = 3$	0.086
Mid-flood	IS8	Surface	$F_{1,163} = 11.3$	**0.001**
Mid-flood	SR4	Surface	$F_{1,163} = 12.2$	**0.001**
Mid-flood	SR4a	Surface	$F_{1,163} = 60.6$	**<0.001**
Mid-ebb	IS(Mf)16	Middle	$F_{1,158} = 2.4$	0.125
Mid-flood	IS(Mf)16	Middle	$F_{1,159} = 11.8$	**0.001**
Mid-ebb	IS(Mf)16	Bottom	$F_{1,163} = 12$	**0.001**
Mid-ebb	IS(Mf)9	Bottom	$F_{1,163} = 0.1$	0.701
Mid-ebb	IS8	Bottom	$F_{1,163} = 5$	**0.027**
Mid-ebb	SR4	Bottom	$F_{1,160} = 11.1$	**0.001**
Mid-ebb	SR4a	Bottom	$F_{1,163} = 61$	**<0.001**
Mid-flood	IS(Mf)16	Bottom	$F_{1,163} = 12.9$	**<0.001**
Mid-flood	IS(Mf)9	Bottom	$F_{1,161} < 0.1$	0.902
Mid-flood	IS8	Bottom	$F_{1,163} = 7.3$	**0.007**
Mid-flood	SR4	Bottom	$F_{1,161} = 9.2$	**0.003**
Mid-flood	SR4a	Bottom	$F_{1,163} = 76$	**<0.001**

Note:

By setting α at 0.05, p-values <0.05 (significant difference) are bold.

Table 2.17 One-way ANOVA Results for Depth-averaged Turbidity Comparison between Impact and Baseline Periods

Tide	Station	F ratio	p-value
Mid-ebb	IS(Mf)16	$F_{1,163} = 1.3$	0.248
Mid-ebb	IS(Mf)9	$F_{1,163} = 2.3$	0.131
Mid-ebb	IS8	$F_{1,163} = 1.9$	0.168

Tide	Station	F ratio	p-value
Mid-ebb	SR4	$F_{1,163} = 1.2$	0.277
Mid-ebb	SR4a	$F_{1,163} = 1.1$	0.290
Mid-flood	IS(Mf)16	$F_{1,163} = 0.8$	0.376
Mid-flood	IS(Mf)9	$F_{1,163} < 0.1$	0.914
Mid-flood	IS8	$F_{1,163} = 1.6$	0.209
Mid-flood	SR4	$F_{1,163} < 0.1$	0.923
Mid-flood	SR4a	$F_{1,163} = 2.9$	0.089

Note:

By setting α at 0.05, p-values < 0.05 (significant difference) are bold.

Table 2.18 ***One-way ANOVA Results for Depth-averaged SS Comparison between Impact and Baseline Periods***

Tide	Station	F ratio	p-value
Mid-ebb	IS(Mf)16	$F_{1,163} = 2.6$	0.107
Mid-ebb	IS(Mf)9	$F_{1,163} = 3.2$	0.077
Mid-ebb	IS8	$F_{1,163} = 2.5$	0.116
Mid-ebb	SR4	$F_{1,163} = 3.1$	0.078
Mid-ebb	SR4a	$F_{1,163} = 8$	**0.005**
Mid-flood	IS(Mf)16	$F_{1,163} = 4$	**0.048**
Mid-flood	IS(Mf)9	$F_{1,163} = 0.3$	0.592
Mid-flood	IS8	$F_{1,163} < 0.1$	0.851
Mid-flood	SR4	$F_{1,163} = 0.8$	0.372
Mid-flood	SR4a	$F_{1,163} = 5.3$	**0.022**

Note:

By setting α at 0.05, p-values < 0.05 (significant difference) are bold.

In addition, linear regression was conducted to examine any significant relationship between DO / Turbidity / SS levels and time (i.e. number of days after construction works commencement) during this yearly monitoring period at each monitoring station. The method of data interpretation followed the same method as indicated in *Section 2.1.4* for TSP monitoring. As shown in *Tables 2.19* to 2.*21*, results of the regression analysis indicated that there was no significant ($r^2 < 0.60$) relationship between DO / Turbidity / SS level and time during this yearly monitoring period. As such, it is

considered that there is no apparent trend of increasing or decreasing DO / Turbidity / SS levels since commencement of constructions works.

Table 2.19 Linear Regression Result of DO

Parameter	Station	R^2	$F_{1,151}$	p-value	Intercept	Coefficient of days of construction
Mid-ebb	IS(Mf)16	0.066	10.6	0.001	7.58	-0.001
Surface DO	IS(Mf)9	0.050	7.9	0.006	7.56	-0.001
	IS8	0.081	13.3	<0.001	7.64	-0.002
	SR4	0.068	11	0.001	7.57	-0.001
	SR4a	0.072	11.7	<0.001	7.65	-0.002
Mid-flood	IS(Mf)16	0.069	11.3	<0.001	7.67	-0.001
surface DO	IS(Mf)9	0.044	6.9	0.009	7.59	-0.001
	IS8	0.092	15.4	<0.001	7.76	-0.002
	SR4	0.084	13.9	<0.001	7.72	-0.002
	SR4a	0.065	10.5	0.001	7.67	-0.001
Mid-ebb	IS(Mf)16	0.061	9.8	0.002	7.42	-0.001
middle DO						
Mid-flood	IS(Mf)16	0.069	11.3	<0.001	7.54	-0.001
middle DO						
Mid-ebb	IS(Mf)16	0.072	11.7	<0.001	7.33	-0.001
bottom DO	IS(Mf)9	0.055	8.8	0.003	7.36	-0.001
	IS8	0.092	15.3	<0.001	7.6	-0.002
	SR4	0.088	14.7	<0.001	7.58	-0.002
	SR4a	0.104	17.5	<0.001	7.67	-0.002
Mid-flood	IS(Mf)16	0.084	13.8	<0.001	7.45	-0.002
bottom DO	IS(Mf)9	0.058	9.2	0.003	7.44	-0.001
	IS8	0.125	21.5	<0.001	7.81	-0.002
	SR4	0.113	19.2	<0.001	7.76	-0.002
	SR4a	0.143	25.1	<0.001	7.93	-0.002

Note:

1. Dependent variable is set as DO (in mg/L) and independent variable is set as number of day of construction works.

2. R^2 values of insignificant regression model are underlined.

3. By setting α at 0.01, insignificant intercepts and coefficients are underlined.

Table 2.20 Linear Regression Result of Turbidity

Parameter	Station	R^2	$F_{1,151}$	p-value	Intercept	Coefficient of days of construction
Mid-ebb	IS(Mf)16	0.014	2.1	0.145	7.57	0.005
depth-averaged	IS(Mf)9	0.010	1.5	0.223	7.97	0.004
turbidity	IS8	0.008	1.2	0.275	8.15	0.004
	SR4	0.009	1.4	0.242	8.15	0.004
	SR4a	0.014	2.1	0.146	7.65	0.005
Mid-flood	IS(Mf)16	0.009	1.4	0.237	7.83	0.004
depth-averaged	IS(Mf)9	0.008	1.2	0.267	7.91	0.004
turbidity	IS8	0.007	1.1	0.295	7.95	0.004
	SR4	0.008	1.2	0.278	7.97	0.004
	SR4a	0.012	1.8	0.186	7.58	0.004

Note:

1. Dependent variable is set as turbidity (in NTU) and independent variable is set as number of day of construction works.

2. R^2 values of insignificant regression model are underlined.

3. By setting α at 0.01, insignificant intercepts and coefficients are underlined.

Table 2.21 Linear Regression Result of SS

Parameter	Station	R^2	$F_{1,151}$	p-value	Intercept	Coefficient of days of construction
Mid-ebb	IS(Mf)16	0.019	2.9	0.088	9.87	0.008
depth-averaged SS	IS(Mf)9	0.010	1.6	0.208	10.89	0.006
	IS8	0.010	1.6	0.211	10.92	0.006
	SR4	0.011	1.6	0.202	11.02	0.006
	SR4a	0.017	2.6	0.108	10.28	0.007
Mid-flood	IS(Mf)16	0.011	1.7	0.191	10.58	0.006
depth-averaged SS	IS(Mf)9	0.010	1.6	0.21	10.6	0.006
	IS8	0.009	1.4	0.238	10.71	0.006
	SR4	0.008	1.1	0.286	11.08	0.005
	SR4a	0.011	1.7	0.194	10.69	0.005

Note:

1. Dependent variable is set as turbidity (in NTU) and independent variable is set as number of day of construction works.

2. R^2 values of insignificant regression model are underlined.

3. By setting α at 0.01, insignificant intercepts and coefficients are underlined.

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 2.22 summarizes the equipment used for the impact dolphin monitoring.

Table 2.22 Dolphin Monitoring Equipment

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

2.4.3 *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 2.23* below.

Table 2.23 Impact Dolphin Monitoring Line Transect Co-ordinates

Line No.		Easting	Northing	Line No.		Easting	Northing
1	Start Point	804671	814577 (815456)	13	Start Point	816506	819480
1	End Point	804671	831404	13	End Point	816506	824859
2	Start Point	805475	815457 (815913)	14	Start Point	817537	820220
2	End Point	805477	826654	14	End Point	817537	824613
3	Start Point	806464	819435	15	Start Point	818568	820735
3	End Point	806464	822911	15	End Point	818568	824433
4	Start Point	807518	819771	16	Start Point	819532	821420
4	End Point	807518	829230	16	End Point	819532	824209
5	Start Point	808504	820220	17	Start Point	820451	822125
5	End Point	808504	828602	17	End Point	820451	823671
6	Start Point	809490	820466	18	Start Point	821504	822371
6	End Point	809490	825352	18	End Point	821504	823761
7	Start Point	810499	820690	19	Start Point	822513	823268

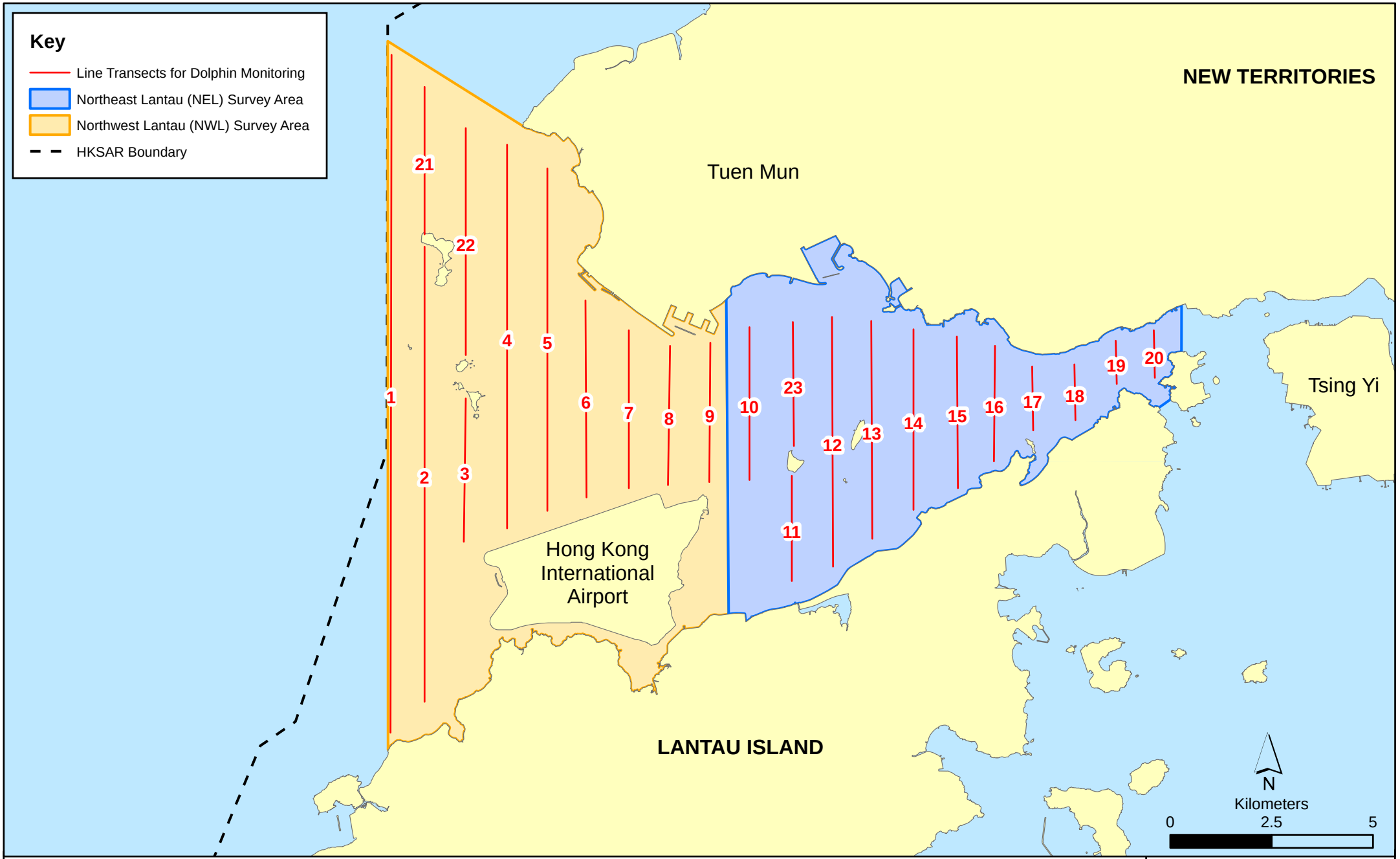

Figure 2.4

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

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Date: 10/12/2013

Environmental Resources Management

ERM

Line No.		Easting	Northing	Line No.		Easting	Northing
			(820880)				
7	End Point	810499	824613	19	End Point	822513	824321
8	Start Point	811508	820847 (821123)	20	Start Point	823477	823402
8	End Point	811508	824254	20	End Point	823477	824613
9	Start Point	812516	820892 (821303)	21	Start Point	805476	827081
9	End Point	812516	824254	21	End Point	805476	830562
10	Start Point	813525	820872	22	Start Point	806464	824033
10	End Point	813525	824657	22	End Point	806464	829598
11	Start Point	814556	818449 (818853)	23	Start Point	814559	821739
11	End Point	814556	820992	23	End Point	814559	824768
12	Start Point	815542	818807				
12	End Point	815542	824882				

Note:

Northing co-ordinates in bracket are the adjusted co-ordinates since August 2015 due to obstruction of permanent structures associated with construction works. Approval of the adjustments from EPD was received in July 2015.

2.4.5 *Action & Limit Levels*

The Action and Limit levels of dolphin impact monitoring are shown in *Appendix C*. The Event Action Plan is presented in *Appendix H*.

2.4.6 *Monitoring Schedule for the Reporting Period*

The dolphin monitoring schedules for the reporting period are provided in the *Thirteenth* to *Twenty-fourth Monthly EM&A Reports*.

2.4.7 *Results & Observations*

A total of 3,589.91 km of survey effort was collected, with 97.0% 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, 1,381.43 km and 2,208.48 km of survey effort were conducted in NEL and

NWL survey areas, respectively. The total survey effort conducted on primary lines was 2,612.04 km while the effort on secondary lines was 977.87 km. Both survey efforts conducted on primary and secondary lines were considered as on-effort survey data. The survey efforts are summarized in *Appendix G*.

During the twenty-four sets of monitoring surveys from November 2014 to October 2015, a total of 54 groups of 229 Chinese White Dolphins (CWDs) were sighted. In this 12-month period, all except four (4) dolphin sightings were made during primary on-effort search. Forty-four (44) out of 50 dolphin sightings were made on primary lines, while six (6) groups of dolphins were sighted on secondary lines. All sightings were made in NWL region except one (1), in which the sighting in NEL was a lone animal. No sighting was made in the proximity of the Project's alignment. Summary table of the dolphin sightings is shown in *Appendix I of Appendix G*.

During the present 12-month impact phase monitoring period, the average daily encounter rates of Chinese White Dolphins were deduced in NEL and NWL survey areas, and compared to the ones deduced from the baseline and transitional phases as shown in *Table 2.24*.

Table 2.24 Average Dolphin 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)	
	Northeast Lantau	**Northwest Lantau**	**Northeast Lantau**	**Northwest Lantau**
Impact Phase (2014-15, this reporting period)	0.11 ± 0.54	2.54 ± 2.49	0.11 ± 0.54	11.64 ± 14.04
Impact Phase (2013-14)	0.22 ± 0.74	6.93 ± 4.08	0.76 ± 2.59	26.31 ± 17.56
Transitional Phase (2012-13)	1.70 ± 2.26	7.68 ± 4.36	4.75 ± 7.61	27.51 ± 18.06
Baseline Phase (2011-12)	6.05 ± 5.04	7.75 ± 5.69	19.91 ± 21.30	29.57 ± 26.96

Comparison of average daily dolphin encounter rates from this impact phase (November 2014 – October 2015), the first impact phase (November 2013 – October 2014), transitional phase

(November 2012 – October 2013) and baseline phase monitoring periods (February 2011 – January 2012). (± denotes the standard deviation of the value)

Group size of Chinese White Dolphins ranged from one to thirteen (1-13) individuals per group in North Lantau region during November 2014 - October 2015. The average dolphin group sizes from the 12-month impact phase monitoring period were compared with the ones deduced from baseline and transitional phases, as shown in *Table 2.25*.

Table 2.25 Comparison of Average Dolphin Group Size

	Average Dolphin Group Size		
	Overall	**Northeast Lantau**	**Northwest Lantau**
Impact Phase (2014-15, this reporting period)	4.24 ± 3.15 (n = 54)	1.00 (n = 1)	4.30 ± 3.15 (n = 53)
Impact Phase (2013-14)	3.76 ± 2.57 (n = 136)	5.00 ± 2.71 (n = 4)	3.73 ± 2.57 (n = 132)
Transitional Phase (2012-13)	3.37 ± 2.98 (n = 186)	2.64 ± 2.38 (n = 22)	3.47 ± 3.05 (n = 164)
Baseline Phase (2011-12)	3.32 ± 2.86 (n = 288)	2.80 ± 2.35 (n = 79)	3.52 ± 3.01 (n = 209)

Comparison of average dolphin group size from this impact phase (November 2014 – October 2015), the first impact phase (November 2013 – October 2014), transitional phase (November 2012 – October 2013) and baseline phase monitoring periods (February 2011 – January 2012). (± denotes the standard deviation of the value)

Two (2) Action Level exceedances for both NEL and NWL regions, and three (3) Limit Level exceedances were recorded for four (4) sets of quarterly dolphin monitoring data between November 2014 and October 2015. In this reporting period, no unacceptable impact from the activities of this Contract on Chinese White Dolphins was noticeable from the general observations. It is essential to continue monitoring the dolphin usage in North Lantau region for the rest of the impact phase monitoring period. Photo IDs of sighted dolphin are presented in *Appendix K of the Thirteenth to Twenty-fourth Monthly EM&A Report*.

2.4.8 Marine Mammal Exclusion Zone Monitoring

Daily marine mammal exclusion zone monitoring was undertaken during the period of marine works under this Contract. Passive Acoustic Monitoring (PAM) was also implemented for the detection of marine mammal when marine works were carried out outside the daylight hours under this Contract.

In the reporting period, there was no marine mammal detected in the marine mammal exclusion zone. Since night time marine piling works was completed in September 2015, PAM was decommissioned in the same month.

2.5 EM&A SITE INSPECTION

Site inspections were carried out on weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures under the Contract. Fifty-two (52) site inspections were carried out in the reporting period. Key observations were summarized in the section of *EM&A Site Inspection* in the *Thirteen to Twenty-fourth Monthly EM&A Reports*. The Contractor has rectified all of the observations identified during environmental site inspections in the reporting period.

2.6 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, chemical waste and marine sediments (Categories L and M). Reference has been made to the waste flow table prepared by the Contractor (*Appendix I*). The quantities of different types of wastes are summarized in *Table 2.26*.

Table 2.26 Quantities of Different Waste Generated in the Reporting Period

Month/Year	Inert Construction Waste [a] (m^3)	Imported Fill (m^3)	Inert Construction Waste Re-used (m^3)	Non-inert Construction Waste [b] (tonnes)	Recyclable Materials [c] (kg)	Chemical Wastes (kg)	Marine Sediment (m^3)	
							Category L	Category M
Nov 2014	12,474	436	3,356	114,370	133	0	0	234
Dec 2014	15,987	0	3,020	130,970	147	0	337	275
Jan 2015	12,474	115	990	132,170	91	0	178	487
Feb 2015	5,759	14	461	141,020	112	400	801	333
Mar 2015	9,600	77	473	120,940	203	0	618	222
Apr 2015	7,694	32	2,261	133,630	105	0	0	0
May 2015	8,091	0	662	107,920	42	0	550	0
Jun 2015	7,166	0	1,351	89,930	119	17	324	287
Jul 2015	2,322	78	992	111,570	105	1,400	0	0
Aug 2015	1,265	0	105	87,760	133	1,200	0	0
Sept 2015	3,525	0	623	66,680	105	600	0	0
Oct 2015	1,635	0	615	102,080	84	0	0	0
Total	87,992	752	14,909	1,339,040	1,379	3,617	2,808	1,838

Notes:

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

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

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

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

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

2.7 ENVIRONMENTAL LICENSES AND PERMITS

The status of environmental licensing and permit is summarized in *Table 2.27* below.

Table 2.27 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/B	28-Jan-14	N/A	HyD	Tuen Mun- Chek Lap Kok Link (superseded by *EP-354/2009/C* in December 2014)
Environmental Permit	EP-354/2009/C	10-Dec-14	N/A	HyD	Tuen Mun- Chek Lap Kok Link (superseded by EP-354/2009/D in March 2015)
Environmental Permit	EP-354/2009/D	13-Mar-15	N/A	HyD	Tuen Mun- Chek Lap Kok Link
Environmental Permit	EP-353/2009/I	17-Jul-15	N/A	HyD	Hong Kong Boundary Crossing Facilities (effective from Septermber 2015)
Chemical Waste Registration	5213-951-G2380-17	12-Jun-14	N/A	GCL	Viaducts A, B, C, D & E
Chemical Waste Registration	5213-961-G2380-13	10-Oct-13	N/A	GCL	Chemical waste produced in Contract HY/2012/07 (Area 1 adjacent to Cheng Tung Road, Siu Ho Wan)
Chemical Waste Registration	5213-961-G2380-14	10-Oct-13	N/A	GCL	Chemical waste produced in Contract HY/2012/07 (Area 2 adjacent to Cheung Tung Road, Pak Mong Village)
Chemical Waste Registration	5213-974-G2588-03	04-Nov-13	N/A	GCL	Chemical waste produced in Contract HY/2012/07 (WA5 adjacent to Cheung Tung Road, Yam O)
Construction Dust Notification	361571	05-Jul-13	N/A	GCL	
Construction Dust Notification	362093	17-Jul-13	N/A	GCL	For Area 23
Construction Noise Permit	GW-RS0419-14	15-May-14	13-Nov-14	GCL	For loading & unloading on NLH near Viaducts A & B
Construction Noise Permit	GW-RS0700-14	21-Jul-14	31-Dec-14	GCL	For loading & unloading on NLH near Viaduct A & B
Construction Noise Permit	GW-RS0792-14	31-Jul-14	24-Dec-14	GCL	Broad Permit for Works at Seafront & Marine Piers & Pier B9
Construction Noise Permit	Nil	N/A	N/A	GCL	For Piling Works
Construction Noise Permit for night works and works in general holidays	GW-RS0078-15	28-Jan-15	29-Jul-15	GCL	For Plant mobilization using tractor with trailer

License/ Permit	License or Permit No.	Date of Issue	Date of Expiry	License/ Permit Holder	Remarks
Construction Noise Permit for night works and works in general holidays	GW-RS0084-15	28-Jan-15	30-Apr-15	GCL	Pier B8 formwork erection
Construction Noise Permit for night works and works in general holidays	GW-RS0137-15	12-Feb-15	15-Aug-15	GCL	Pre-casted pile cap shell installation at E10-E13
Construction Noise Permit for night works and works in general holidays	GW-RS0212-15	02-Mar-15	04-Jun-15	GCL	Pier A8A9 Safety Fence Erection
Construction Noise Permit for night works and works in general holidays	GW-RS0225-15	13-Mar-15	12-May-15	GCL	TTA Case 009 Ch.2.1E-4.2E
Construction Noise Permit for night works and works in general holidays	GW-RS0266-15	20-Mar-15	30-Apr-15	GCL	B8 Pier Head Segment Erection and Formwork Installation
Construction Noise Permit for night works and works in general holidays	GW-RS0307-15	27-Mar-15	27-Sep-15	GCL	For Load unload at NLH near Viaduct D
Construction Noise Permit for night works and works in general holidays	GW-RS0326-15	30-Mar-15	31-May-15	GCL	B9-B16 Pier Head Segments Erection
Construction Noise Permit for night works and works in general holidays	GW-RS0470-14	29-Apr-15	28-Oct-15	GCL	For Broad Permit
Construction Noise Permit for night works and works in general holidays	GW-RS0489-15	08-May-15	07-Aug-15	GCL	B8 Pier Head Temp Works Lifting
Construction Noise Permit for night works and works in general holidays	GW-RS0491-15	08-May-15	30-Jun-15	GCL	TTA Case 009 Ch.2.1E-4.2E
Construction Noise Permit for night works and works in general holidays	GW-RS0539-15	14-May-15	31-Jul-15	GCL	B9-B16 Pier Head Segments Erection
Construction Noise Permit for night works and works in general holidays	GW-RS0691-15	23-Jun-15	22-Dec-15	GCL	For Broad Permit
Construction Noise Permit for night works and works in general holidays	GW-RS0769-15	15-Jul-15	30-Sep-15	GCL	TTA Case 009 Ch.2.1E-4.2E
Construction Noise Permit for night works and works in general holidays	GW-RS0809-15	29-Jul-15	29-Jan-16	GCL	For Plant mobilization using tractor with trailer
Construction Noise Permit for night works and works in general holidays	GW-RS0854-15	12-Aug-14	15-Feb-16	GCL	Pre-casted pile cap shell installation at E10-E13
Construction Noise Permit for night works and works	GW-RS0855-15	12-Aug-15	11-Feb-16	GCL	Pier construction at C7, D8, D9

License/ Permit	License or Permit No.	Date of Issue	Date of Expiry	License/ Permit Holder	Remarks
in general holidays					
Construction Noise Permit for night works and works in general holidays	GW-RS0911-15	27-Aug-15	26-Feb-16	GCL	Broad Permit for Seg. Launching at Land Portion
Construction Noise Permit for night works and works in general holidays	GW-RS0942-14	11-Sep-14	14-Mar-15	GCL	For Plant mobilization using tractor
Construction Noise Permit for night works and works in general holidays	GW-RS1054-15	30-Sep-15	29-Mar-16	GCL	For Load unload at NLH near Viaduct D
Construction Noise Permit for night works and works in general holidays	GW-RS1086-15	07-Oct-15	15-Dec-15	GCL	TTA Case 009 Ch.2.1E-4.2E
Construction Noise Permit for night works and works in general holidays	GW-RS1129-14	17-Oct-14	31-Dec-14	GCL	For Safety Fences at Pier D9
Construction Noise Permit for night works and works in general holidays	GW-RS1130-14	20-Oct-14	22-Apr-15	GCL	For Plant mobilization using tractor
Construction Noise Permit for night works and works in general holidays	GW-RS1135-14	17-Oct-14	15-Dec-14	GCL	For TTA Case 60-2 Ch.1.3E-3.6E
Construction Noise Permit for night works and works in general holidays	GW-RS1144-15	20-Oct-15	19-Feb-16	GCL	For Broad Permit
Construction Noise Permit for night works and works in general holidays	GW-RS1188-14	30-Oct-14	31-Dec-14	GCL	For TTA Cases 50 Airport Road-5.3
Construction Noise Permit for night works and works in general holidays	GW-RS1225-14	31-Oct-14	02-May-15	GCL	For Broad Permit
Construction Noise Permit for night works and works in general holidays	GW-RS1383-14	15-Dec-14	28-Feb-15	GCL	TTA Case 060-12 Ch.1.0-4.2
Construction Noise Permit for night works and works in general holidays	GW-RS1386-14	15-Dec-14	15-Mar-15	GCL	TTA Case 009 Ch.2.3E-4.2E
Construction Noise Permit for night works and works in general holidays	GW-RS1403-14	15-Dec-14	28-Feb-15	GCL	TTA Case 050 Series Airport Rd to NLH Ch.5.3
Construction Noise Permit for night works and works in general holidays	GW-RS1406-15	30 Mar-15	31-May-15	GCL	B9-B16 Pier Head Segments Erection
Construction Noise Permit for night works and works in general holidays	GW-RW0093-15	26-Feb-15	26-Aug-15	GCL	General works at WA5

License/ Permit	License or Permit No.	Date of Issue	Date of Expiry	License/ Permit Holder	Remarks
Construction Noise Permit for night works and works in general holidays	GW-RW0695-15	30-Jun-15	30-Nov-15	GCL	Segment Erection between B6-B11 by LG1
Construction Noise Permit for night works and works in general holidays	GW-RW0861-15	13-Aug-15	30-Sep-15	GCL	Portal beam installation at Pier D14
Construction Noise Permit	GW-RW0640-14	28 Aug 2014	27 Feb 2015	GCL	General works at WA5
Construction Noise Permit for night works and works in general holidays	GW-RS1032-14	25 Sep 2014	28 Mar 2015	GCL	For Load unload at NLH near Viaduct D
Construction Noise Permit for night works and works in general holidays	GW-RW0422-15	21 Aug 2015	25 Jan 2016	GCL	General works at WA5
Construction Noise Permit for night works and works in general holidays	GW-RS0206-15	24-Feb-15	30-Apr-15	GCL	B9-B16 Pier Head Segments Erection
Construction Waste Disposal Account	7017735	10-Jul-13	N/A	GCL	Waste disposal in Contract HY/2012/07
Construction Waste Disposal Account	7019470	03-Mar-14	N/A	GCL	Vessel CHIT Account
Dumping Permit/ Loading Permit (Type 1 – Open Sea Disposal)	(4) in EP/MD/14-075	25-Sep-13	N/A	GCL	-
Marine Dumping Permit	EP/MD/15-066	28-Jul-14	27-Jan-15	GCL	For dumping Type I sediment
Marine Dumping Permit	EP/MD/15-186	01-Jan-15	31-Jan-15	GCL	For dumping Type I (Dedicated Site) and Type II sediment
Marine Dumping Permit	EP/MD/15-203	28-Jan-15	27-Jul-15	GCL	For dumping Type I sediment
Marine Dumping Permit	EP/MD/15-234	27-Feb-15	31-Mar-15	GCL	For dumping Type I (Dedicated Site) and Type II sediment
Marine Dumping Permit	EP/MD/15-248	27-Mar-15	26-Apr-15	GCL	For dumping Type I (Dedicated Site) and Type II sediment
Marine Dumping Permit	EP/MD/15-257	02-Apr-15	07-Oct-15	GCL	For dumping Type I sediment
Marine Dumping Permit	EP/MD/16-002	17-Apr-15	26-May-15	GCL	For dumping Type I (Dedicated Site) and Type II sediment
Marine Dumping Permit	EP/MD/16-020	22-May-15	26-Jun-15	GCL	For dumping Type I (Dedicated Site) and Type II sediment
Marine Dumping Permit	EP/MD/16-049	22-Jul-15	26-Aug-15	GCL	For dumping Type I (Dedicated Site) and Type II sediment
Marine Dumping Permit	EP/MD/16-071	19-Aug-15	26-Sep-15	GCL	For dumping Type I (Dedicated Site) and

License/ Permit	License or Permit No.	Date of Issue	Date of Expiry	License/ Permit Holder	Remarks
					Type II sediment
Marine Dumping Permit	EP/MD/16-089	22-Sep-15	26-Oct-15	GCL	For dumping Type I (Dedicated Site) and Type II sediment
Marine Dumping Permit	EP/MD/16-102	13-Oct-15	16-Apr-16	GCL	For dumping Type I sediment
Marine Dumping Permit	EP/MD/16-112	22-Oct-15	29-Nov-15	GCL	For dumping Type I (Dedicated Site) and Type II sediment
Marine Dumping Permit	EP/MD/15-161	25-Nov-14	31-Dec-14	GCL	For dumping Type I (Dedicated Site) and Type II sediment
Waste Water Discharge License	WT00019017-2014	13-May-14	31-May-19	GCL	Discharge for marine portion
Waste Water Discharge License	WT00019018-2014	13-May-14	31-May-19	GCL	Discharge for land portion

2.8 IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

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

2.9 SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT

There was no exceedance in noise, 1-hour and 24-hour TSP in the reporting period.

One (1) Action Level exceedance of averaged-depth SS was recorded at SR4a in the reporting period. The exceedance was considered not related to the construction works of this Contract. A detailed investigation report was presented in *Appendix N* of the *Nineteenth Monthly EM&A Report*.

There were a total of five (5) Action and Limit Levels exceedances for impact dolphin monitoring in the reporting period, whereas both NEL and NWL regions each recorded one (1) Action Level exceedance, and three (3) Limit Level exceedances for the whole monitoring region were recorded. 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 period. The investigation reports were presented in *Appendix N* of *Fourth to Seventh Quarterly EM&A Reports*.

2.10 SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

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

Two (2) complaints were received in the reporting period. The first complaint was referred by EPD to June 2015 regarding to the dust emission from dump trucks. Another complaint was referred by EPD in October 2015

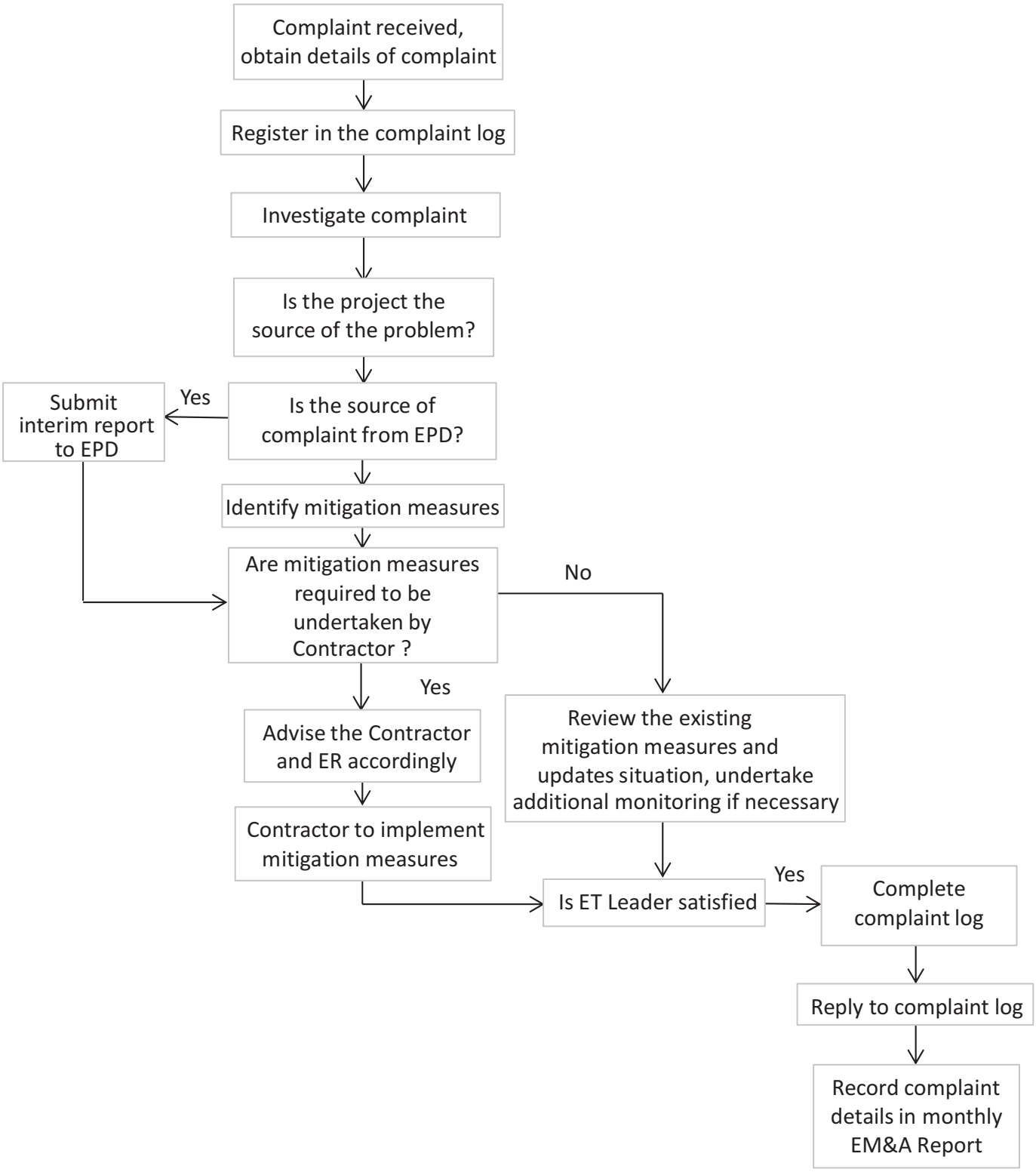

Figure 2.5 Environmental Complaint Handling Procedure

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Environmental Resources Management

ERM

regarding to potential noise from nighttime works. The complaints were followed up in accordance with the complaint handling procedure. Proper mitigation measures were recommended to the Contractor to minimize the corresponding impacts. The detailed investigation reports were presented in the *Appendix N* of the *Twentieth* and *Twenty-fourth Monthly EM&A Reports*.

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

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

3 COMPARISON OF EM&A RESULTS WITH EIA PREDICTIONS AND BASELINE MONITORING RESULTS

The EM&A results in the reporting period are compared to the predictions from EIA Report and baseline monitoring result in order to review the validity of EIA predictions.

3.1 AIR QUALITY MONITORING

The construction activities may have impact on air quality as predicted in the EIA report, whilst excavation works, road works, slope works and foundation works were undertaken in the reporting period. Maximum TSP levels as predicted in the EIA and measured during the impact and baseline monitoring are presented in *Table 3.1*, with average TSP levels measured during both the baseline and impact monitoring shown as well. As shown in *Table 3.1*, although the monitoring stations were relocated closer to the Project area, average TSP levels measured during the impact monitoring were lower than those TSP levels measured during the baseline monitoring at all stations. Maximum TSP levels are similar between baseline and impact monitoring, which are both higher than those predicted in the EIA. It thus appeared that the construction activities of the Contract did not cause significant impact on air quality with similar maximum TSP levels between the baseline and impact monitoring and lower average TPS levels during the impact monitoring.

Table 3.1 Comparison of Impacts on Air Quality (in µg/m³) between EIA Prediction and Impact Monitoring Period

Monitoring Station	EIA Predicted Maximum	Maximum Impact Monitoring	Maximum Baseline Monitoring	Average Baseline Monitoring	Average Impact Monitoring
ASR8/ASR9 (1-hour TSP)	205 (1) /240	241	462	220	103
ASR8/ASR9 (24-hour TSP)	83 (1) / 108	133	113	74	71
ASR8A (1-hour TSP)	293 / 205 (1)	298	464	222	87
ASR8A (24-hour TSP)	105 /83 (1)	104	128	74	60

Monitoring Station	EIA Predicted Maximum	Maximum Impact Monitoring	Maximum Baseline Monitoring	Average Baseline Monitoring	Average Impact Monitoring

Note:

1. EIA prediction of maximum of ASR8 is presented for reference.
2. Scenario 1 of EIA prediction is adopted, in which north and south reclamations of TMCLKL were included in the modelling.
3. EIA predictions and baseline monitoring results of ASR9A and ASR9C are applied to ASR8A and ASR8/ASR9 respectively.

3.2 NOISE IMPACT MONITORING

In the reporting period, the Contractor undertook the construction works and used the Power Mechanical Equipment (PME) as predicted in EIA. The EIA predicted sound pressure level, average baseline and impact noise monitoring results are presented in *Table 3.2*. The EIA assessment has predicted that marginal impacts would be expected at the Pak Mong Village during construction phase. The monitoring results in the reporting period suggested that the Project has managed the construction noise, if any, to an acceptable level and thus monitoring results are considered to comply with the EIA prediction.

Table 3.2 Comparison of Impacts on Noise (in dB (A)) between EIA Prediction and Impact Monitoring Period

Monitoring Station	EIA Predicted Maximum	Average Baseline Monitoring	Average Impact Monitoring	Maximum Impact Monitoring
NSR1	74	56.8	59.5	62.3

Note:

1. EIA maximum noise level was predicted in SPL. Baseline and impact monitoring were measured in $L_{eq,30min}$.

3.3 WATER QUALITY MONITORING

The marine platform erection, piling and pier construction works were undertaken in the monitoring period. According to the EIA prediction, no SS exceedance is anticipated from this Project at the water sensitive receivers nearby the vicinity of Contract (WSR 22a, WSR 22b and WSR 22c). Although

one (1) Action Level exceedance on depth-averaged SS was recorded in the reporting period, the exceedance was considered not related to this Contract upon further investigation. The average baseline and impact monitoring results are presented in *Table 3.3*, in which the annual averaged SS monitoring results at all WQM monitoring stations in both tides were higher than the averaged results of baseline monitoring, including upstream control stations (i.e. CS(Mf)3 for mid-ebb tide and CS(Mf)5 for mid-flood tide). Thus, the impact monitoring results are considered influenced by fluctuation of background regional water quality instead of indicating any unacceptable impacts from the Project.

Table 3.3 ***Comparison of Depth-averaged SS (in mg/L) between Baseline and Impact Monitoring Period***

Monitoring Station	Tide	Baseline monitoring	Impact Monitoring
CS(Mf)3	Mid-ebb	8.8	14.8
CS(Mf)5		9.2	14.4
IS(Mf)16		11.3	14.3
IS(Mf)9		10.9	14.1
IS8		11.3	14.2
SR4		11.1	14.2
SR4a		9.1	14.1
CS(Mf)3	Mid-flood	12.4	14.2
CS(Mf)5		11.5	14.1
IS(Mf)16		10.4	13.8
IS(Mf)9		14.7	13.7
IS8		13.5	13.9
SR4		12.2	13.9
SR4a		9.8	13.7

3.4 MARINE ECOLOGY

According to the baseline results in the *Appendix F* of the approved EIA Report, the dolphin groups were largely sighted near the waters around Lung Kwu Chau and Sha Chau. There was no dolphin sighted along the

alignment of this Contract. Two-way ANOVAs with repeated measures were conducted to compare results of average encounter rate of sightings (STG) and average encounter rate of dolphins (ANI) between baseline, transitional and impact periods. Although the STG and ANI in impact monitoring period were lower than that before the commencement of this Contract (see *Section 2.4.7*) and the differences between the four periods are statistically significant (see *Section 3.3.4* of *Appendix G*), the distribution pattern was still similar between the impact monitoring period and before the commencement (i.e. transition period in 2012 – 2013) of this Contract. Dolphins are observed heavily utilized area around Lung Kwu Chau and less frequently in the North Lantau region where the works area of this Contract is situated. The monitoring results in this reporting period are considered to be in line with the EIA predictions, and the review of monitoring data suggested that no unacceptable impacts was noted from the marine works under this Contract. It is essential to monitor the dolphin usage in North Lantau region for the rest of impact monitoring period to keep track on the trend of dolphin ranging pattern.

3.5 WASTE MANAGEMENT

In general, wastes generated from the construction activities including C&D materials (inert and non-inert), chemical wastes, recyclable materials and marine sediments, the waste generation was in line with the EIA predictions. The summary of waste generation amount is presented in *Table 2.26*.

From the Project commencement to the end of this reporting period, category L of marine sediment was generated within the predicted amount in EIA (0.1 Mm^3). Although the relatively small amount of category M marine sediment from marine bridge foundation was not anticipated in EIA, all sediment disposals could still be undertaken in accordance with agreement from Marine Fill Committee and the corresponding marine dumping permits (*Table 2.27*).

Until the end of the reporting period, cumulative inert construction material was generated within the predicted amounts in EIA (0.56 Mm^3 for cut slopes and 0.03 Mm^3 for excavation material in EIA). The Contractor also reused

the inert construction waste in this Contract where possible, which is also a fulfillment of EIA recommendation.

3.6 SUMMARY OF MONITORING METHODOLOGY AND EFFECTIVENESS

The EM&A monitoring programme has been reviewed and was considered effective and adequate to cater for the nature of works in progress. No further change to the monitoring programme was considered to be necessary.

The EM&A programme will be evaluated as appropriate in the next reporting period and improvements in the EM&A programme will be recommended if deemed necessary.

3.7 SUMMARY OF MITIGATION MEASURES

The mitigation measures stipulated in the Updated EM&A Manual were undertaken by the Contractor in the reporting period. The mitigation measures were reviewed and considered effective. No addition or change on mitigation measures was considered to be necessary.

4 FUTURE KEY ISSUES

4.1 KEY ISSUES FOR THE COMING PERIOD

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

5 CONCLUSION AND RECOMMENDATIONS

This Second Annual EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 November 2014 to 31 October 2015, in accordance with the Updated EM&A Manual and the requirements of the Environmental Permits (*EP-354/2009/D* and *EP-353/2009/I*).

One (1) Action Level Exceedance for depth-averaged SS was recorded in the reporting period which is considered not related to the Contract upon future investigation. Neither Action Level nor Limit Level exceedances were observed for DO, turbidity, 1-hour TSP, 24-hour TSP and noise monitoring in this reporting period.

A total of 54 groups of 229 Chinese White Dolphins (CWDs) were sighted. Two (2) Action Level exceedance for both NEL and NWL regions, and three (3) Limit Level exceedances were recorded for 4 sets of quarterly dolphin monitoring data between November 2014 and October 2015, whilst no unacceptable impact from the activities of this Contract on Chinese White Dolphins was noticeable from the general observations. It is essential to continue monitoring the dolphin usage in North Lantau region for the rest of the impact phase monitoring period.

Environmental site inspection was carried out fifty-two (52) times in the reporting period. Recommendations on remedial actions were given to the Contractor for the deficiencies identified during the site audits.

Two (2) environmental complaints regarding dust emission and potential noise from night time works were received during this reporting period. No summons/ prosecution were received during the reporting period.

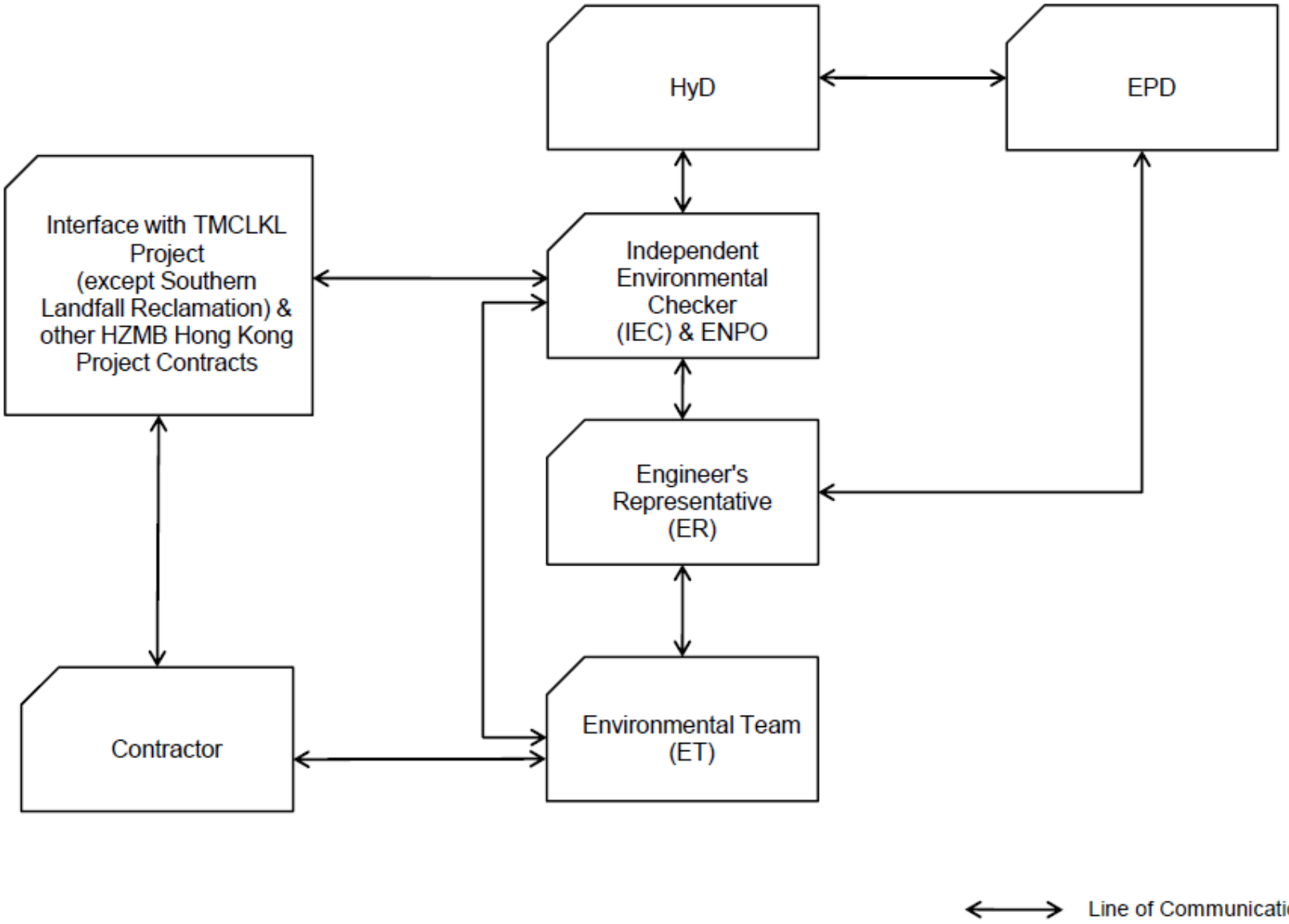
The review of monitoring data suggested that the construction works under this Contract have proceeded in an environmentally acceptable manner in this reporting period. In general, the monitoring results were in line with EIA predictions.

The monitoring programme has been reviewed and was considered as adequate to cater for the nature of works in progress. Change to the

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

Appendix A

Project Organization for Environmental Works



Appendix A1

Contract No. HY/2012/07 Southern Connection Viaduct Section
Project Organization

DATE: 06/03/2013

Environmental Resources Management

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Appendix B

Environmental Mitigation and Enhancement Measure Implementation Schedules

(Adopted from: CINOTECH (2011) Agreement No. CE35/2011 EP Baseline Environmental Monitoring for Hong Kong-Zhuhai-Macao BridgeTuen Mun-Chep Lap Kok Link – Investigation. UpdatedEM&A Manual for Tuen Mun-Chek Lap Kok Link)

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
AIR QUALITY									
4.8.1	3.8	An effective watering programme of 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		✓
NOISE									
5.11	Section 4	Noise monitoring	All existing representative sensitive receivers / during North Lantau Viaduct construction	Contractor	EM&A Manual		Y		✓
WATER QUALITY									
General Marine Works									
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		<>
Temporary Staging work									
	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						
Land Works									
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 soaks away 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 storm water to such silt removal facilities. Catch pits and perimeter channels should be constructed in advance of site formation works and earthworks.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.10	-	Silt removal facilities, channels and manholes shall be maintained and any deposited silt and grit shall be removed regularly, including specifically at the onset of and after each rainstorm.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.10	-	Temporary access roads should be surfaced with crushed stone or gravel.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
6.10	-	Rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.10	-	Measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
6.10	-	Open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
6.10	5.8	Manholes (including any newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.10	-	Discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.10	-	All vehicles and plant should be cleaned before they leave the construction site to ensure that no earth, mud or debris is deposited by them on roads. A wheel washing bay should be provided at every site exit.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
6.10	-	Wheel wash overflow shall be directed to silt removal facilities before being discharged to the storm drain.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
6.10	-	Section of construction road between the wheel washing bay and the public road should be surfaced with crushed stone or coarse gravel.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
6.10	-	Wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
6.10	-	Vehicle and plant servicing areas, vehicle wash bays and lubrication facilities shall be located under roofed areas. The drainage in these covered areas shall be connected to foul sewers via a petrol interceptor in accordance with the requirements of the WPCO or collected for offsite disposal.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.10	-	The Contractor shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.10	-	Waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance.	All areas/ throughout construction period	Contractor	TM-EIAO Waste Disposal Ordinance		Y		✓

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status
						D	C	O	
6.10	-	All fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
6.10	-	Surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
6.10	-	Roadside gullies to trap silt and grit shall be provided prior to discharging the stormwater into the marine environment. The sumps will be maintained and cleaned at regular intervals.	Roadside/design and operation	Design Consultant/ Contractor	TM-EIAO	Y		Y	**n/a**
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		✓
Water Quality Monitoring									
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	✓
ECOLOGY									
8.14	6.3	Specification for and implement pre, during and post construction dolphin abundance monitoring.	All Areas/Detailed Design/ during construction works/post construction	Design Consultant/ Contractor	TMEIA	Y	Y	Y	✓
8.14	6.3	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		✓
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 (donor 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		<>
LANDSCAPE AND VISUAL									
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/	TMEIA	Y	Y		✓
10.9	7.6	Hydroseeding or sheeting of soil stockpiles with visually unobtrusive material (in earth tone) (CM4)	All areas/detailed design/ during construction/post construction	Design Consultant/ Contractor	TMEIA	Y	Y		<>
10.9	7.6	Screening of construction works by hoardings around works area in visually unobtrusive colours, to screen works (CM5)	All areas/detailed design/ during construction/post construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
10.9	7.6	Control night-time lighting and glare by hooding all lights (CM6)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
10.9	7.6	Ensure no run-off into water body adjacent to the Project Area (CM7)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
10.9	7.6	Avoidance of excessive height and bulk of buildings and structures (CM8)	All areas/detailed design/ during construction	Design Consultant/ Contractor	TMEIA	Y	Y		✓
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/ L CSD
10.9	7.6	Tall buffer screen tree / shrub / climber planting should be incorporated to soften hard engineering structures and facilities (OM2)	All areas/detailed design/ during construction/ during operation	Design Consultant/ Contractor	TMEIA	Y	Y	Y	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
WASTE									
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	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: - suitable for the substance to be held, resistant to corrosion, maintained in good conditions and securely closed; - Having a capacity of <450L unless the specifications have been approved by the EPD; and - 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; - Enclosed with at least 3 sides; - 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; - Adequate ventilation; - Sufficiently covered to prevent rainfall entering (water collected within the bund must be tested and disposed of as chemical waste, if necessary); and - Incompatible materials are adequately separated.	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 utilizing 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 hard standing.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling.	All areas / throughout construction period	Contractor	TMEIA		Y		✓
12.6	8.1	Office wastes can be reduced by recycling of 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, aluminum 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						
CULTURAL HERITAGE									
11.8	Section 9	EM&A in the form of audit of the mitigation measures	All areas / throughout construction period	Highways Department	EIAO-TM		Y		n/a

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

Appendix C

Summary of Action and Limit Levels

Table C1 Action and Limit Levels for 1-hour and 24-hour TSP

Parameters	Action	Limit
24 Hour TSP Level in μg/m³	ASR9A/ASR8A = 178 ASR9C/ASR8/ASR9 = 178	260
1 Hour TSP Level in μg /m³	ASR9A/ASR8A = 394 ASR9C/ASR8/ASR9 = 393	500

Table C2 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 C3 Action and Limit Levels for Water Quality

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

Notes:

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

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

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

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

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

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 C4 Action and Limit Levels for Impact Dolphin Monitoring

	North Lantau Social Cluster	
	NEL	**NWL**
Action Level	STG < 70% of baseline & ANI < 70% of baseline	STG < 70% of baseline & ANI < 70% of baseline
Limit Level	[STG < 40% of baseline & ANI < 40% of baseline] and STG < 40% of baseline & ANI < 40% of baseline	

Notes:

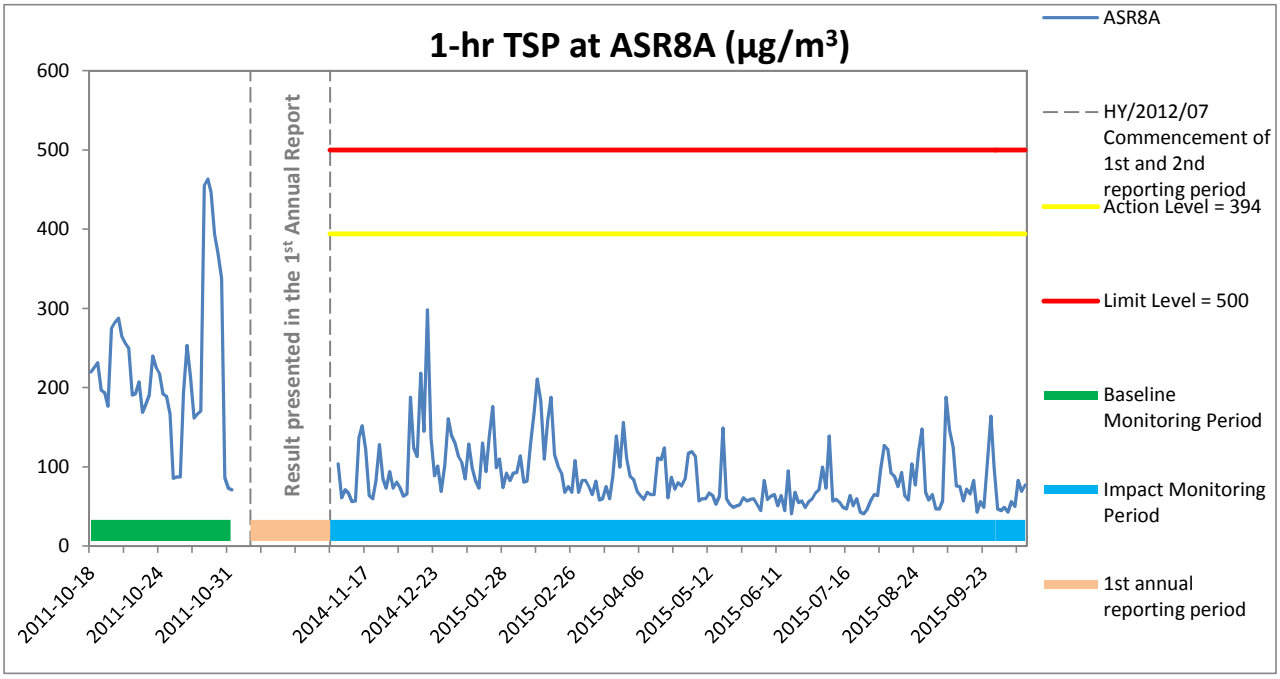
1. STG means quarterly encounter rate of number of dolphin sightings, which is **6.00 in NEL** and **9.85 in NWL** during the baseline monitoring period
2. ANI means quarterly encounter rate of total number of dolphins, which is **22.19 in NEL** and **44.66 in NWL** during the baseline monitoring period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

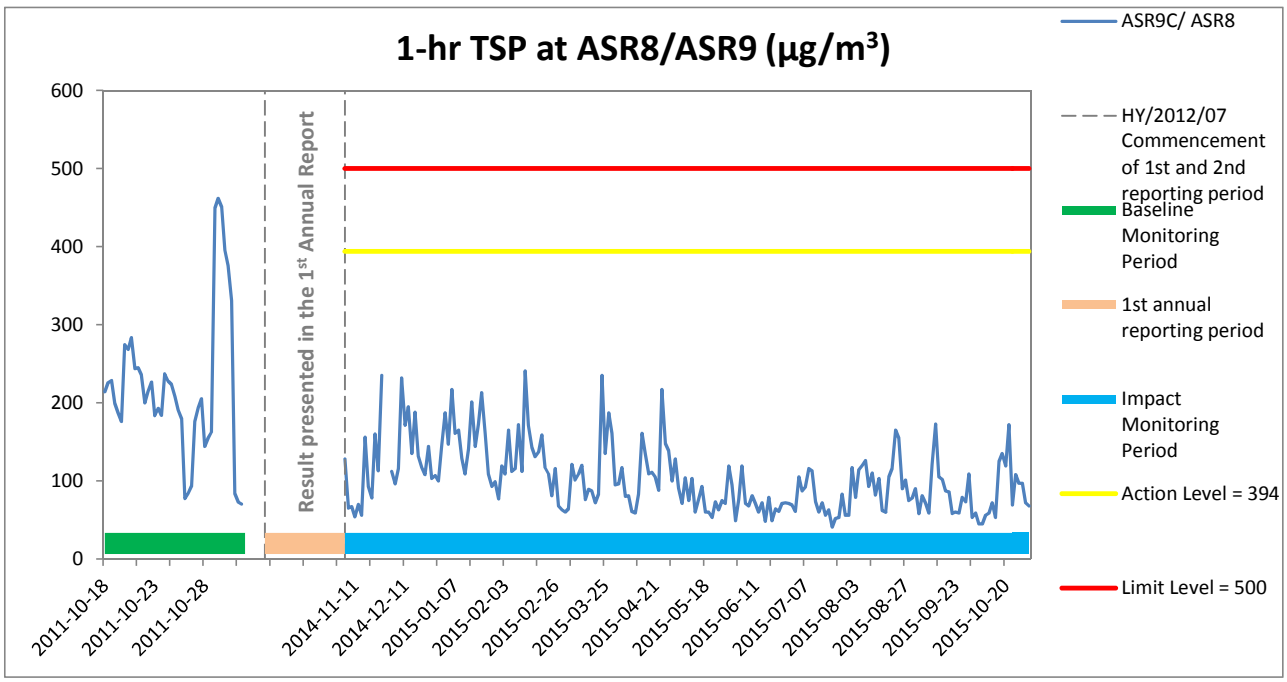
Table C5 Derived Value of Action Level (AL) and Limit Level (LL)

	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 D

Impact Air Quality Monitoring Graphical Presentation



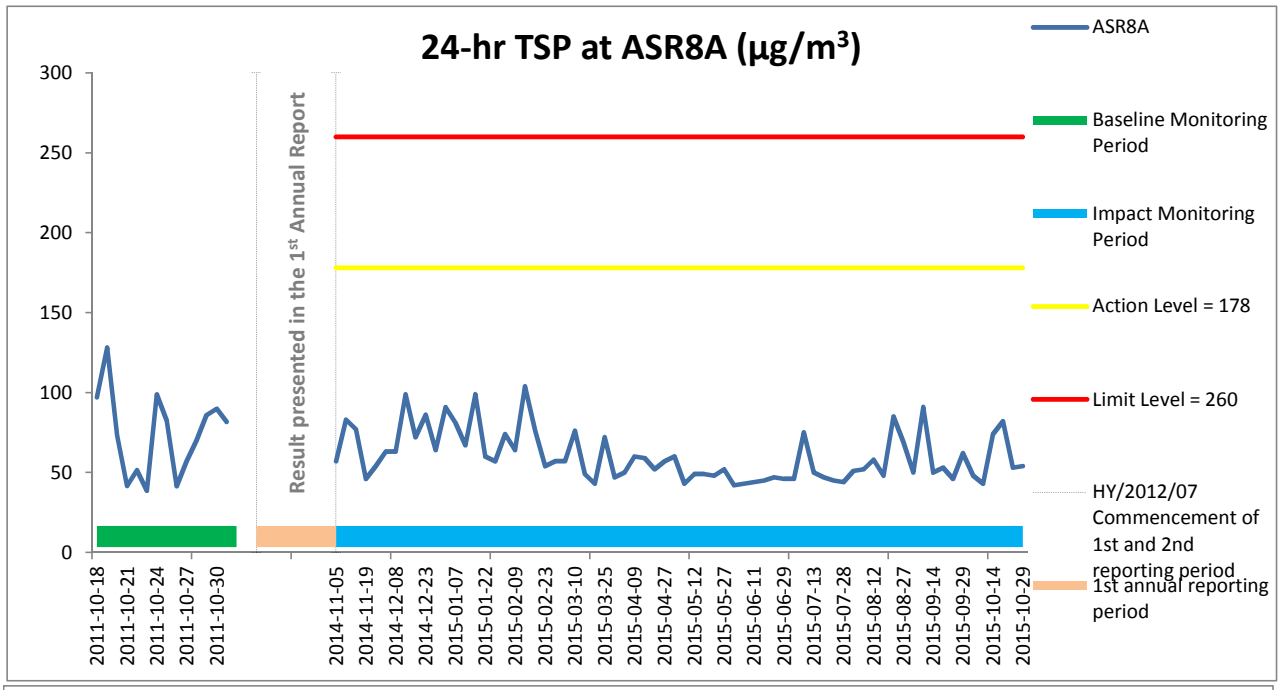


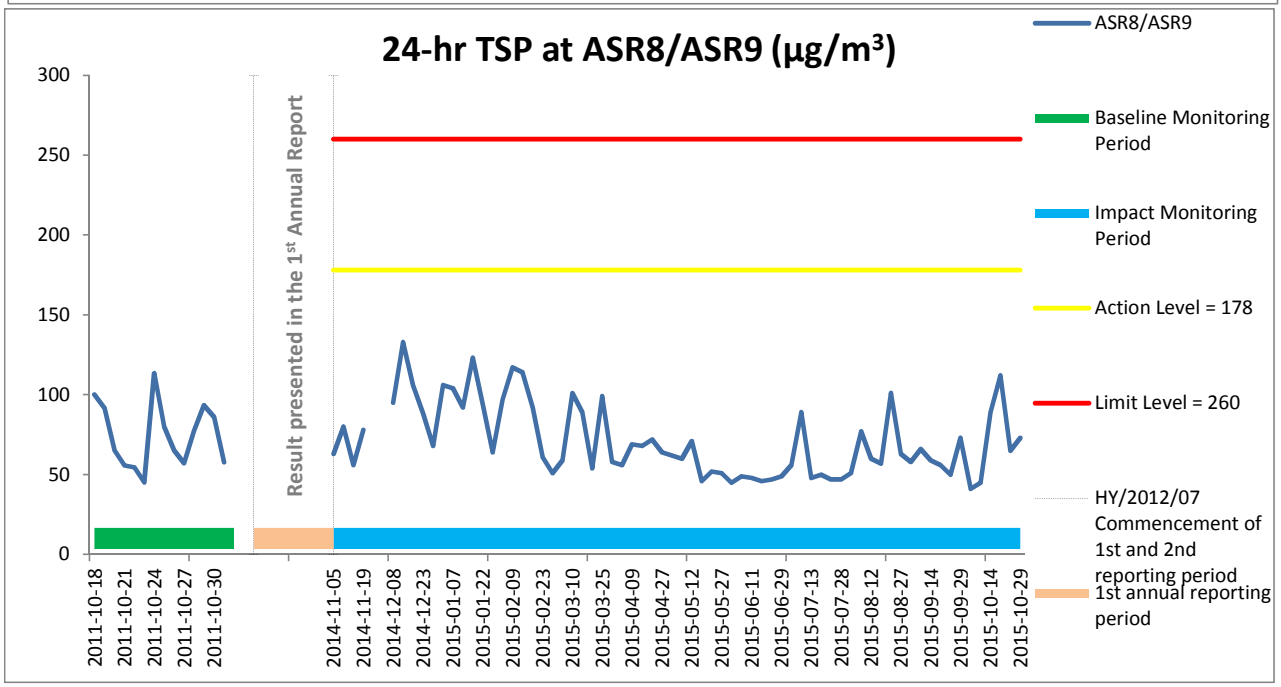
Weather condition within the reporting period varied between sunny to rainy. The overall monitoring results were not affected by weather conditions.

Major construction works undertaken within the reporting period include Additional land GI, trial pits & lab testing; Channel re-construction at Area 1; Construction of pile caps; Drainage works; Installation of pier head segment; Land piling; Pier construction; Pre-drilling works; Re-alignment of Cheung Tung Road; Relocation of MTR fence; Slope works; Tree survey, felling and transplanting; and Utility surveys.

Marine works within the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pile caps; Installation of pier head and deck segment; Launching gantry assembly; Marine piling; Marine platform installation and uninstallation; and Pier construction.

TSP monitoring at ASR8 was suspended on 26 November and 2 December 2016 due to rejection of access to the monitoring station.





Weather condition within the reporting period varied between sunny to rainy. The overall monitoring results were not affected by weather conditions.

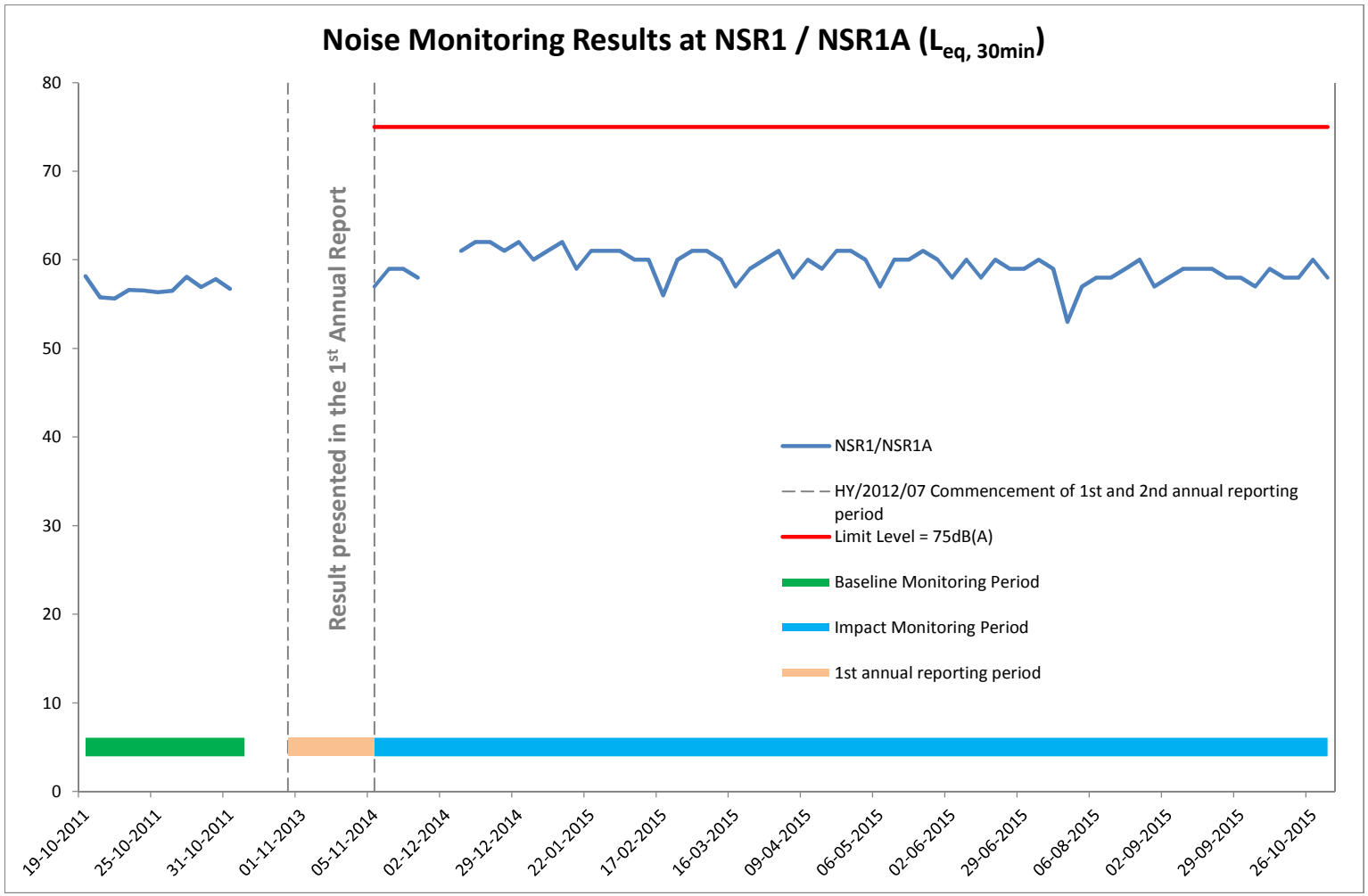
Major construction works undertaken within the reporting period include Additional land GI, trial pits & lab testing; Channel re-construction at Area 1; Construction of pile caps; Drainage works; Installation of pier head segment; Land piling; Pier construction; Pre-drilling works; Re-alignment of Cheung Tung Road; Relocation of MTR fence; Slope works; Tree survey, felling and transplanting; and Utility surveys.

Marine works within the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pile caps; Installation of pier head and deck segment; Launching gantry assembly; Marine piling; Marine platform installation and uninstallation; and Pier construction.

TSP monitoring at ASR8 was suspended on 26 November and 2 December 2014 due to rejection of access to the monitoring station.

Appendix E

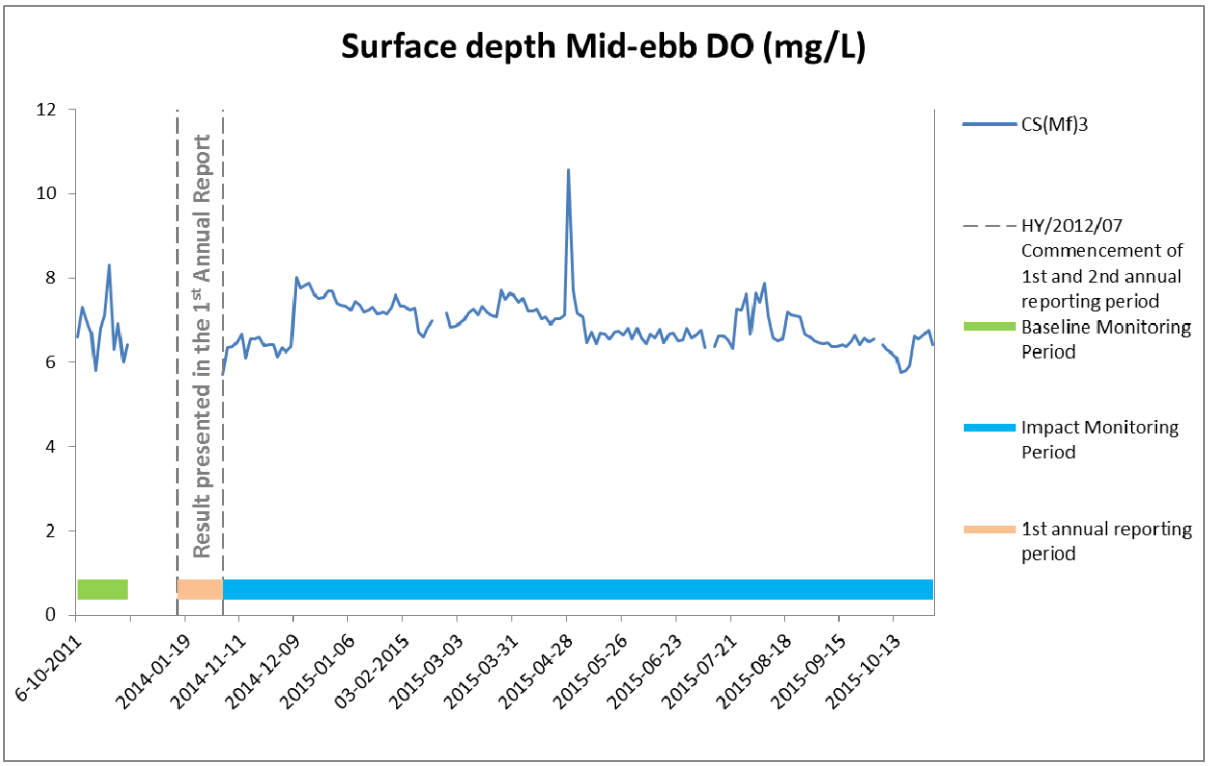
Impact Noise Monitoring Graphical Presentation



Weather condition within the reporting period varied between sunny to rainy. The overall monitoring results were not affected by weather conditions.
Major construction works undertaken within the reporting period include Additional land GI, trial pits & lab testing; Channel re-construction at Area 1; Construction of pile caps; Drainage works; Installation of pier head segment; Land piling; Pier construction; Pre-drilling works; Re-alignment of Cheung Tung Road; Relocation of MTR fence; Slope works; Tree survey, felling and transplanting; and Utility surveys.
Marine works within the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pile caps; Installation of pier head and deck segment; Launching gantry assembly; Marine piling; Marine platform installation and uninstallation; and Pier construction.
Noise monitoring at NSR1 was suspended on 26 November and 2 December 2014 due to rejection of access to the monitoring station.
Baseline monitoring results are presented graphically in daily average.

Appendix F

Impact Water Quality Monitoring Graphical Presentation



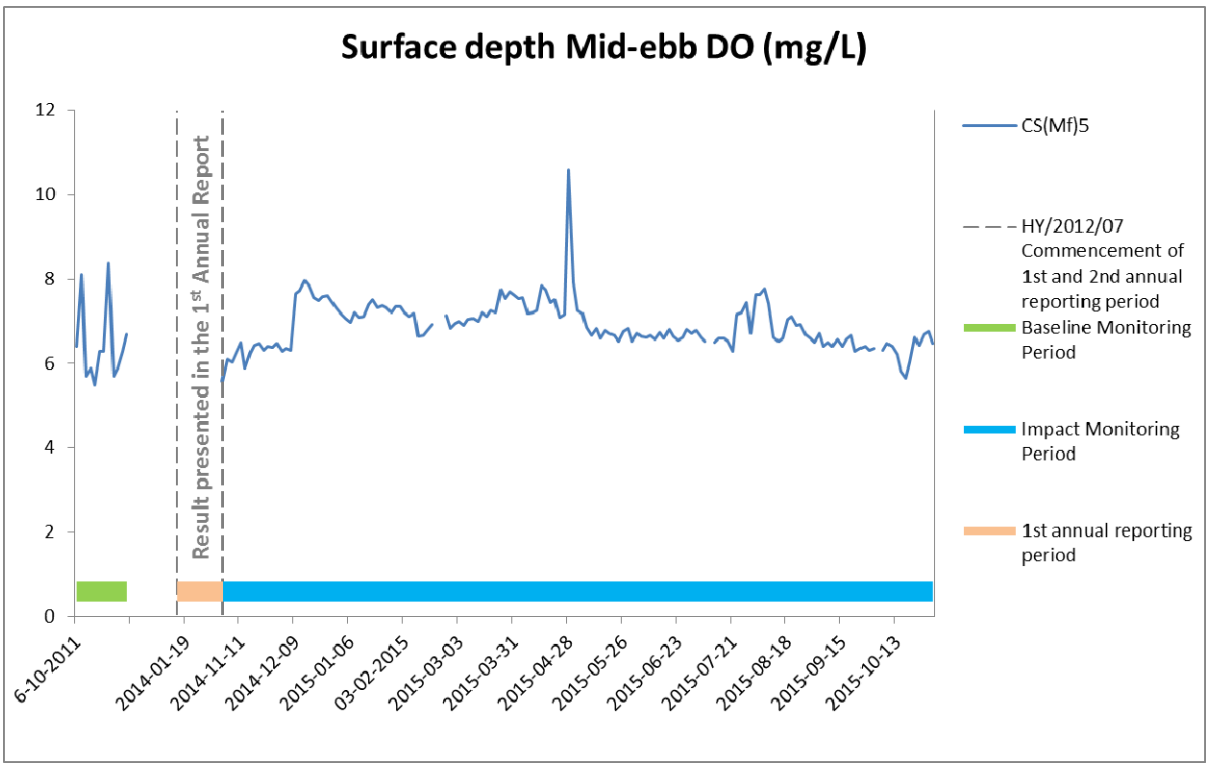
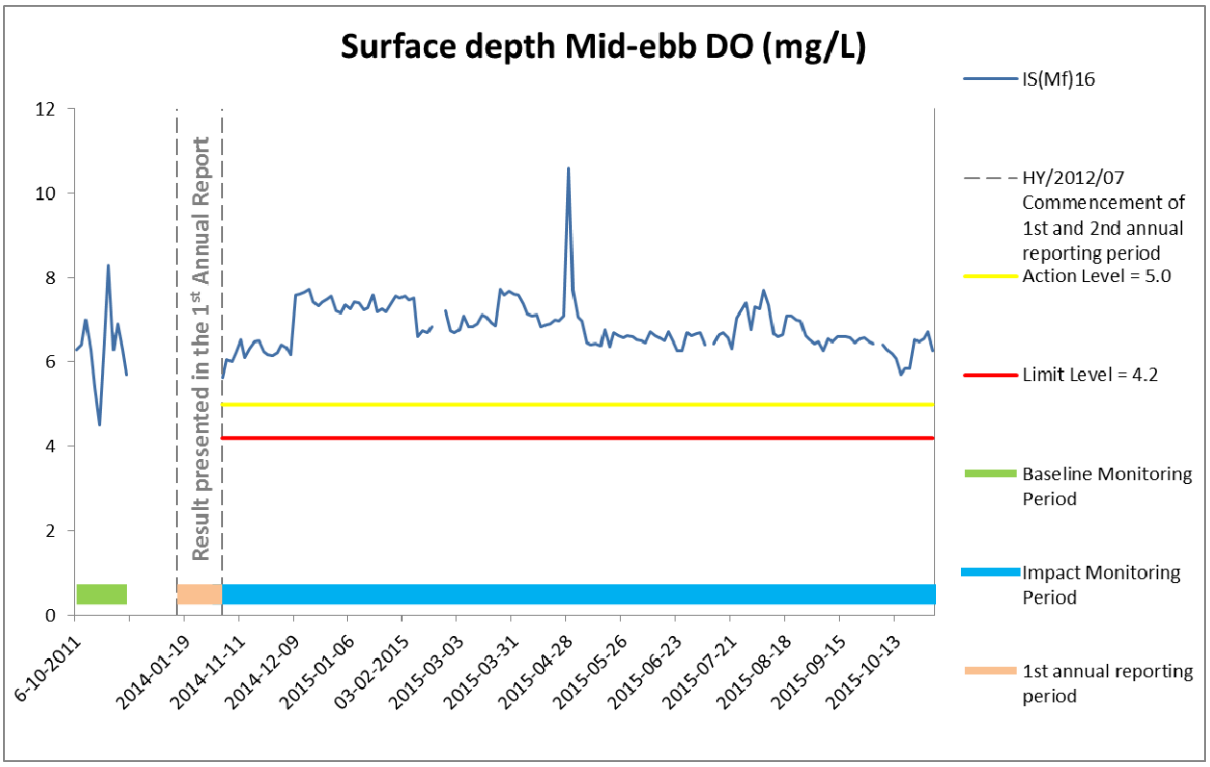


Figure F1 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-ebb tide between 1 November 2014 and 31 October 2015 at CS(Mf)3 and CS(Mf)5.

(Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions.
Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.



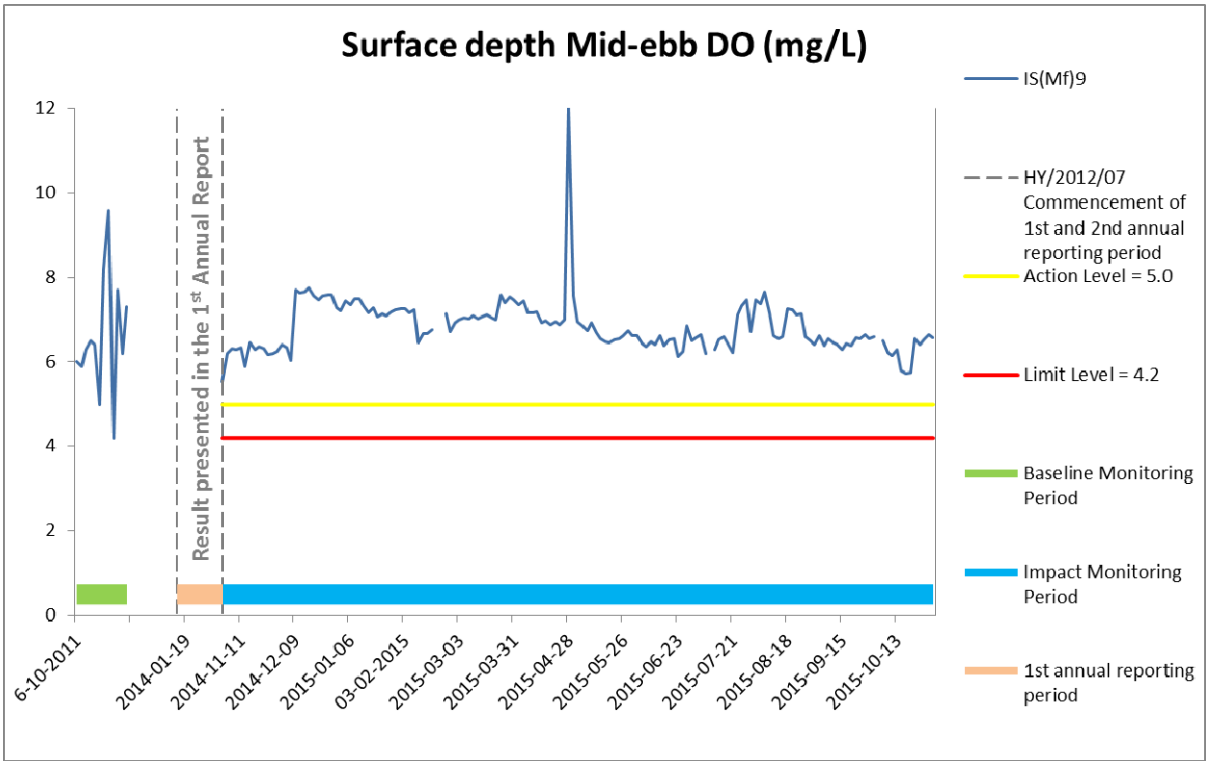


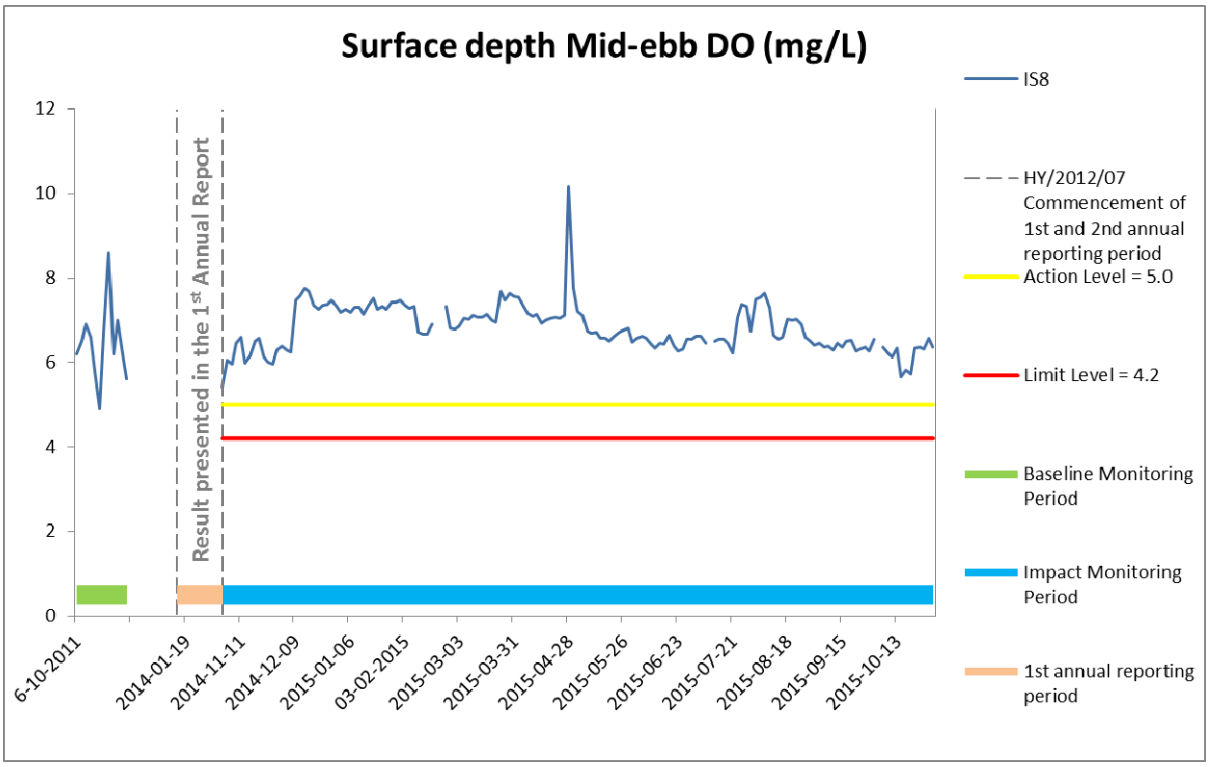
Figure F2 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-ebb tide between 1 November 2014 and 31 October 2015 at IS(Mf)16 and IS(Mf)9.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions.

Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.

Environmental Resources Management

ERM



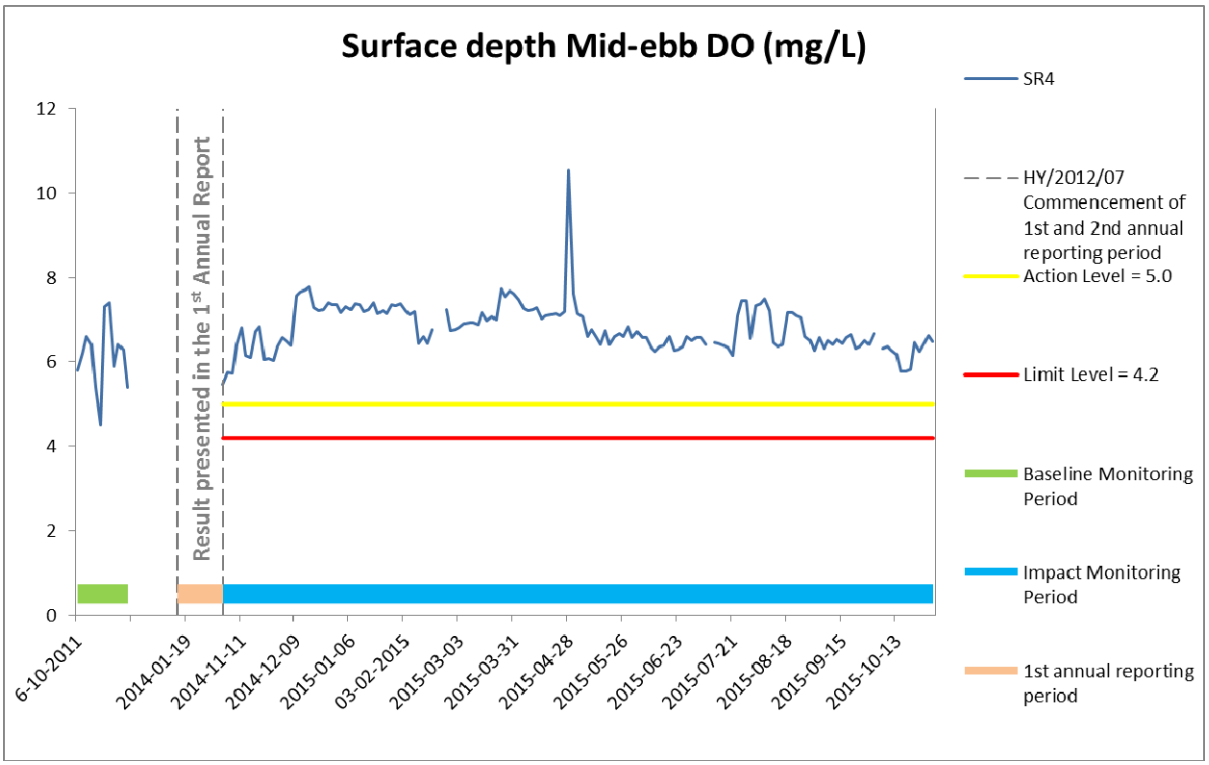


Figure F3 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-ebb tide between 1 November 2014 and 31 October 2015 at IS8 and SR4.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.

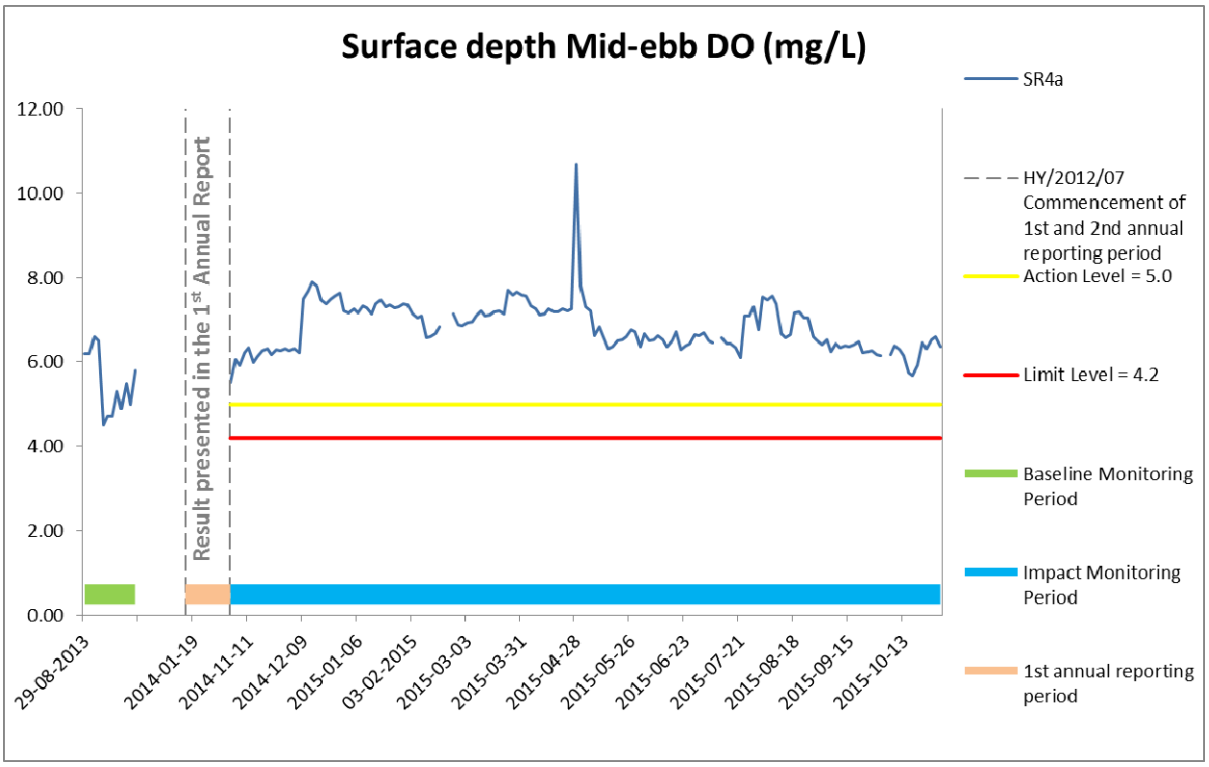
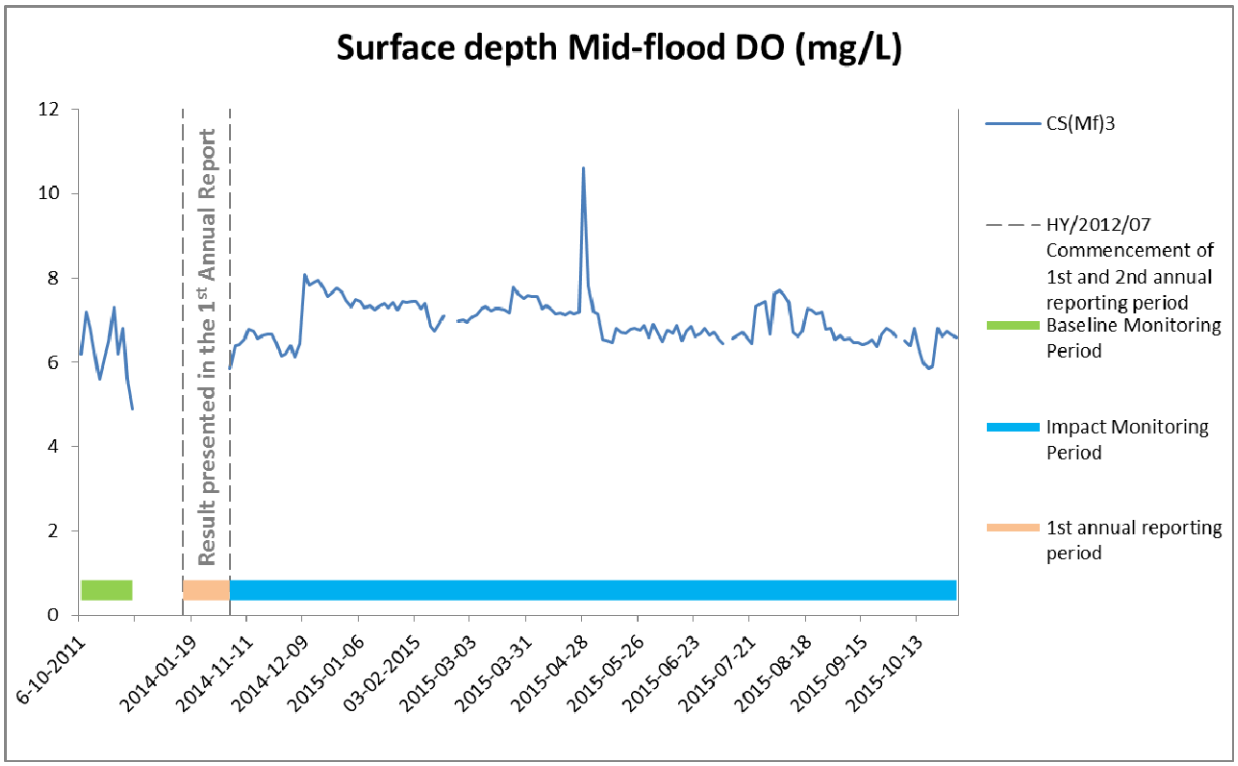


Figure F4 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-ebb tide between 1 November 2014 and 31 October 2015 at SR4a.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.

Environmental Resources Management

ERM



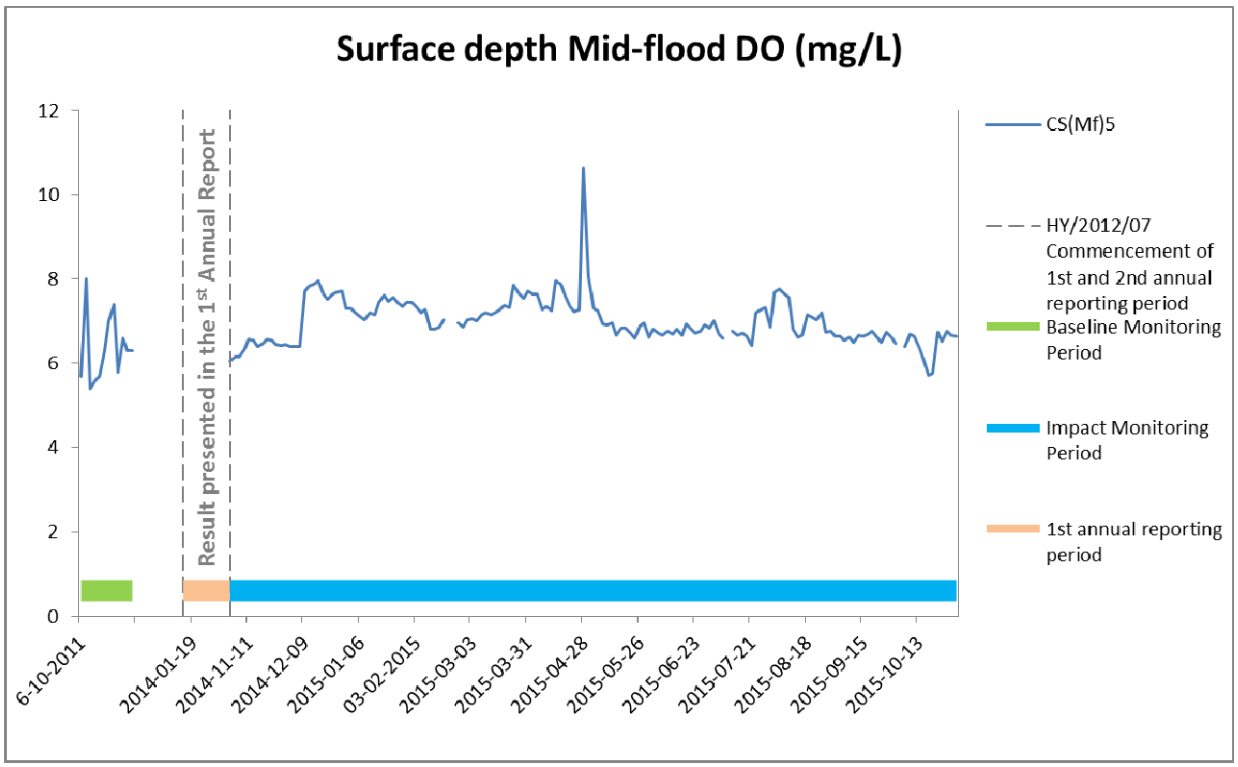
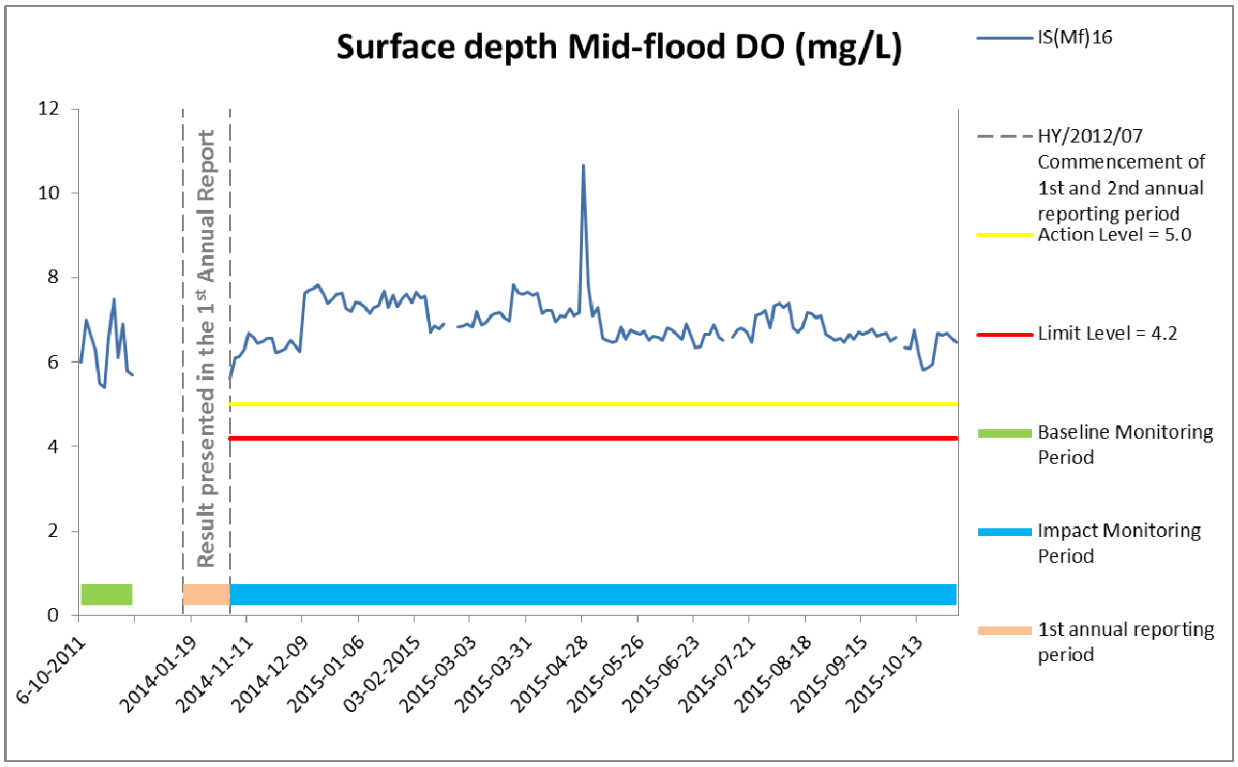


Figure F5 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-flood tide between 1 November 2014 and 31 October 2015 at CS(Mf)3 and CS(Mf)5.

(Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.)



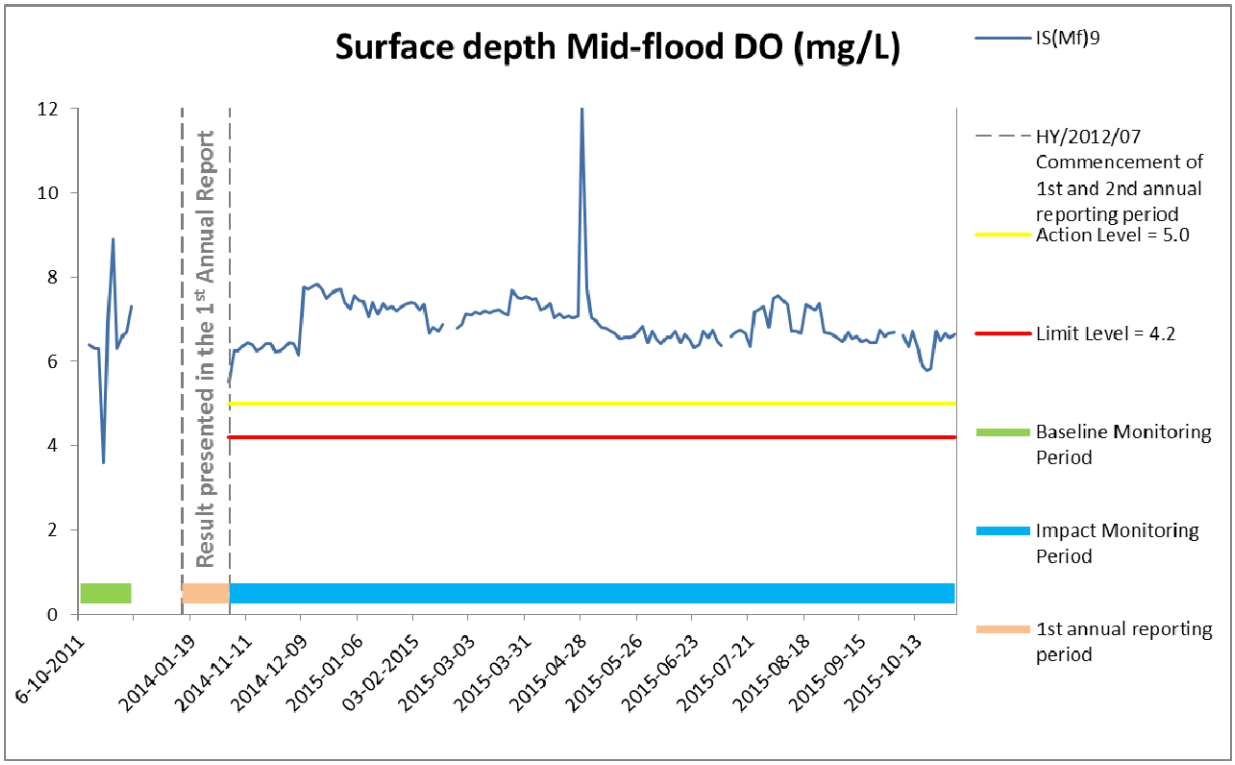


Figure F6 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-flood tide between 1 November 2014 and 31 October 2015 at IS(Mf)16 and IS(Mf)9.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.

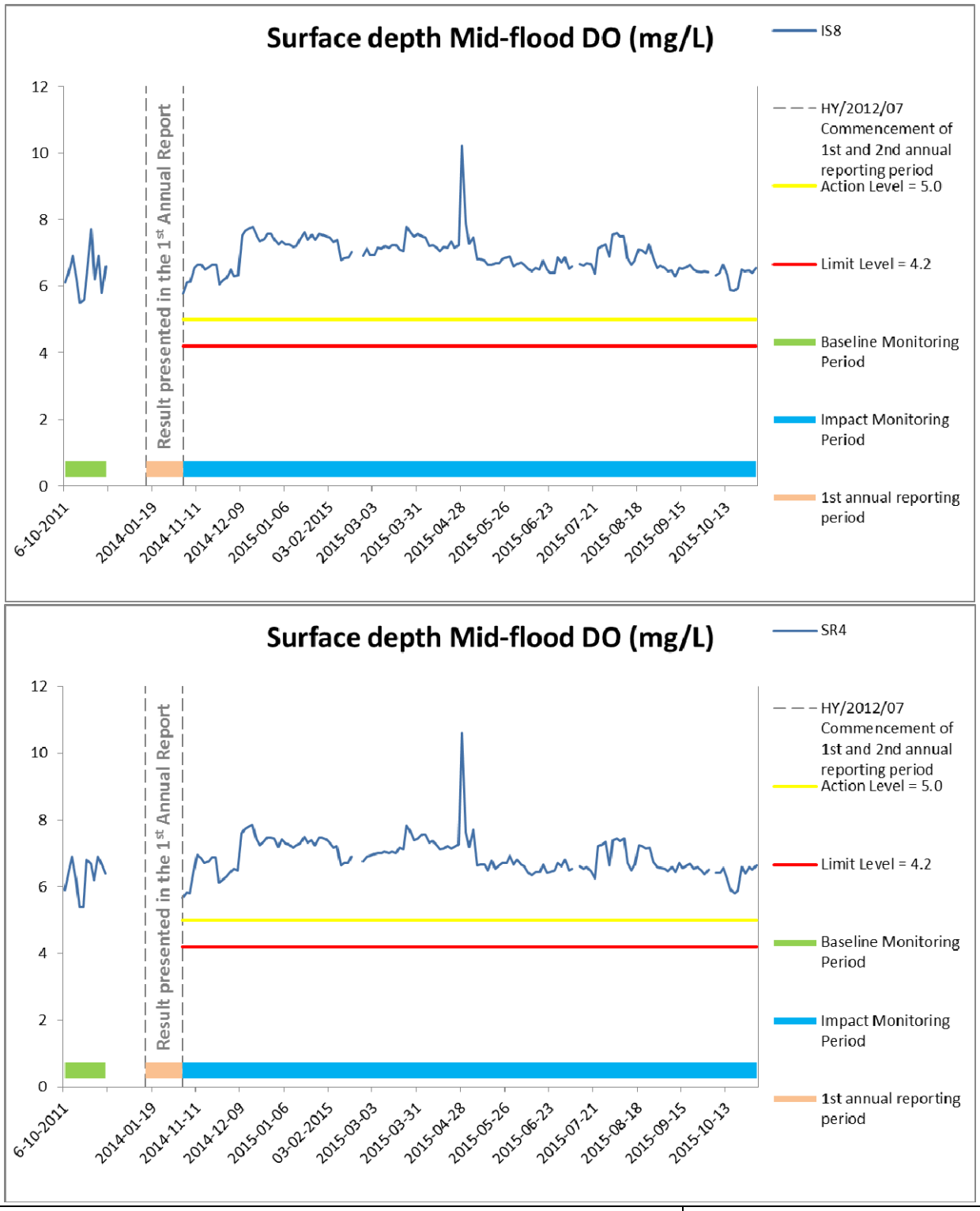


Figure F7 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-flood tide between 1 November 2014 and 31 October 2015 at IS8 and SR4.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.

Environmental Resources Management

ERM

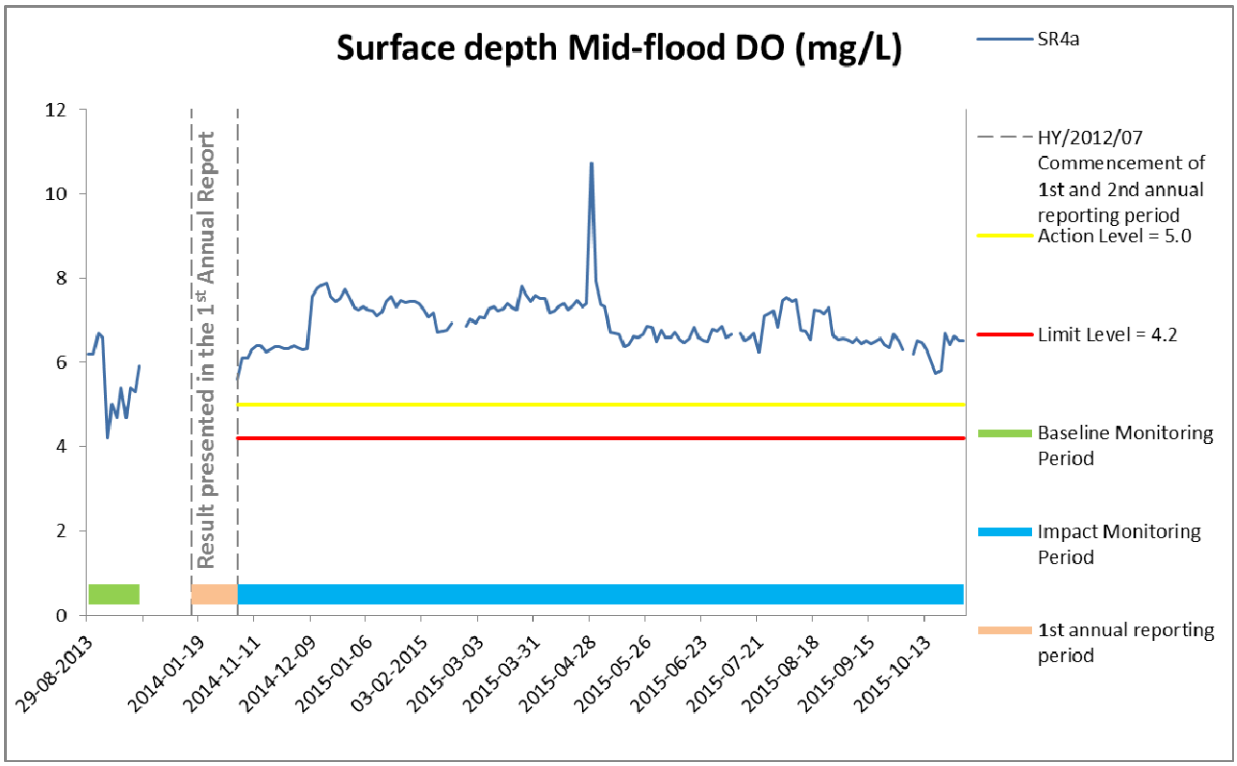
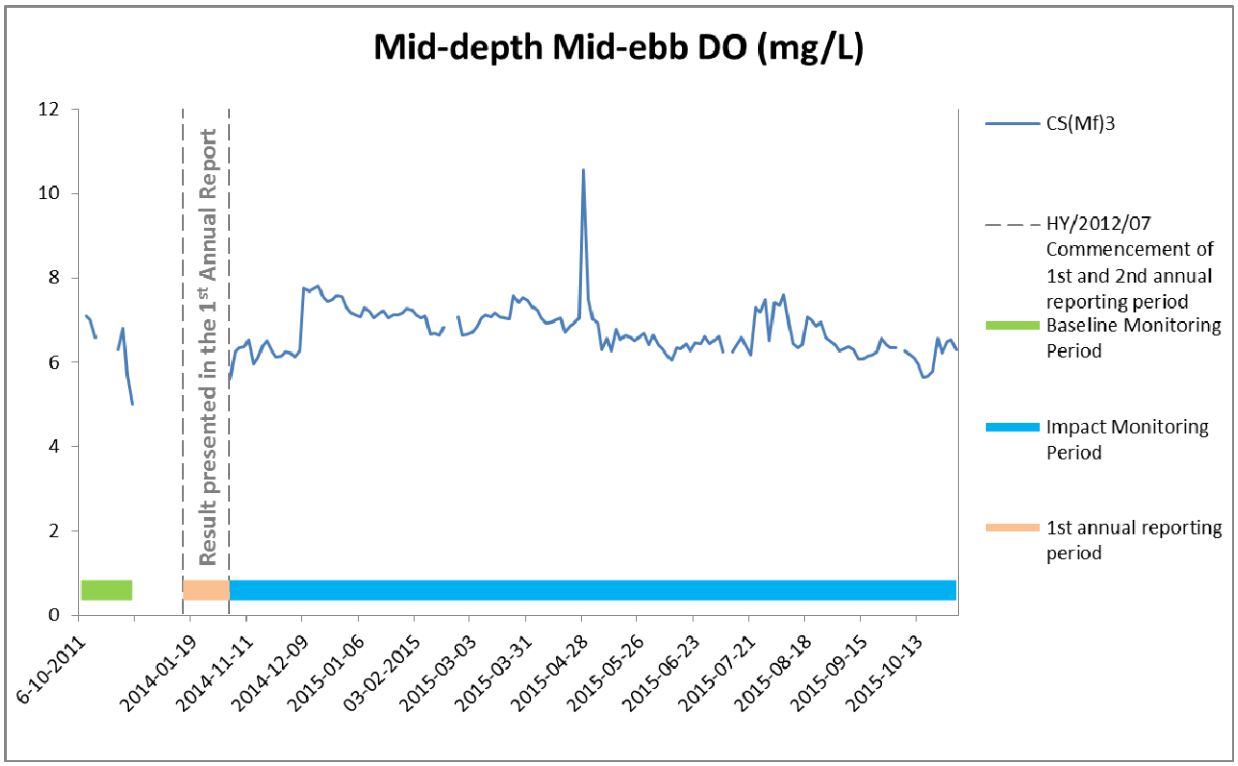


Figure F8 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in surface waters during mid-flood tide between 1 November 2014 and 31 October 2015 at SR4a.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions.

Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.



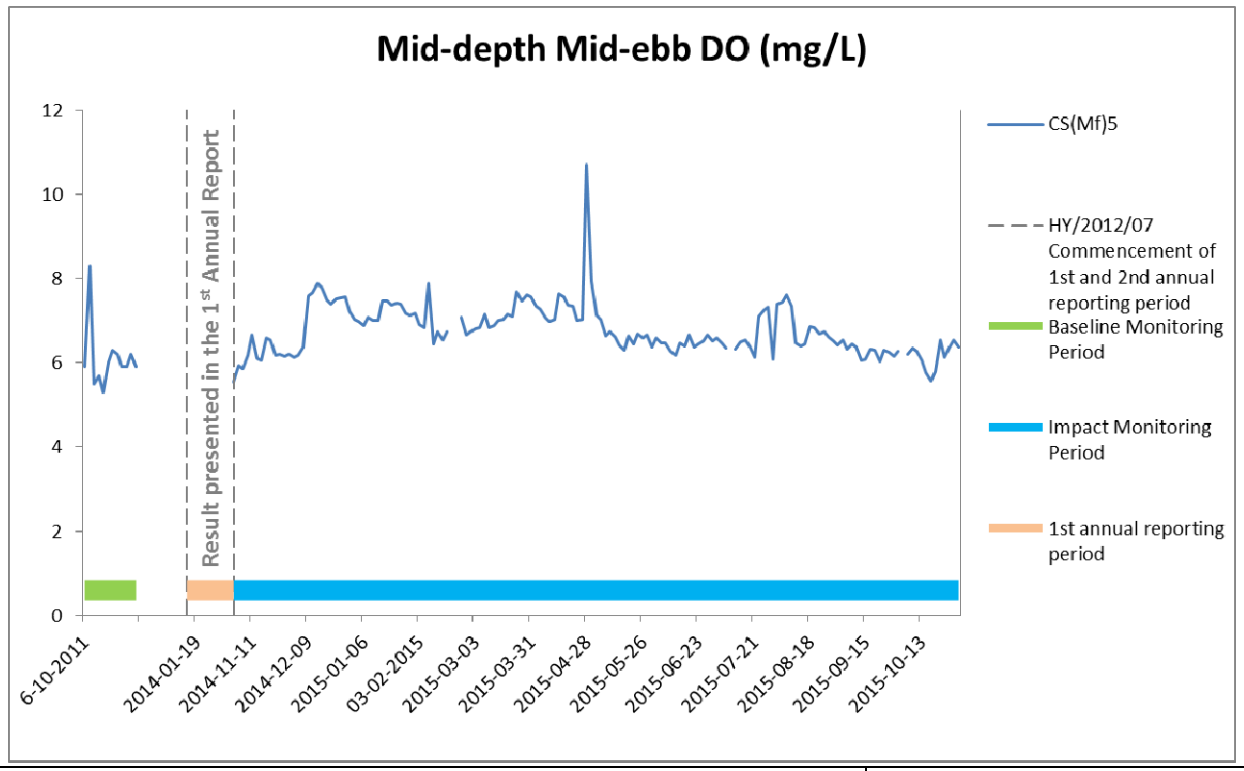


Figure F9 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters during mid-ebb tide between 1 November 2014 and 31 October 2015 at CS(Mf)3 and IS(Mf)5.

(Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.)

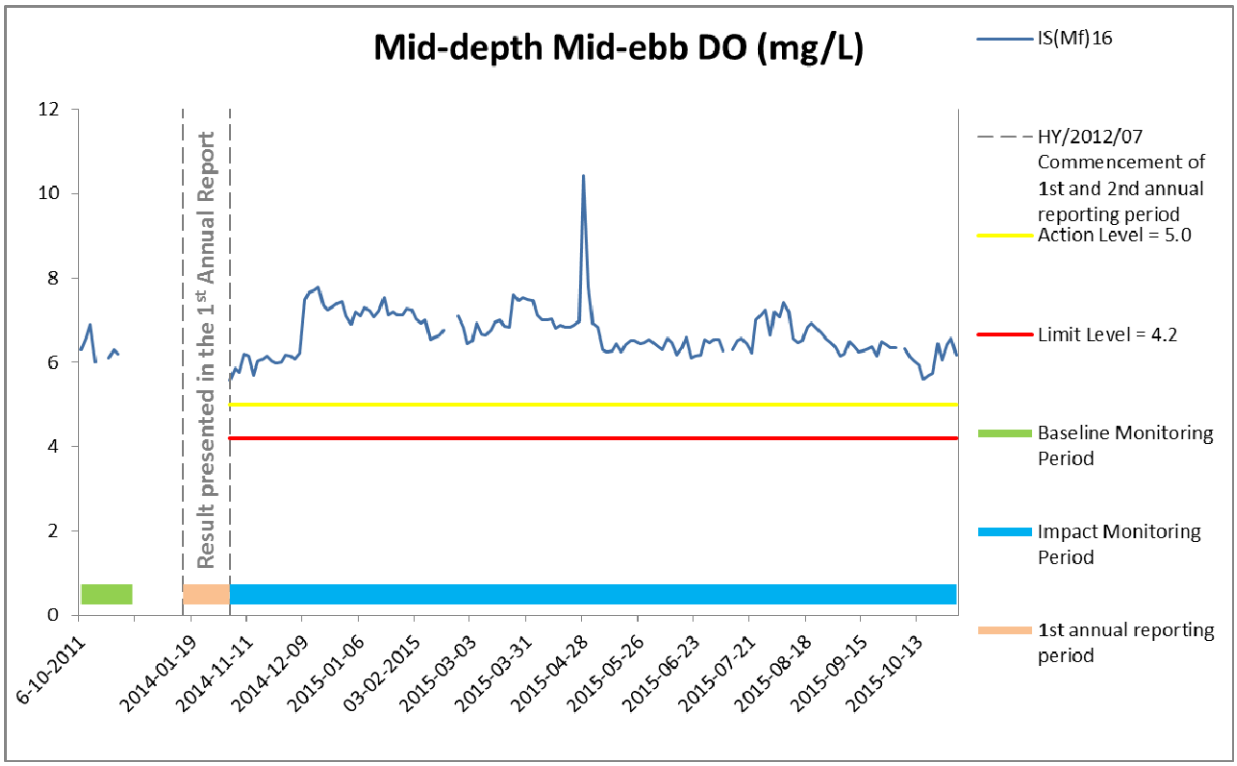
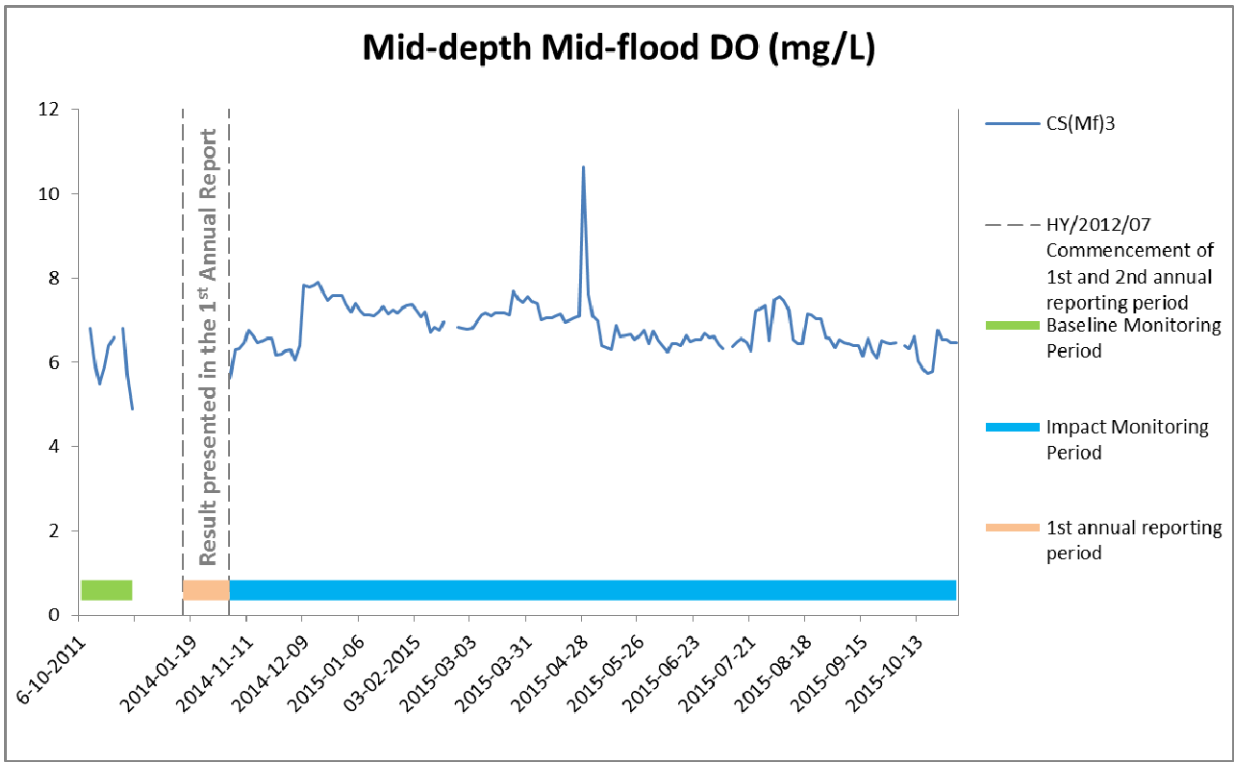


Figure F10 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters during mid-ebb tide between 1 November 2014 and 31 October 2015 at IS(Mf)16.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.



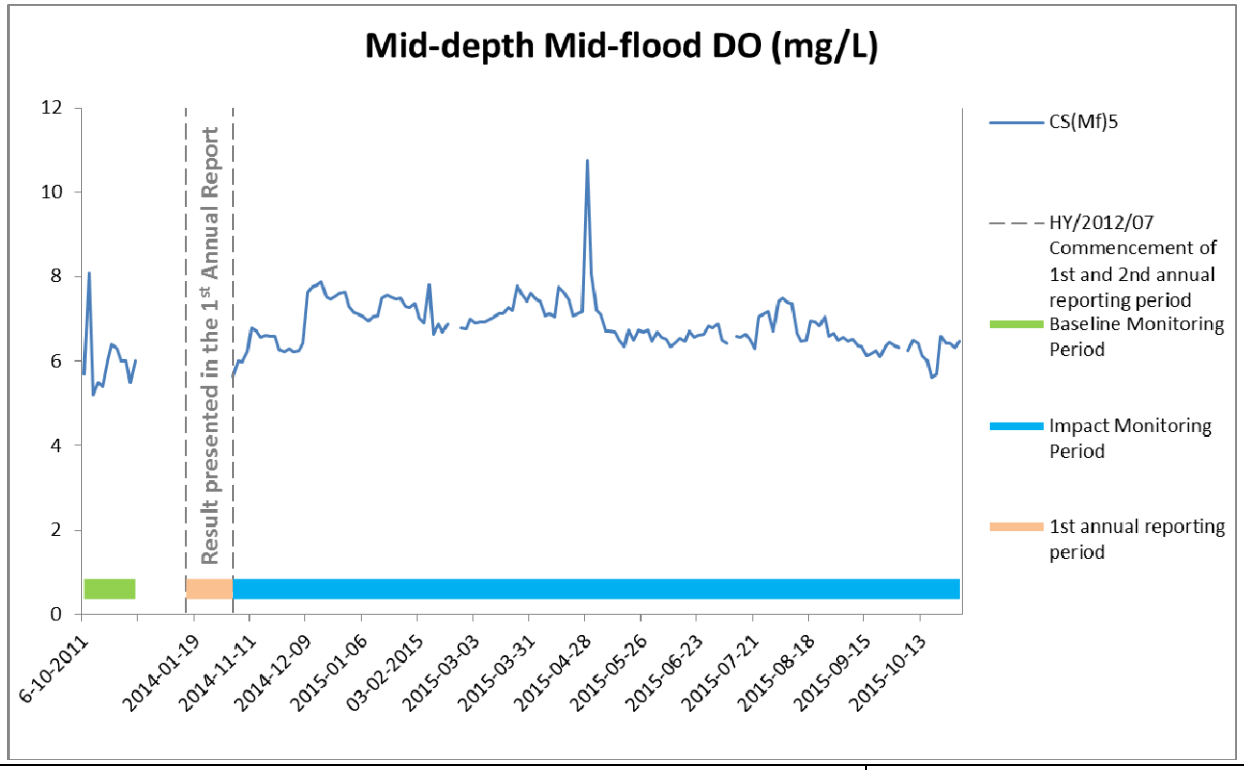


Figure F11 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters during mid-flood tide between 1 November 2014 and 31 October 2015 at CS(Mf)3 and IS(Mf)5.

(Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.)

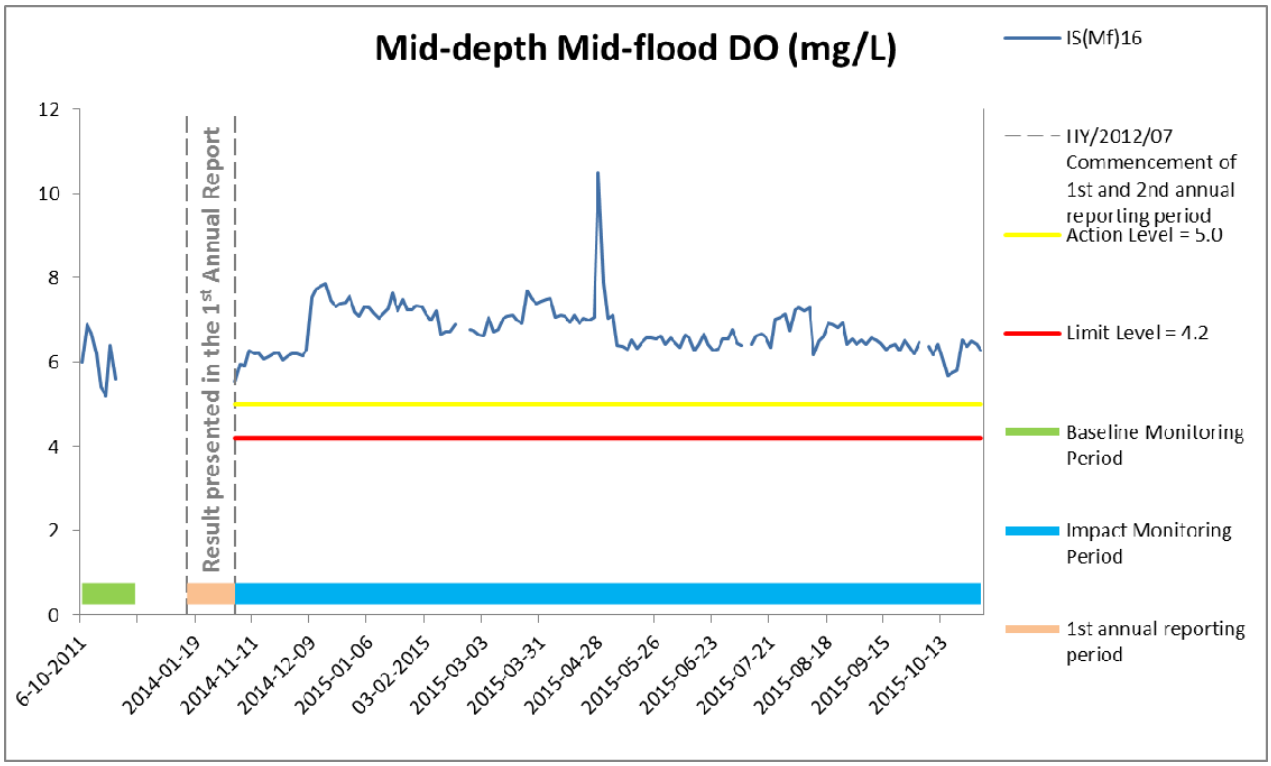
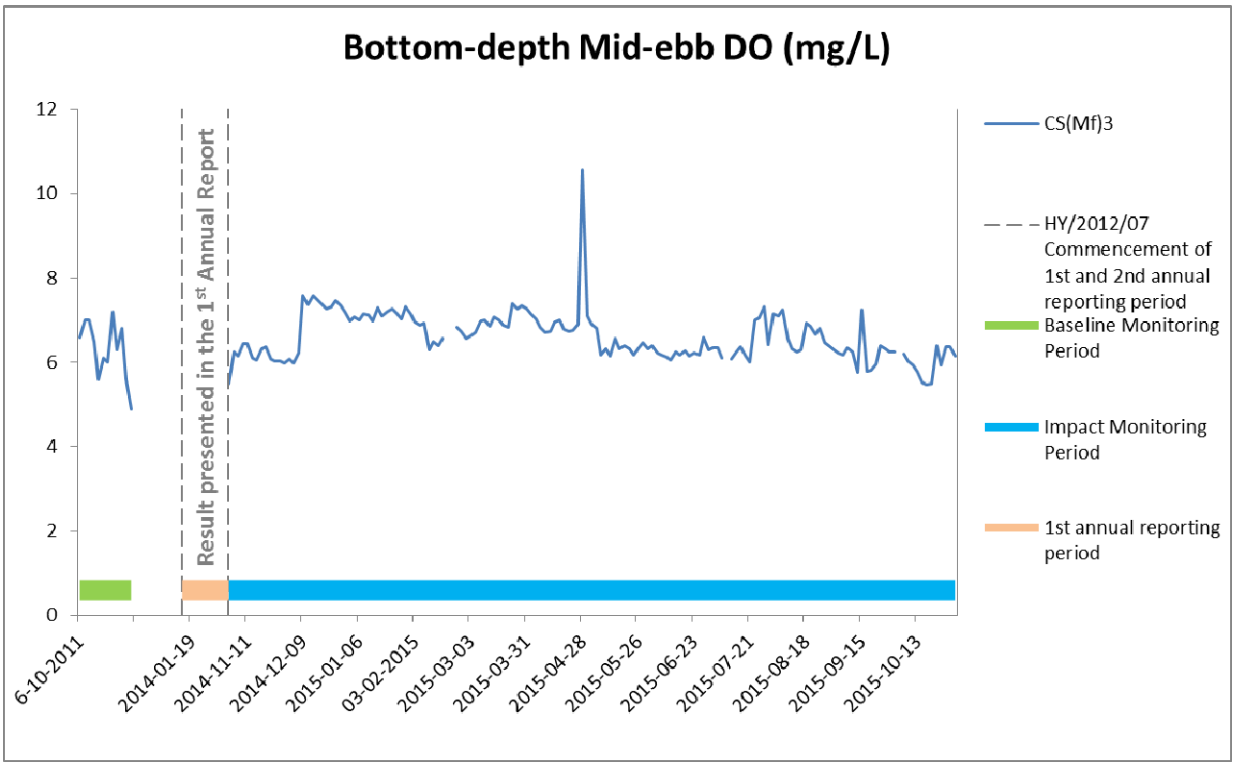


Figure F12 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in mid-depth waters during mid-flood tide between 1 November 2014 and 31 October 2015 at IS(Mf)16.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.



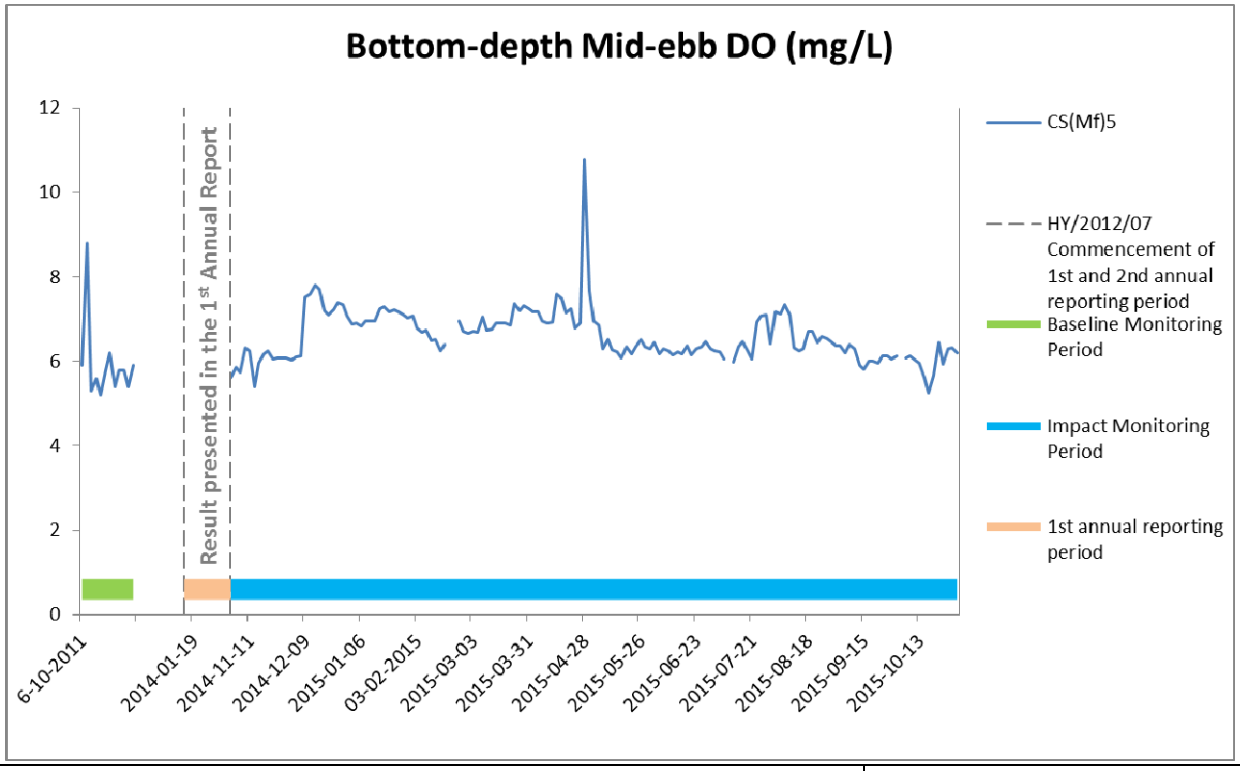
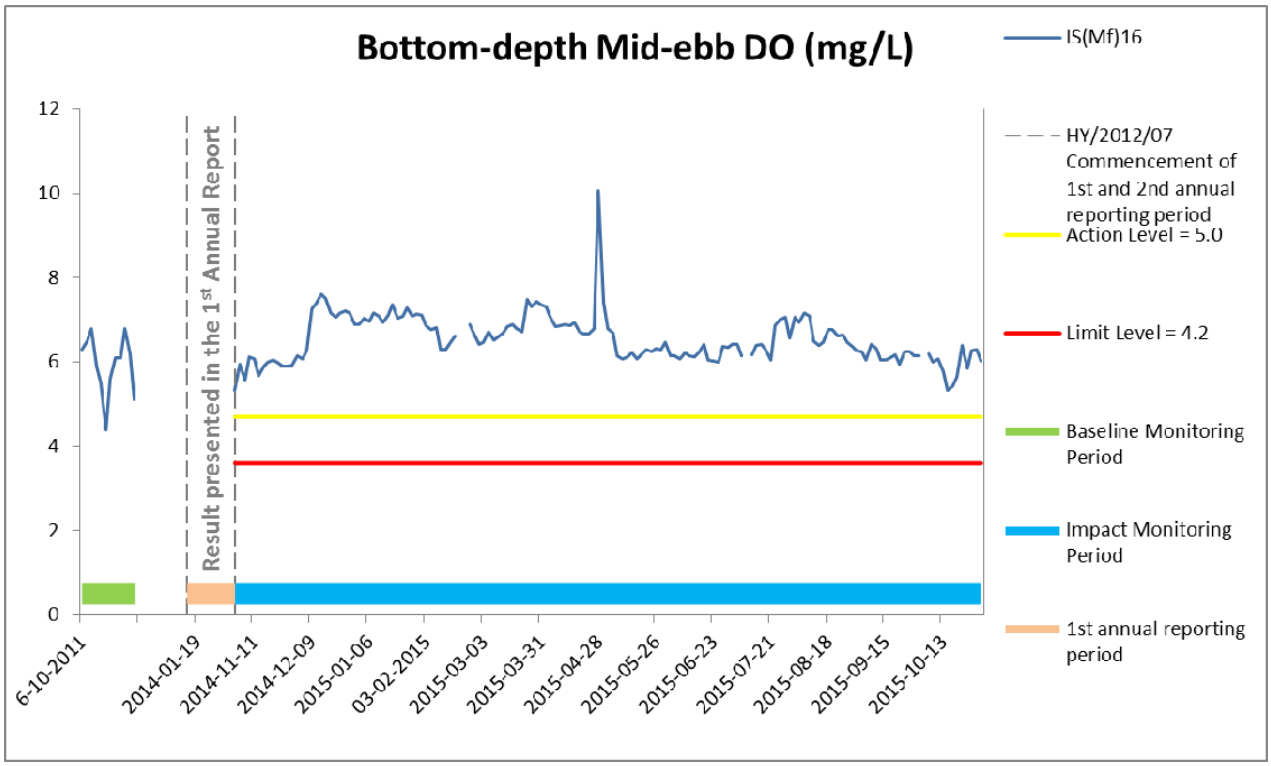


Figure F13 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-ebb tide between 1 November 2014 and 31 October 2015 at CS(Mf)3 and CS(Mf)5.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.



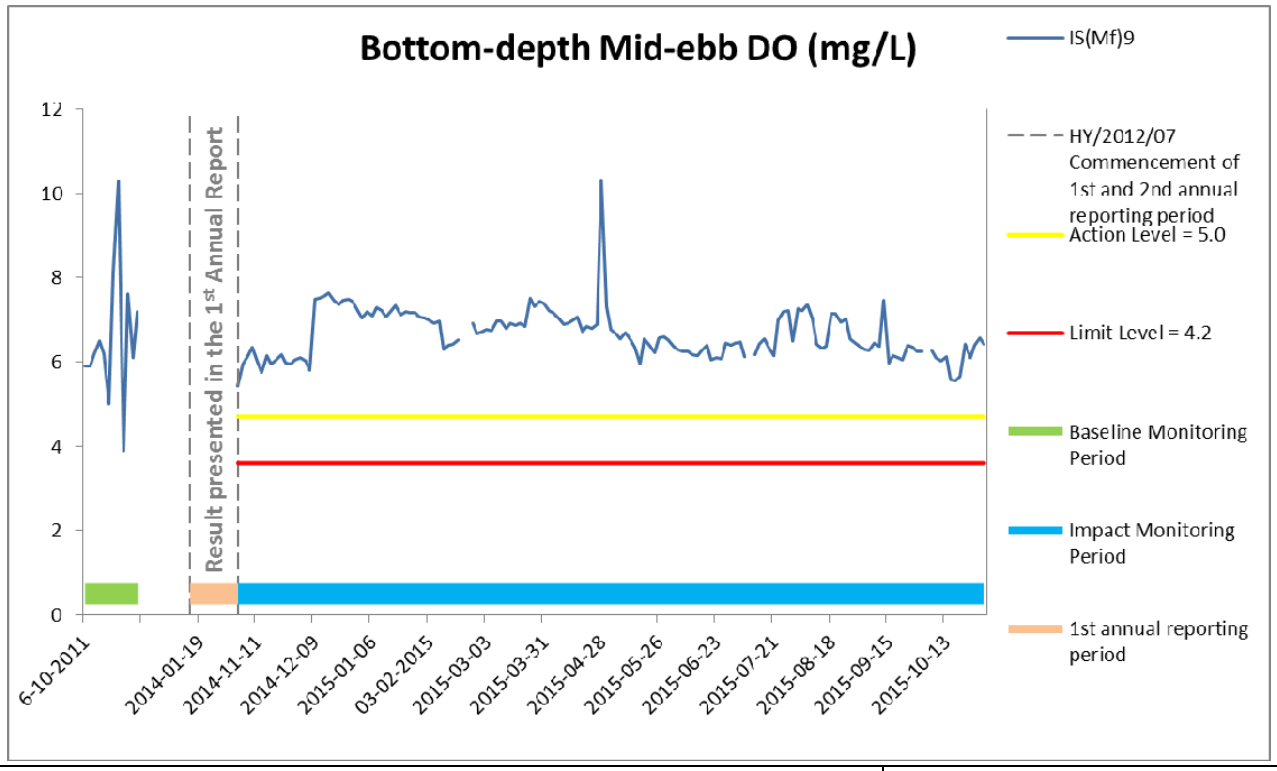
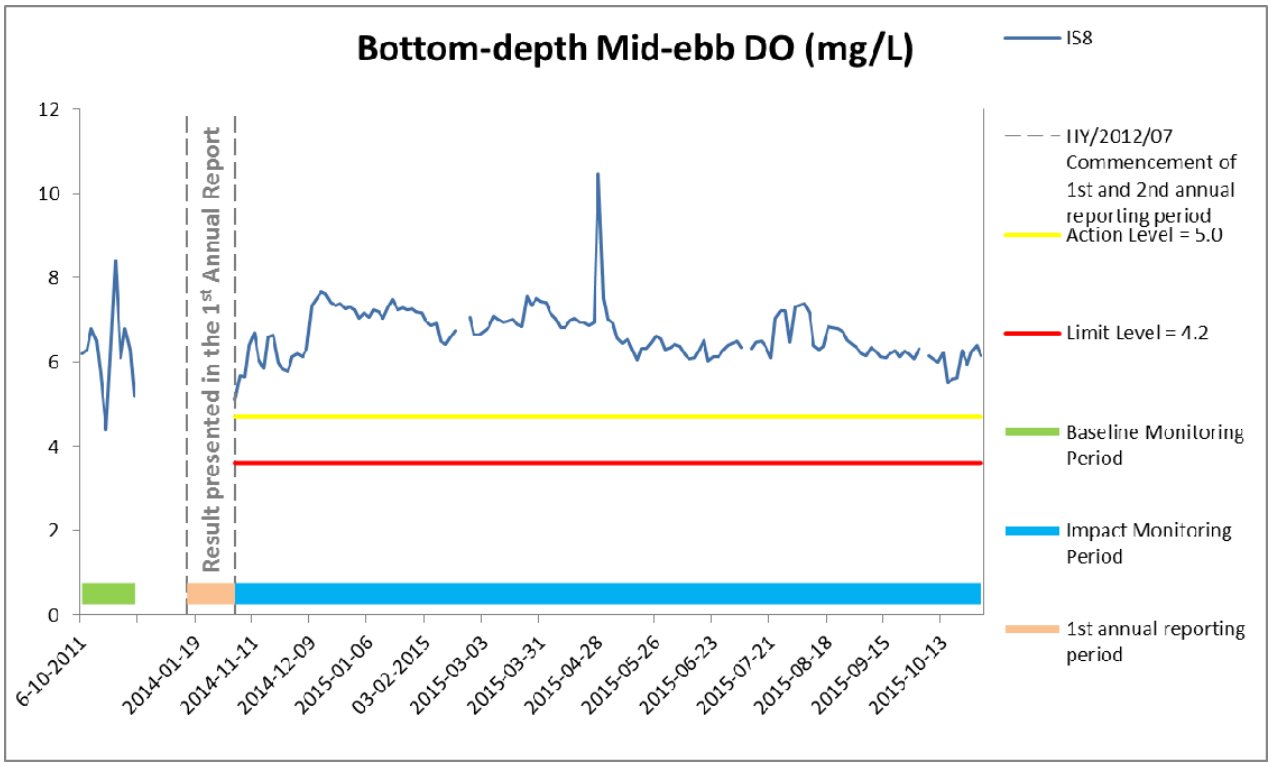


Figure F14 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-ebb tide between 1 November 2014 and 31 October 2015 at IS(Mf)16 and IS(Mf)9.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.



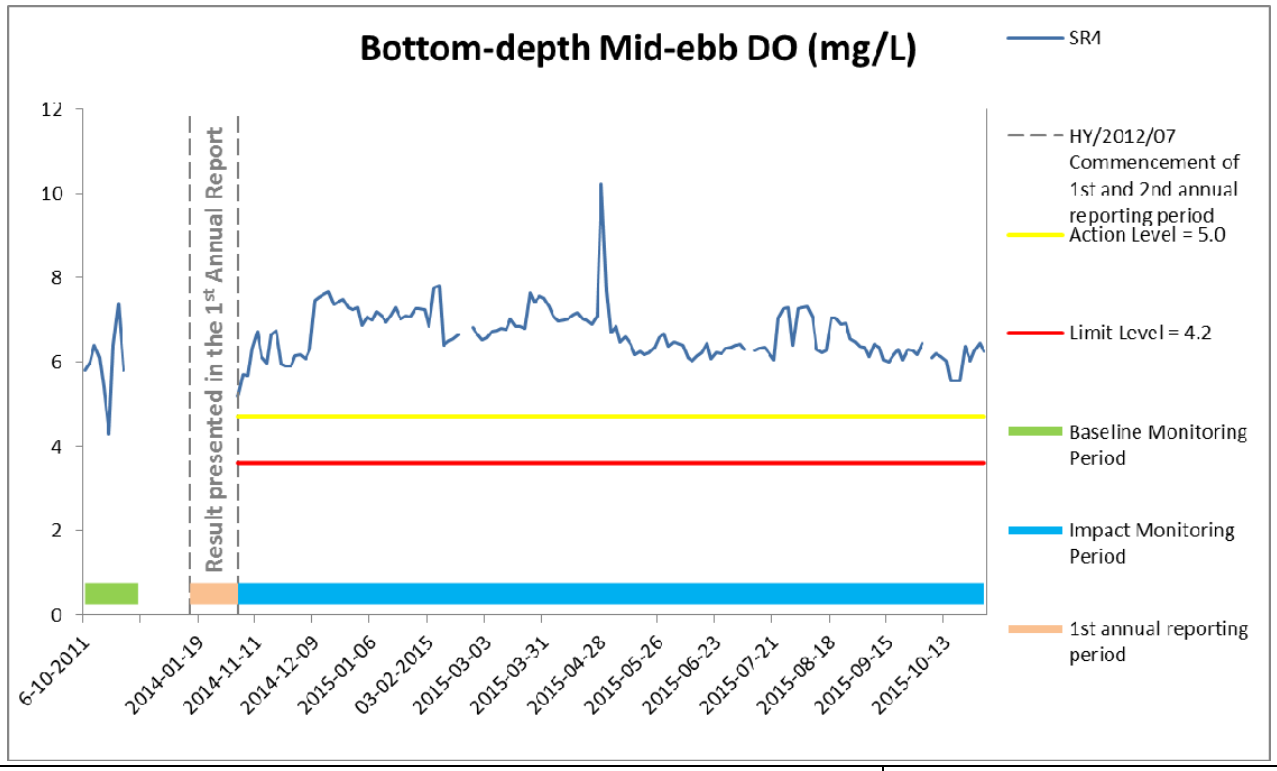


Figure F15 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-ebb tide between 1 November 2014 and 31 October 2015 at IS8 and SR4.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.

Environmental Resources Management

ERM

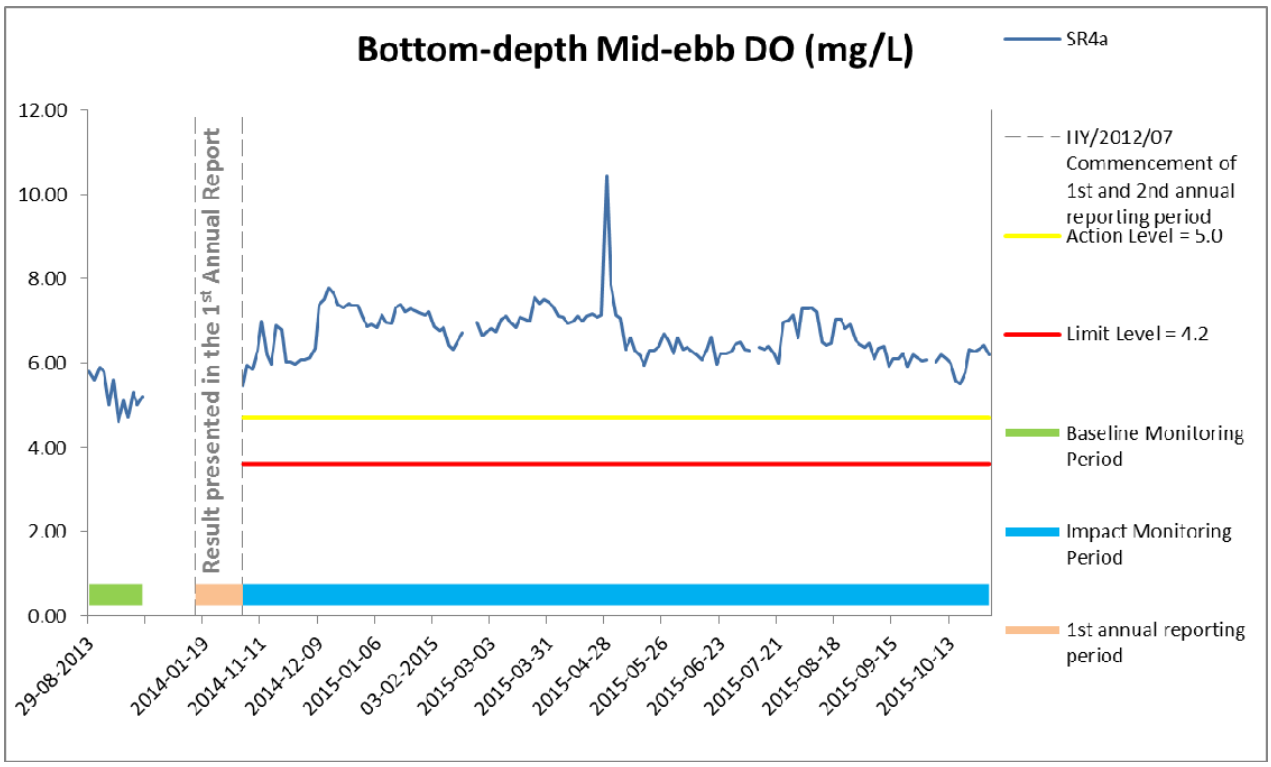
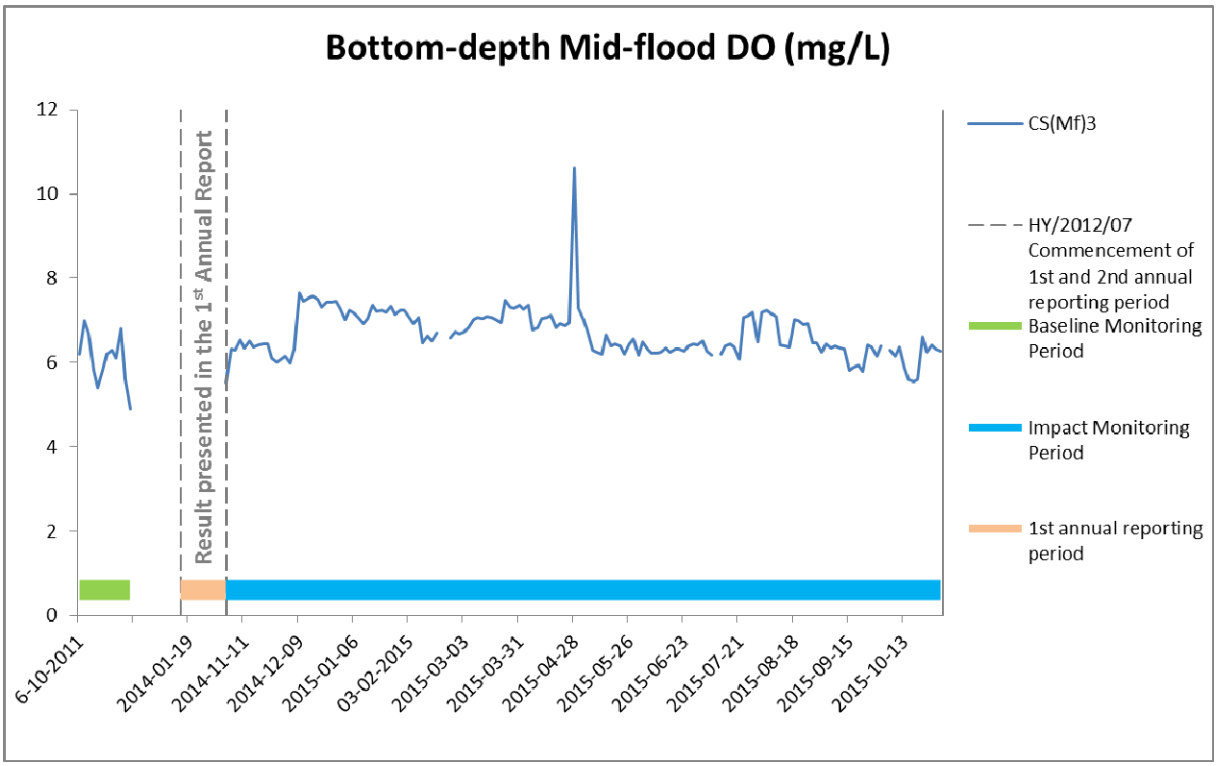


Figure F16 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-ebb tide between 1 November 2014 and 31 October 2015 at SR4a.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions.
Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.



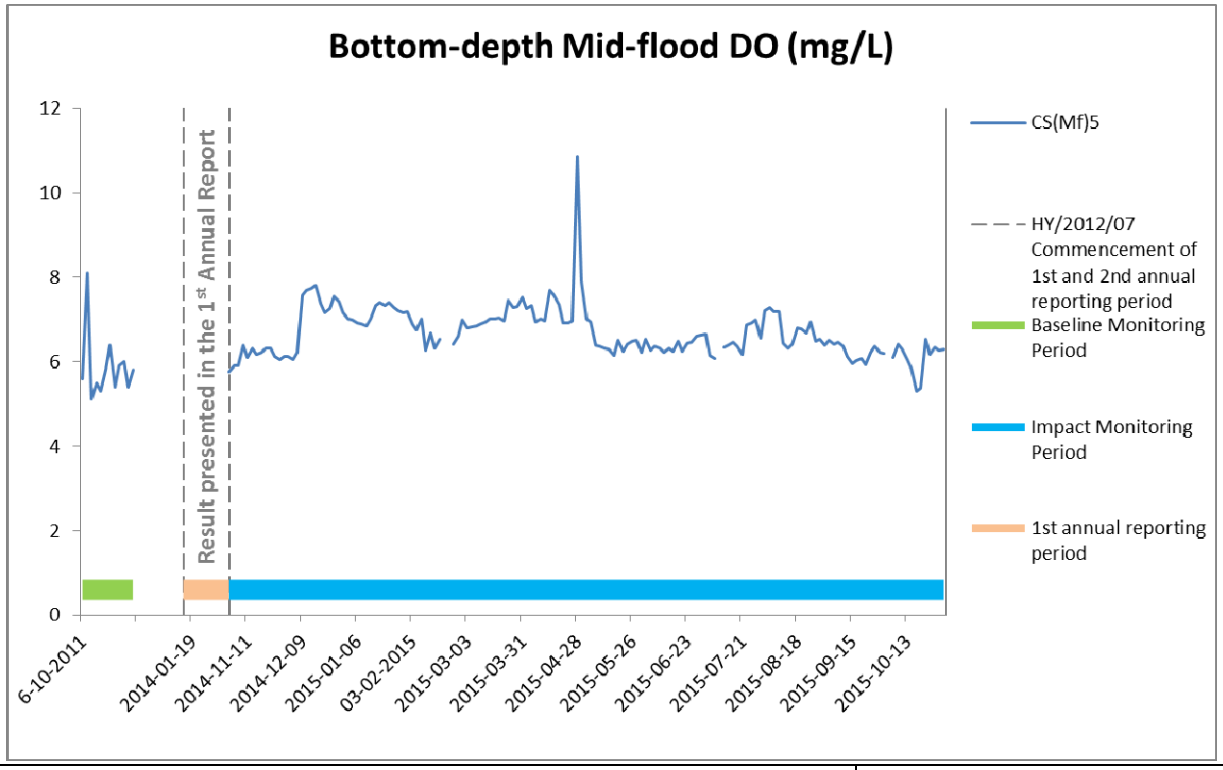
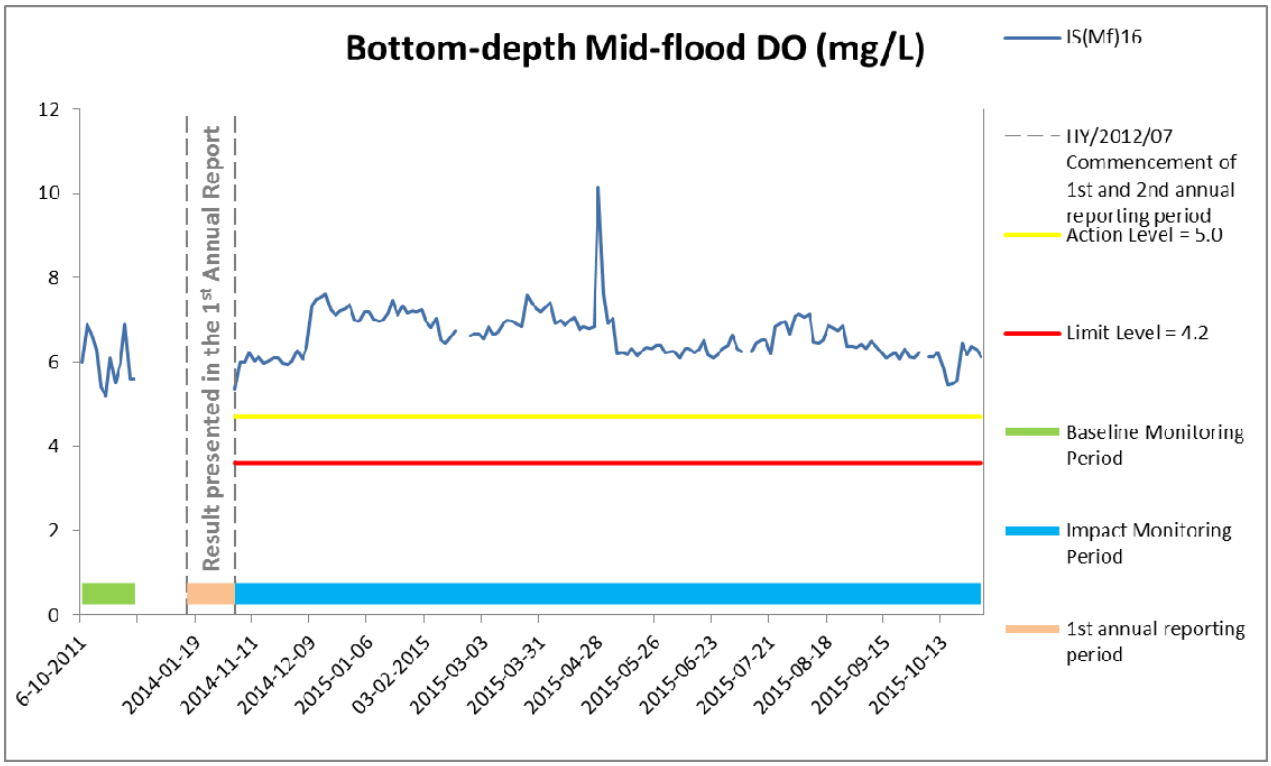


Figure F17 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-flood tide between 1 November 2014 and 31 October 2015 at CS(Mf)3 and CS(Mf)5.

(Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.)



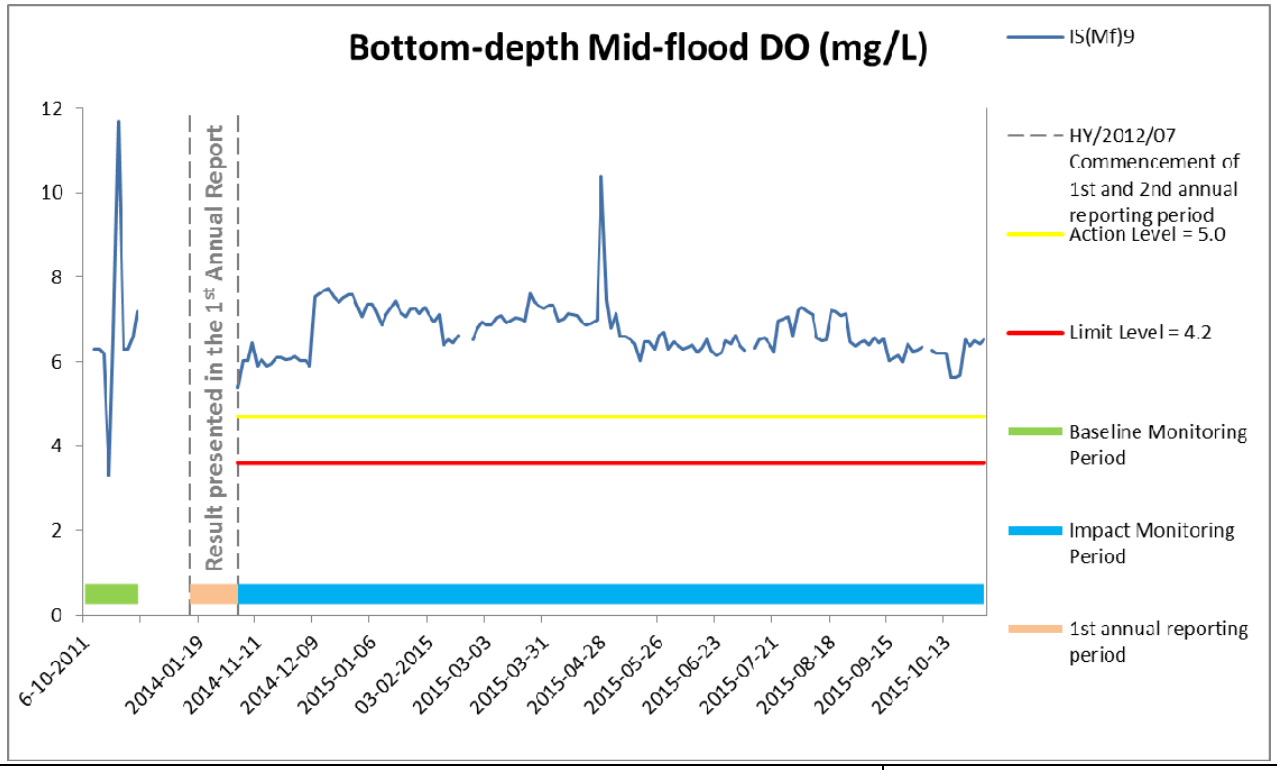
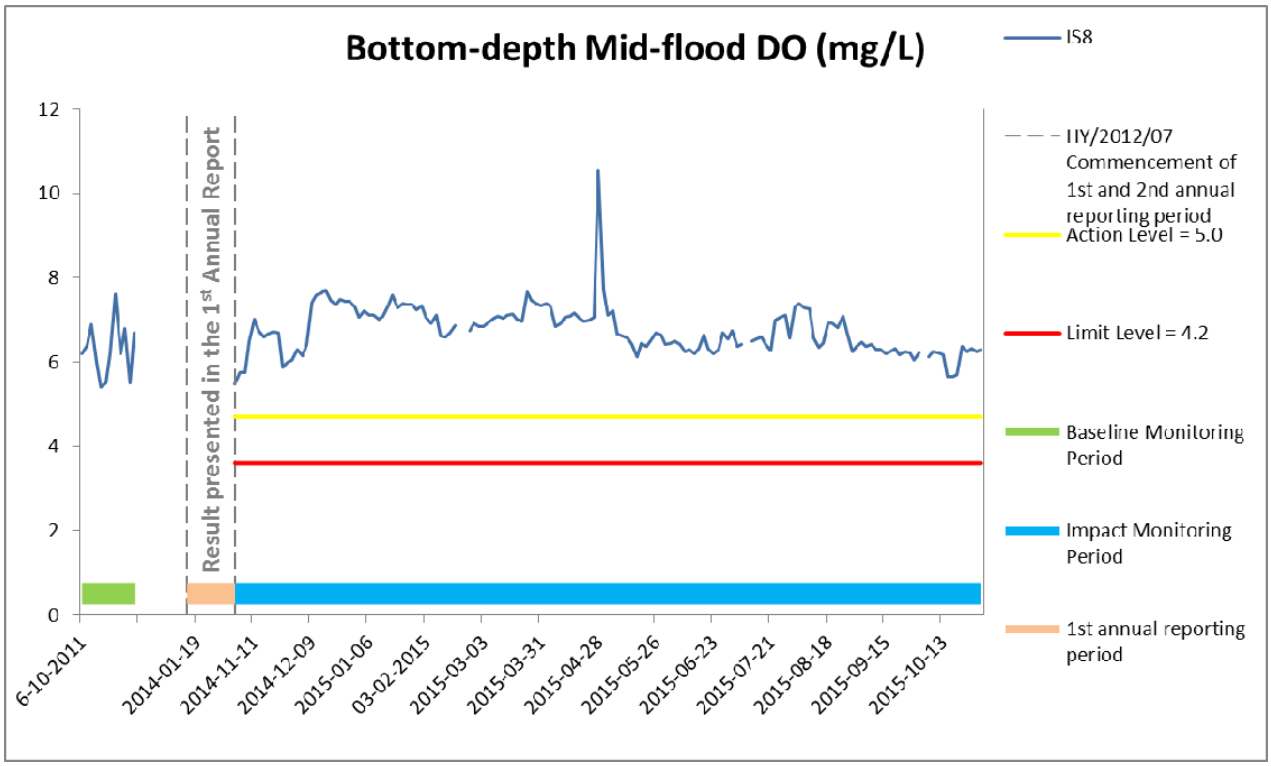


Figure F18 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-flood tide between 1 November 2014 and 31 October 2015 at IS(Mf)16 and IS(Mf)9.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.



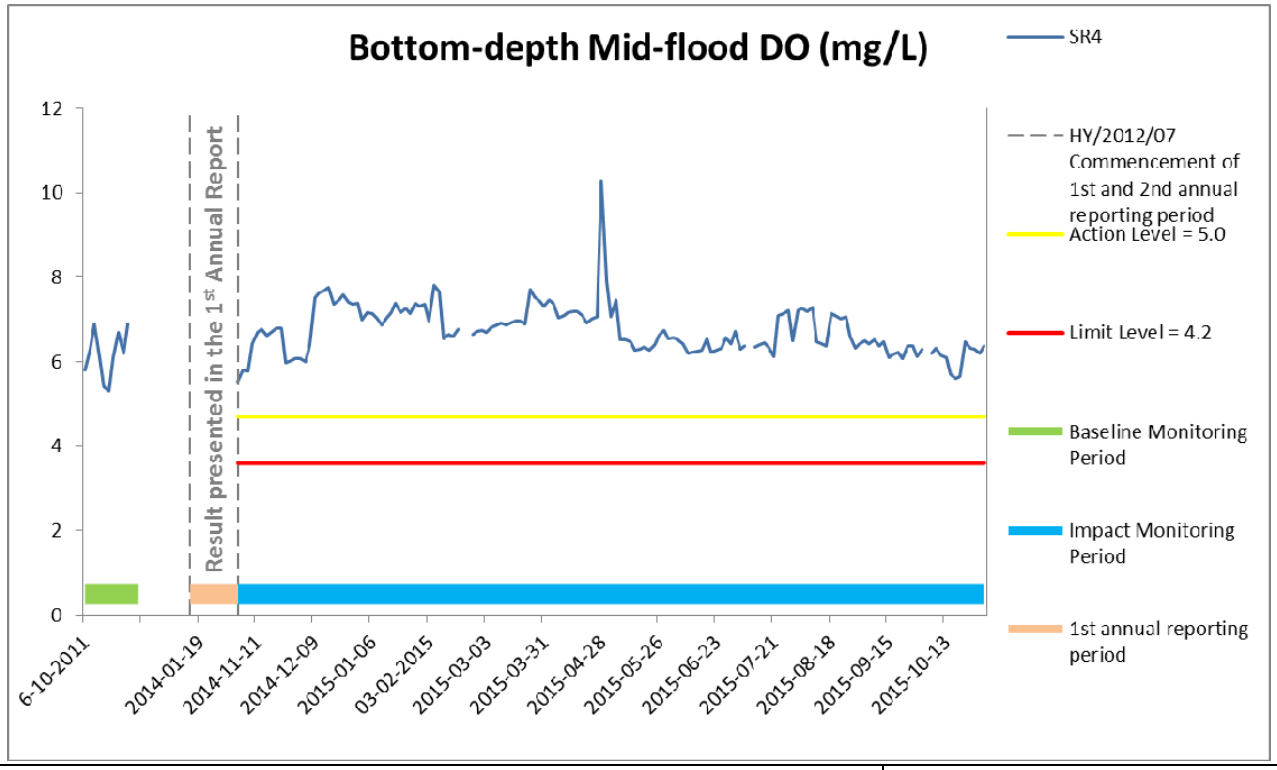


Figure F19 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-flood tide between 1 November 2014 and 31 October 2015 at IS8 and SR4.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.

Environmental Resources Management

ERM

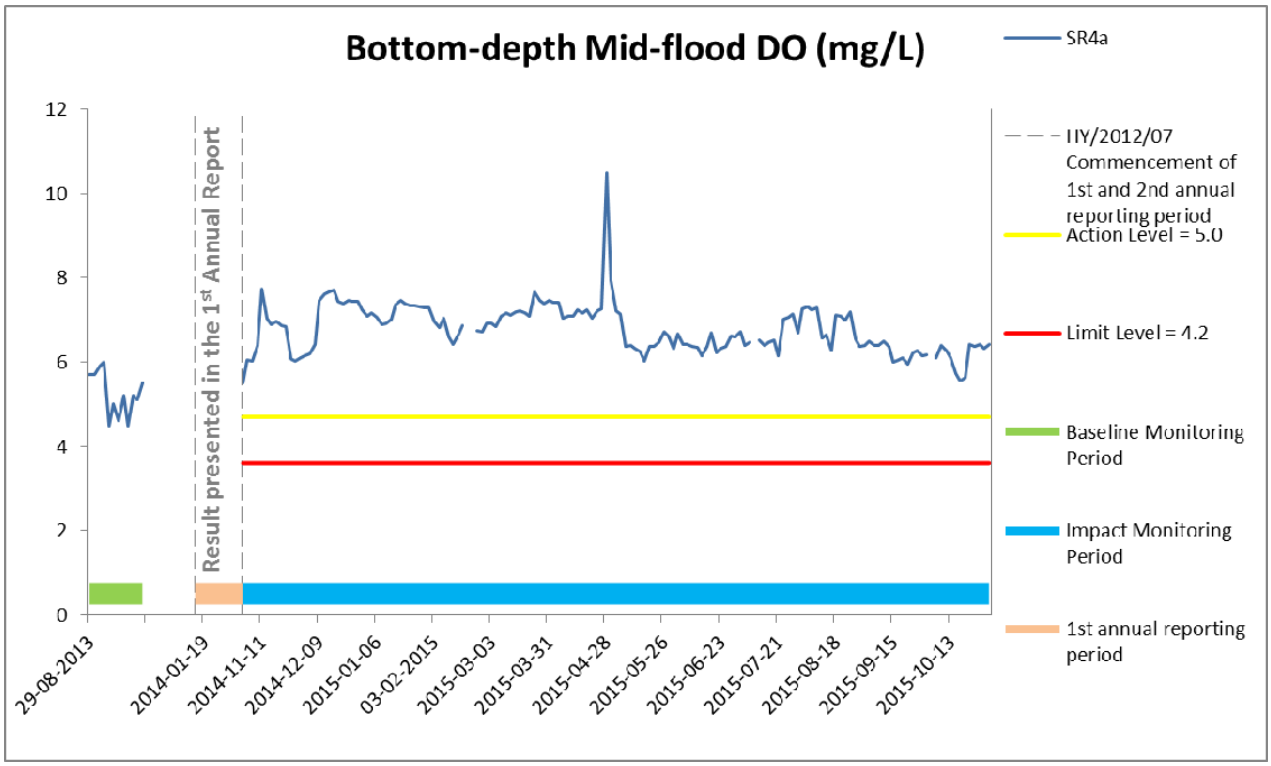
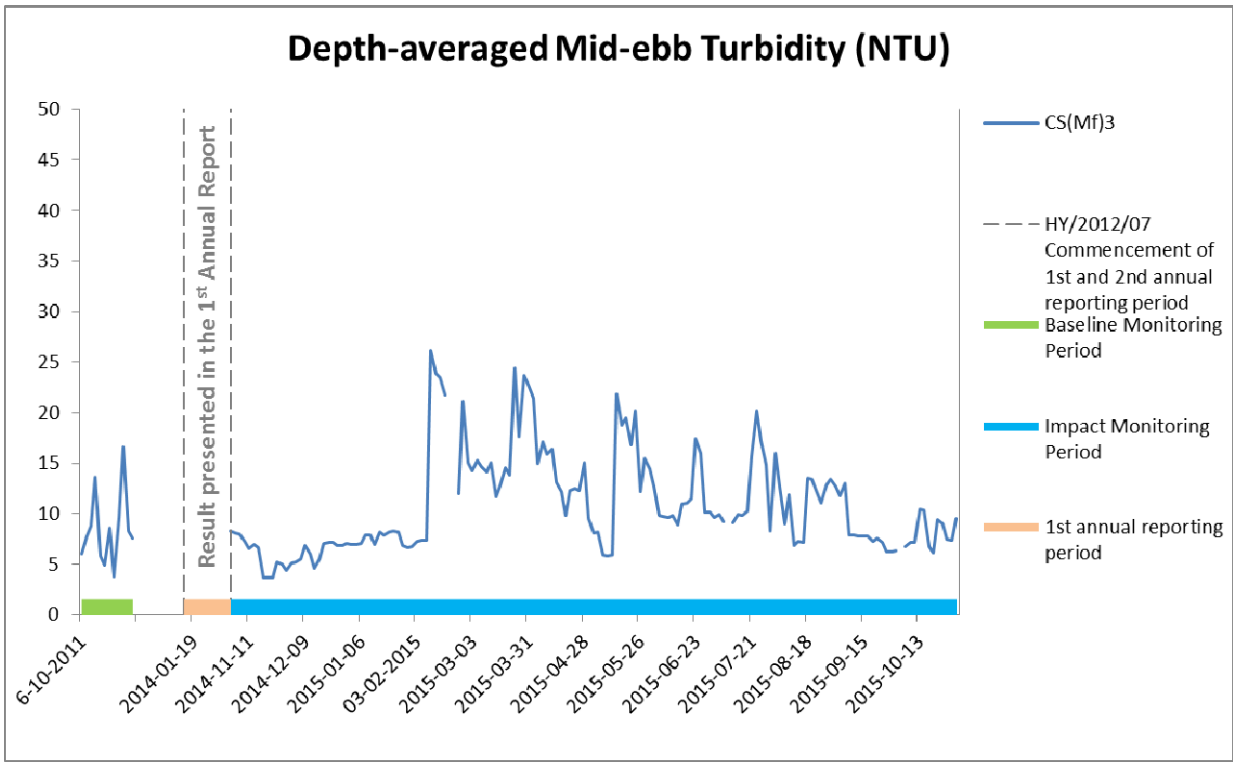


Figure F20 Impact Monitoring – Mean Level of Dissolved Oxygen (mg/L) in bottom waters during mid-flood tide between 1 November 2014 and 31 October 2015 at SR4a.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.



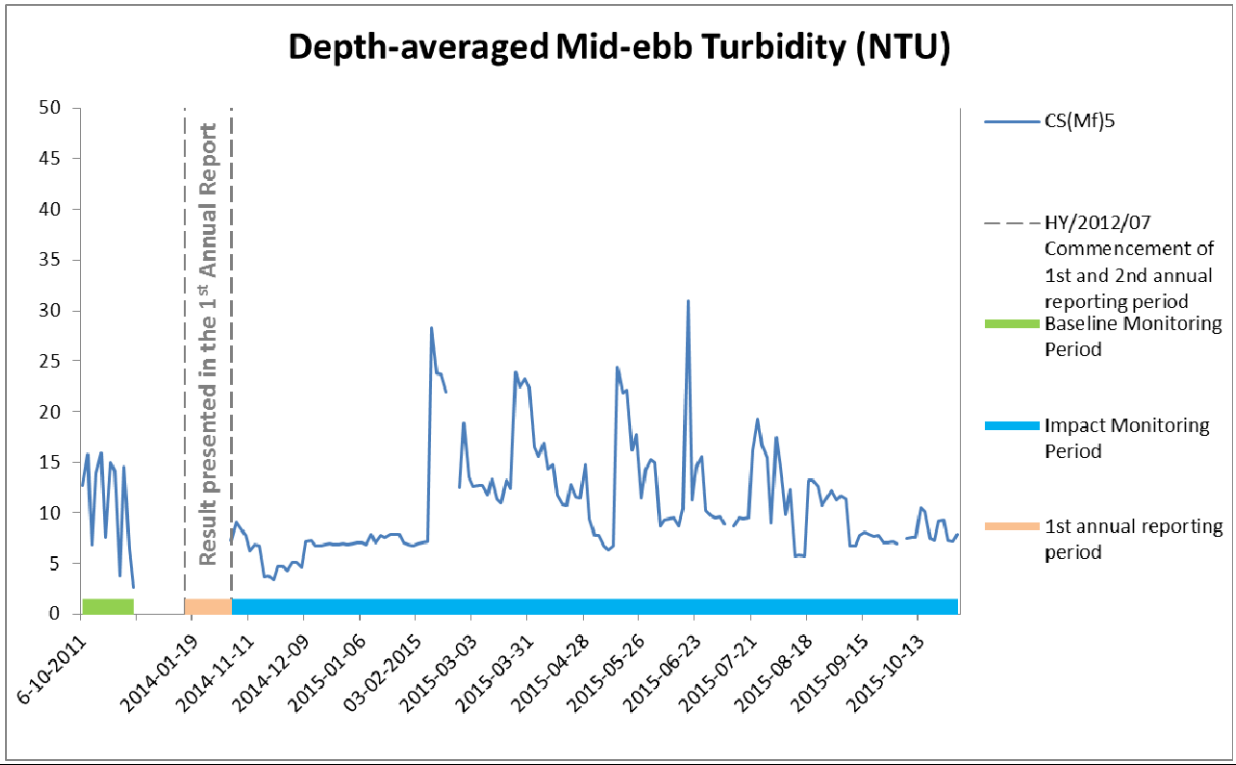
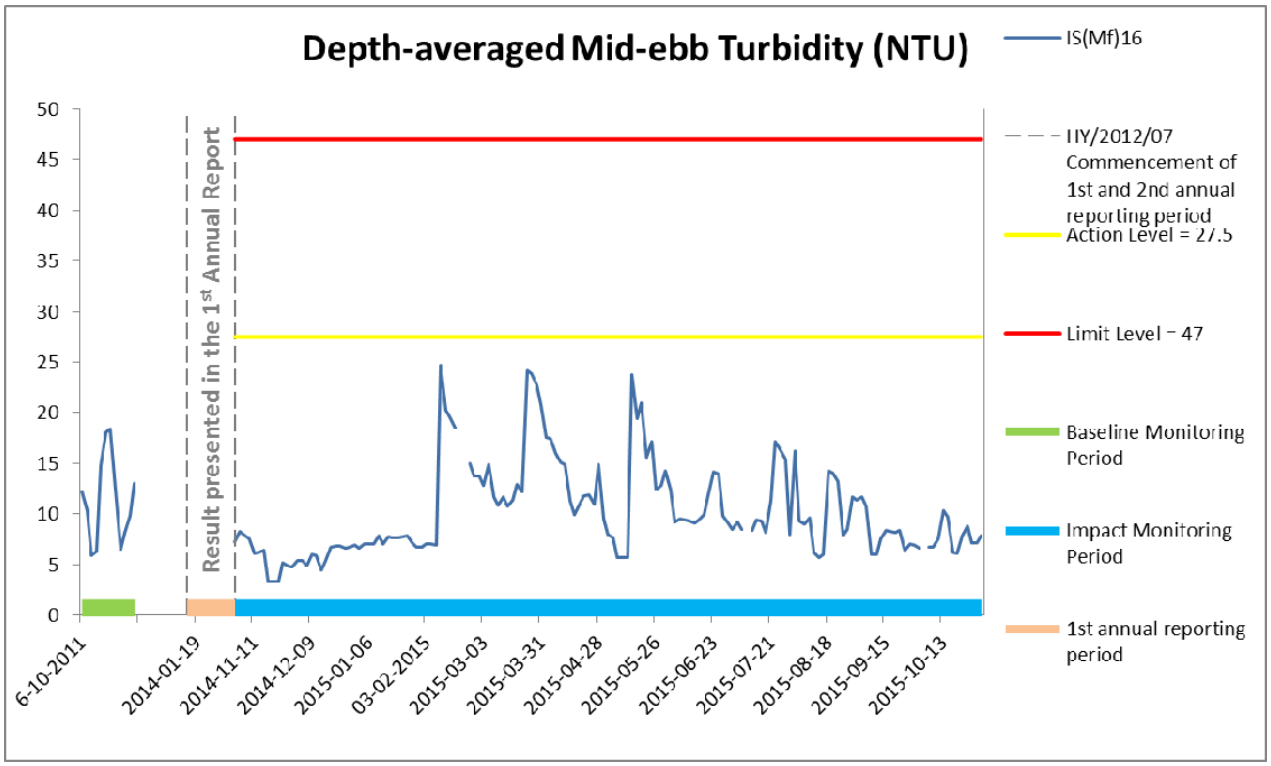


Figure F21 Impact Monitoring – Mean Level of depth-averaged Turbidity (NTU) during mid-ebb tide between 1 November 2014 and 31 October 2015 at CS(Mf)3 and CS(Mf)5.

(Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.)



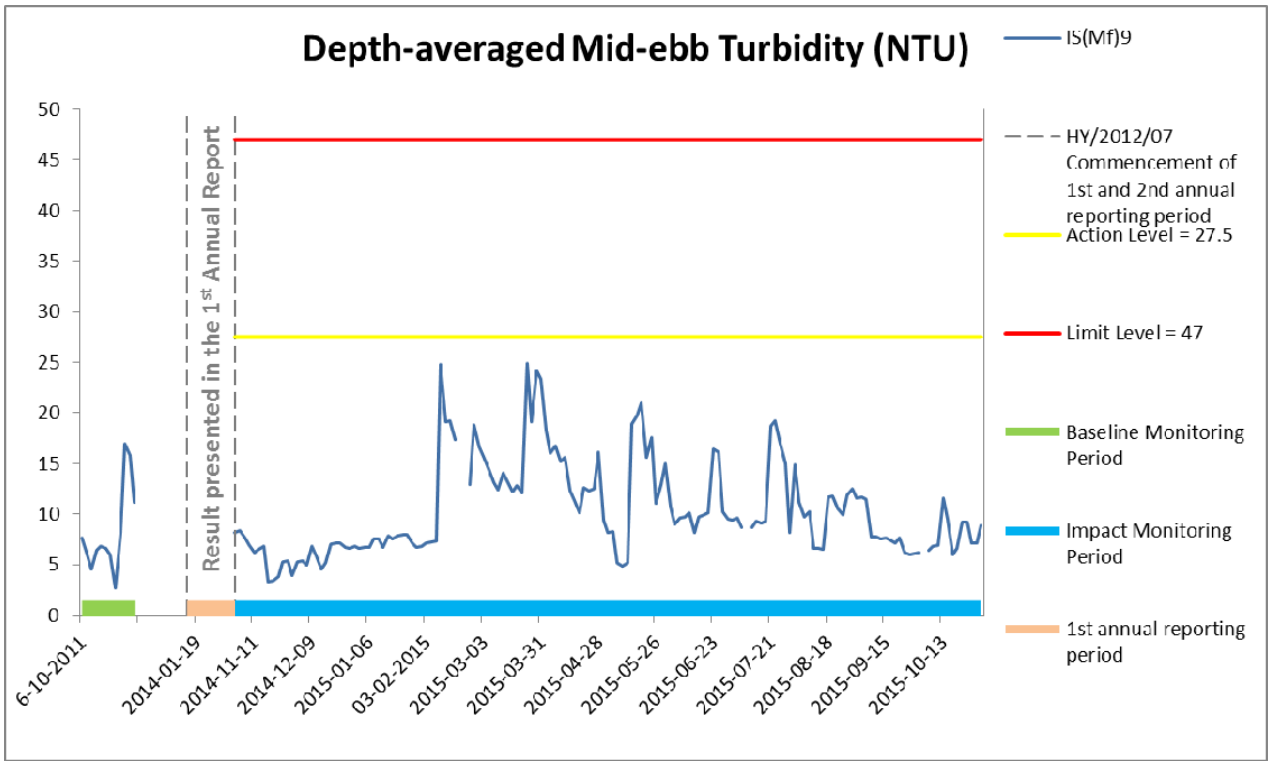
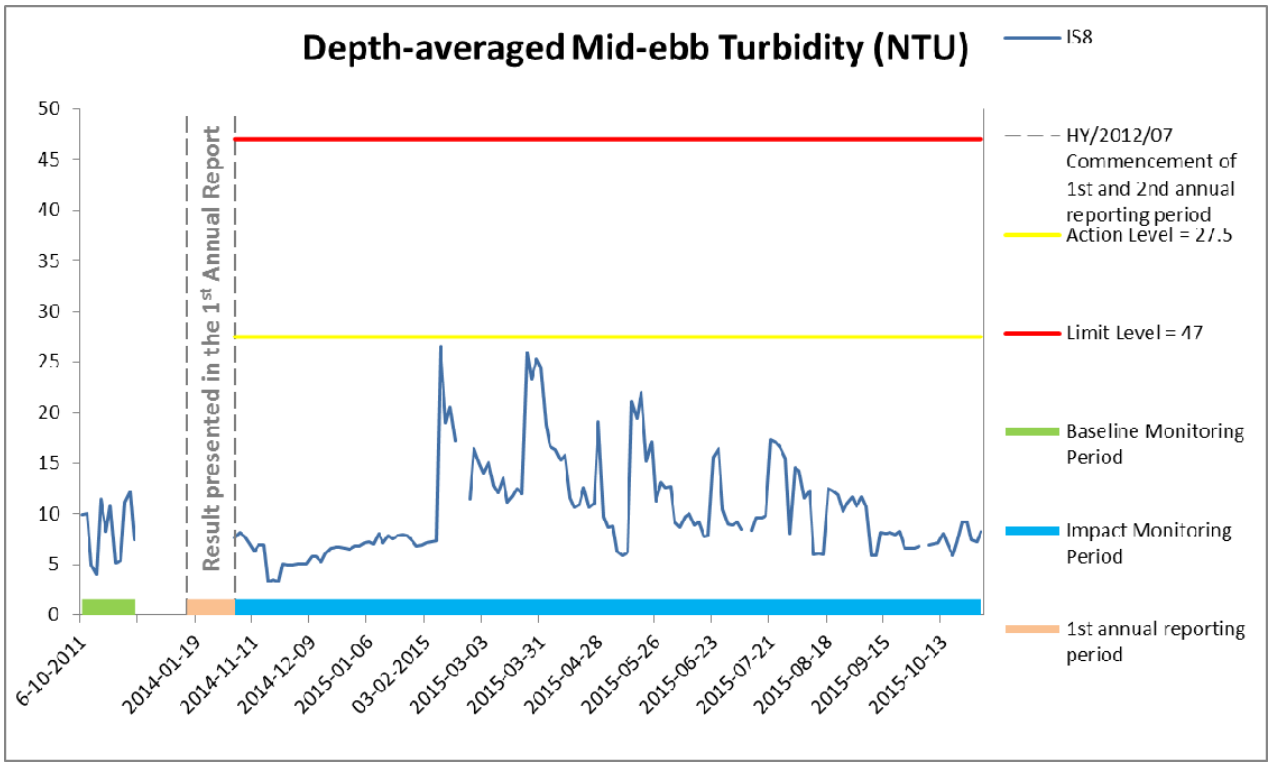


Figure F22 Impact Monitoring – Mean Level of depth-averaged Turbidity (NTU) during mid-ebb tide between 1 November 2014 and 31 October 2015 at IS(Mf)16 and IS(Mf)9.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.



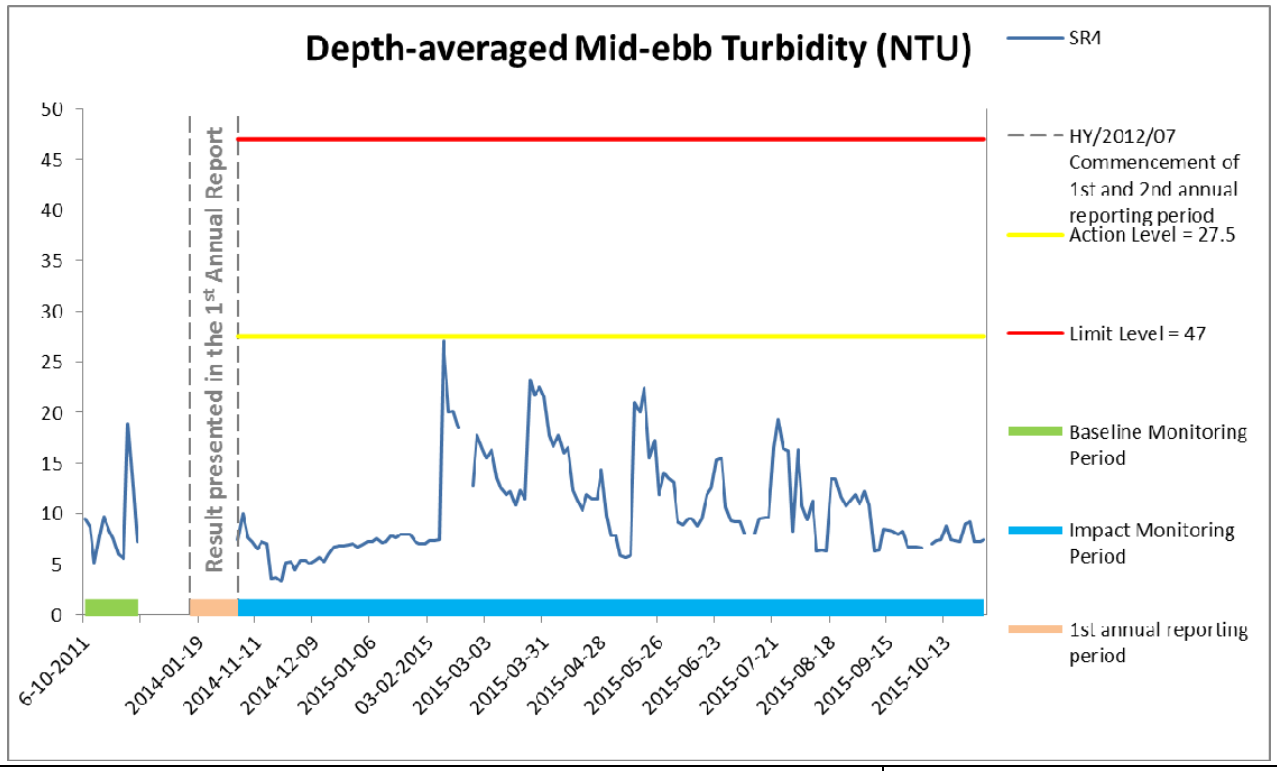


Figure F23 Impact Monitoring – Mean Level of depth-averaged Turbidity (NTU) during mid-ebb tide between 1 November 2014 and 31 October 2015 at IS8 and SR4.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.

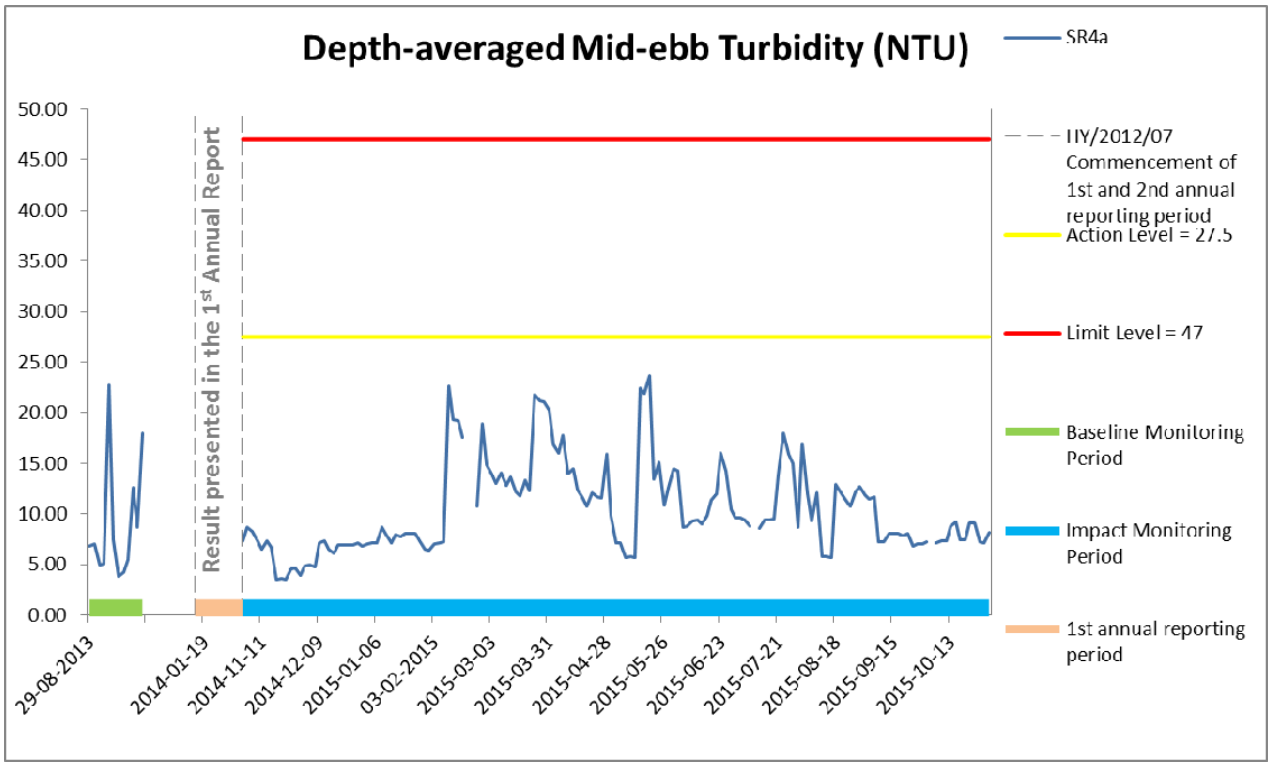
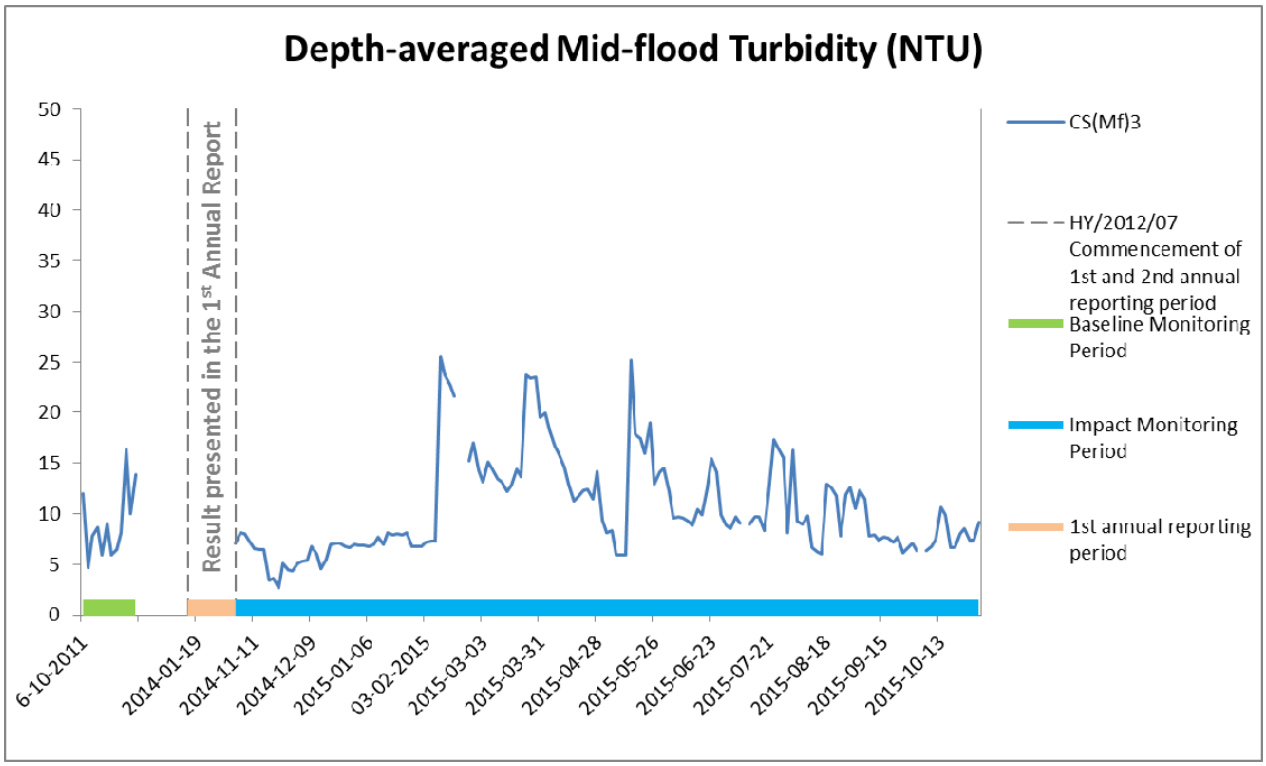


Figure F24 Impact Monitoring – Mean Level of depth-averaged Turbidity (NTU) during mid-ebb tide between 1 November 2014 and 31 October 2015 at SR4a.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.



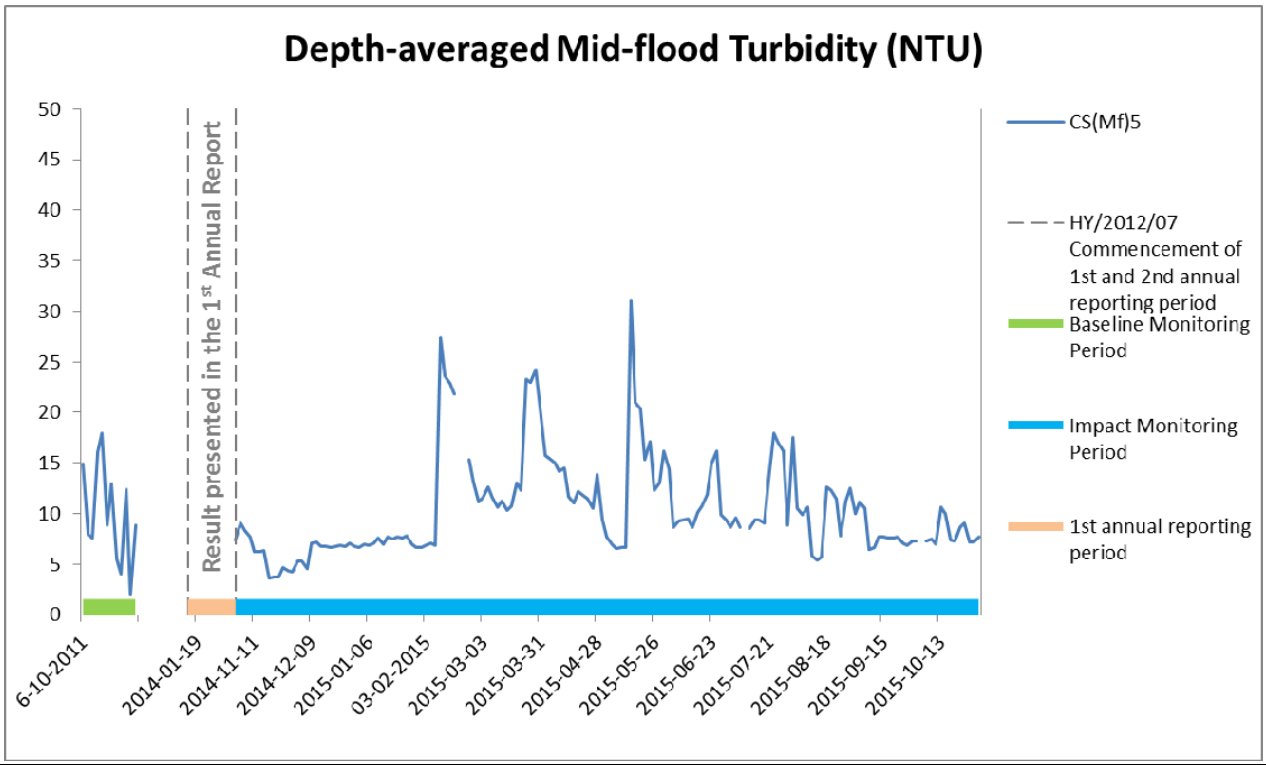
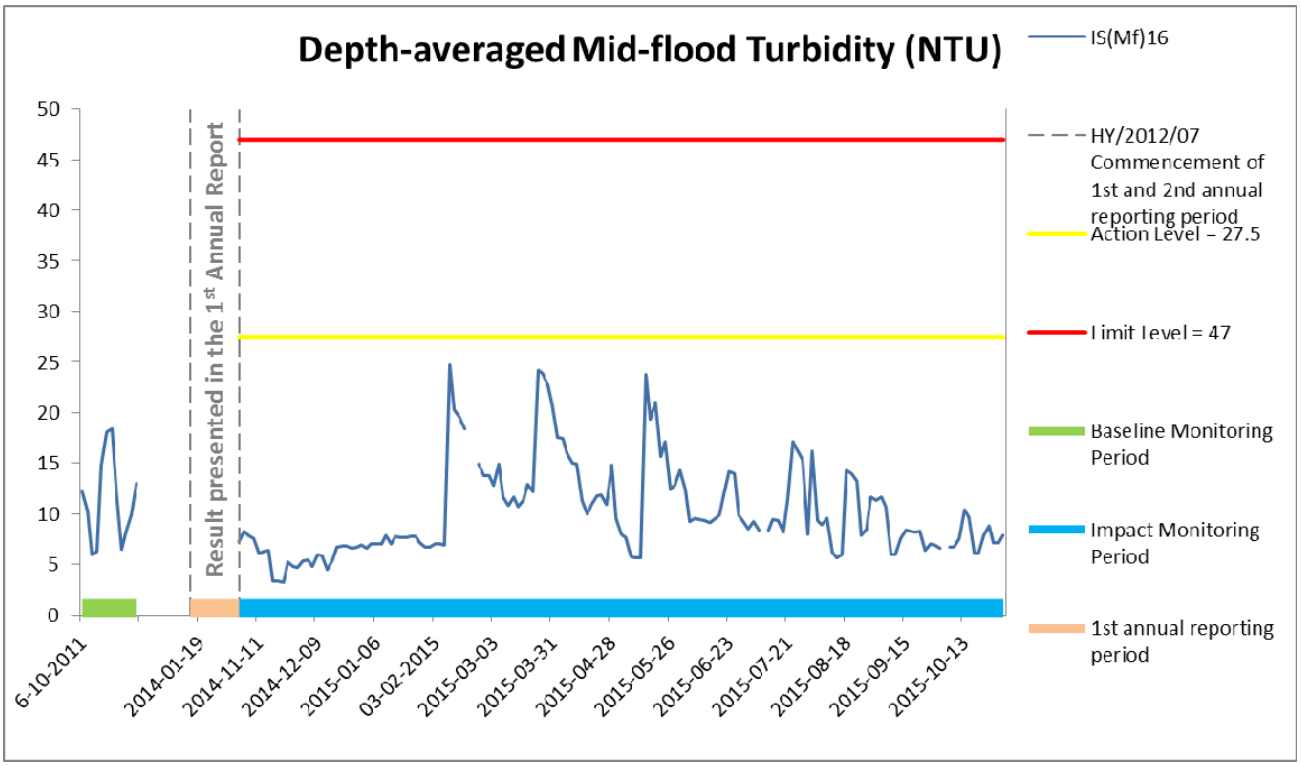


Figure F25 Impact Monitoring – Mean Level of depth-averaged Turbidity (NTU) during mid-flood tide between 1 November 2014 and 31 October 2015 at CS(Mf)3 and CS(MF)5.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions.
Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.



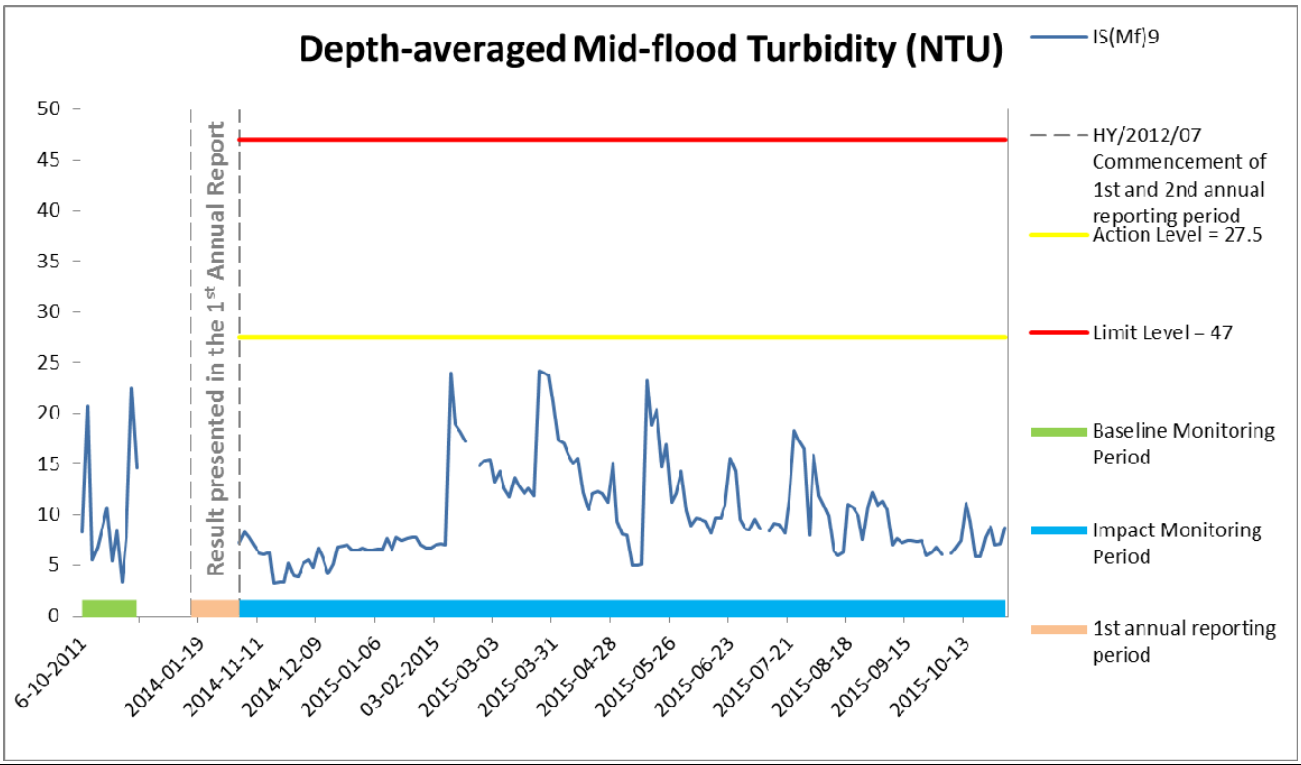


Figure F26 Impact Monitoring – Mean Level of depth-averaged Turbidity (NTU) during mid-flood tide between 1 November 2014 and 31 October 2015 at IS(Mf)16 and IS(Mf)9.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.

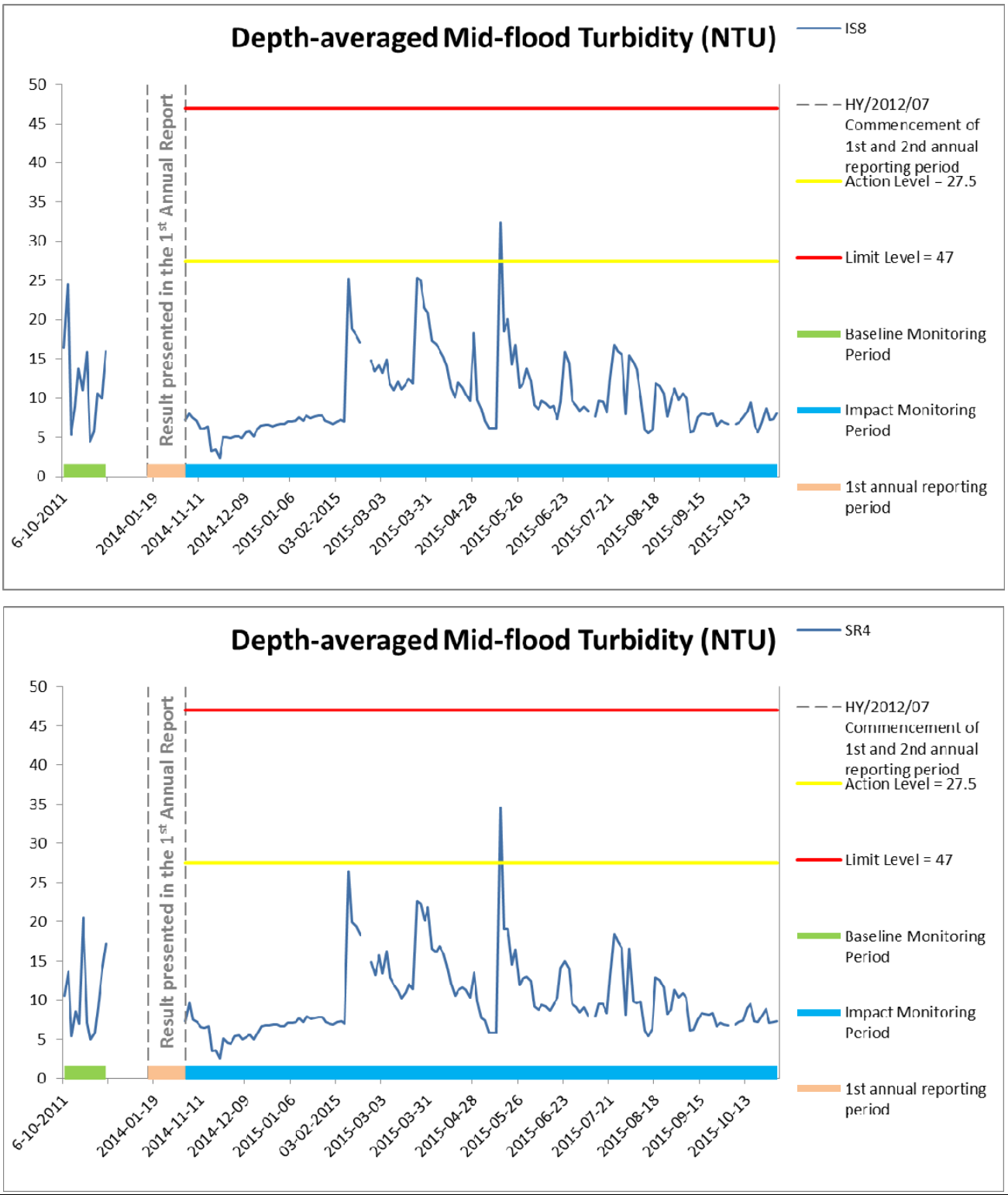


Figure F27 Impact Monitoring – Mean Level of depth-averaged Turbidity (NTU) during mid-flood tide between 1 November 2014 and 31 October 2015 at IS8 and SR4.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather. Result higher than corresponding Action Level but lower than 120% of upstream control station is not regarded as exceedance.

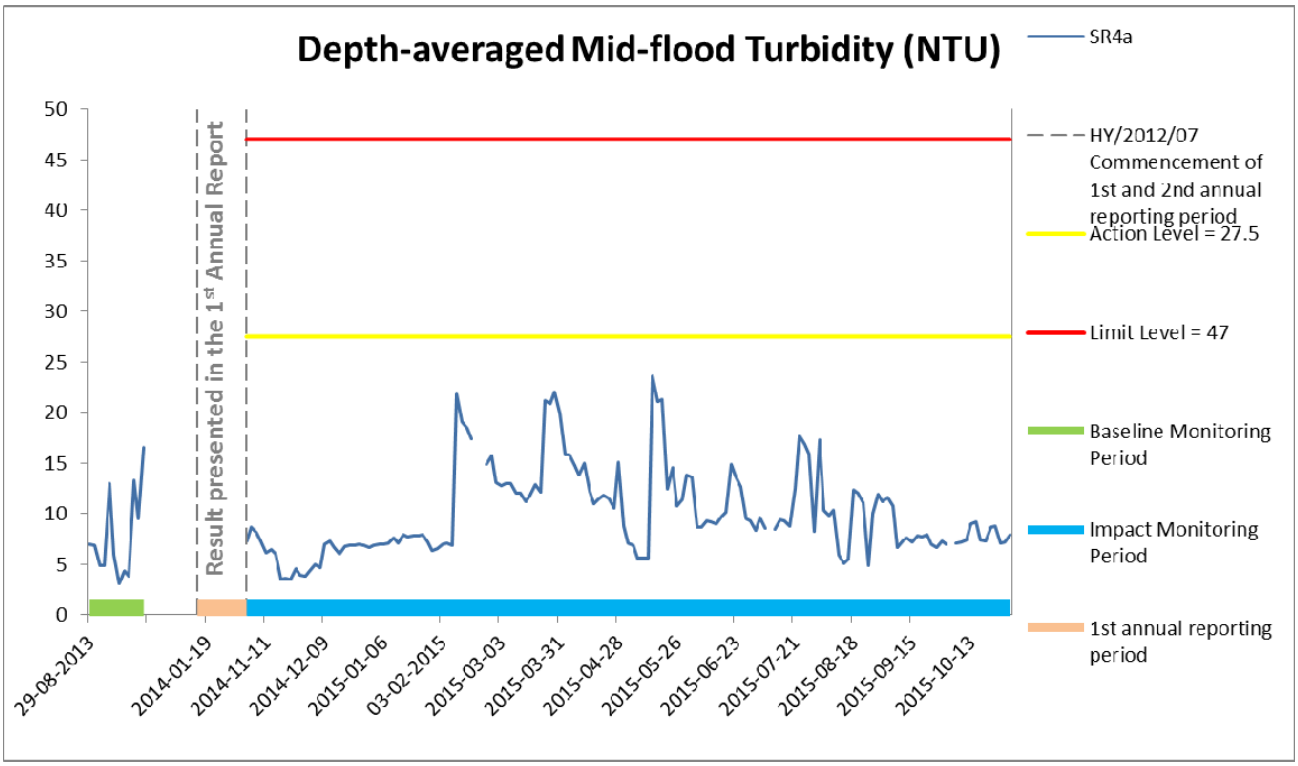
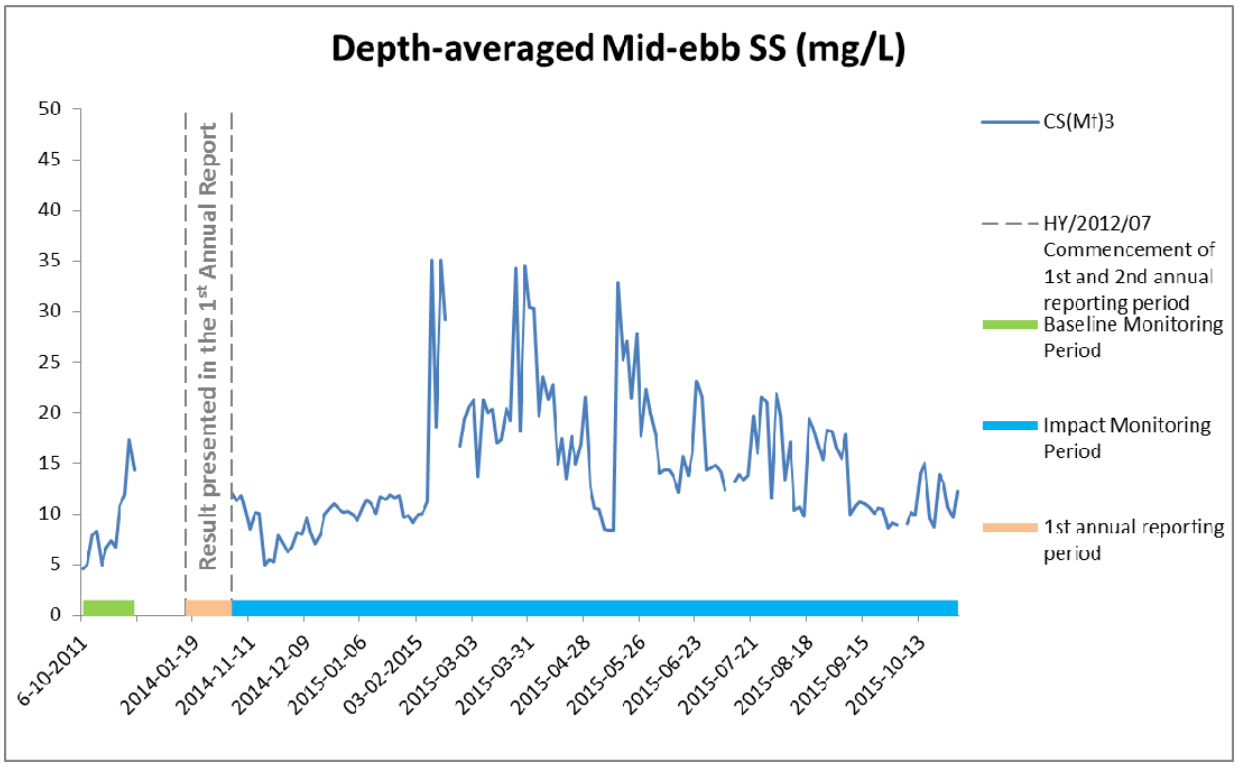


Figure F28 Impact Monitoring – Mean Level of depth-averaged Turbidity (NTU) during mid-flood tide between 1 November 2014 and 31 October 2015 at SR4a.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.



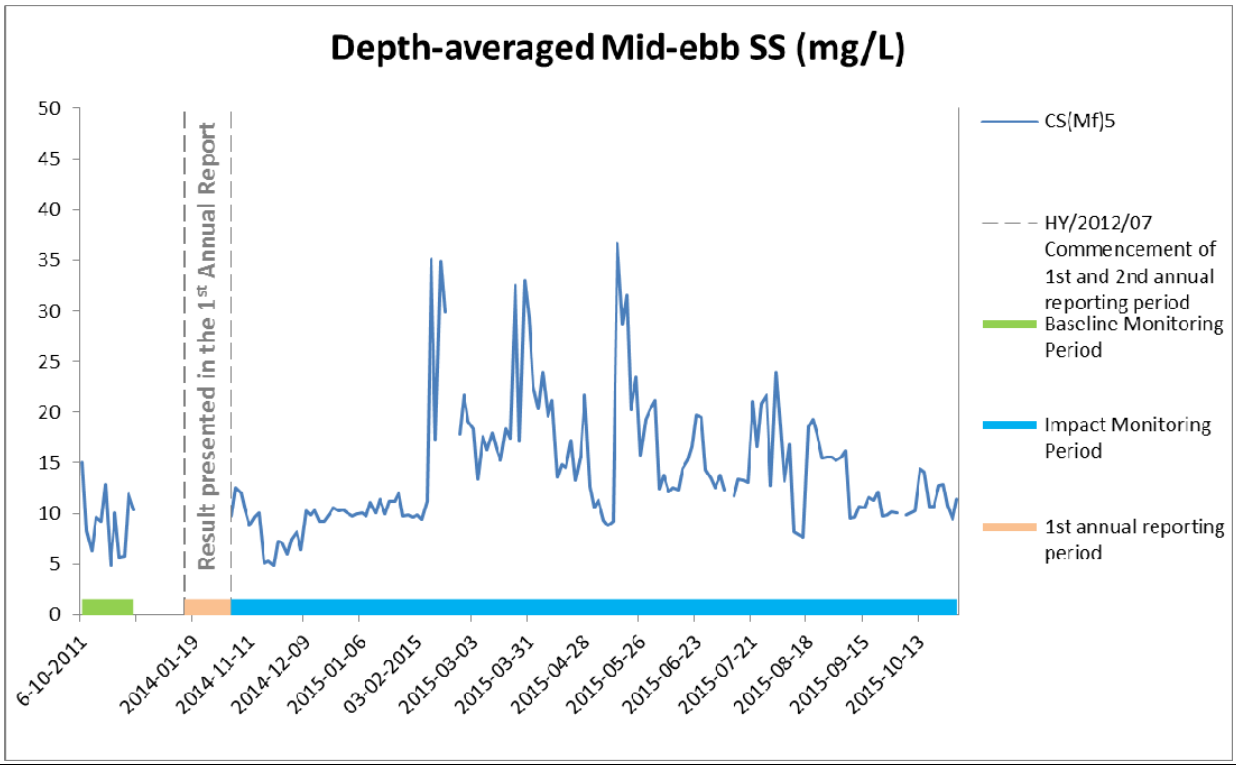


Figure F29 Impact Monitoring – Mean Level of depth-averaged Suspended Solids (mg/L) during mid-ebb tide between 1 November 2014 and 31 October 2015 at CS(Mf)3 and CS(Mf)5.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.

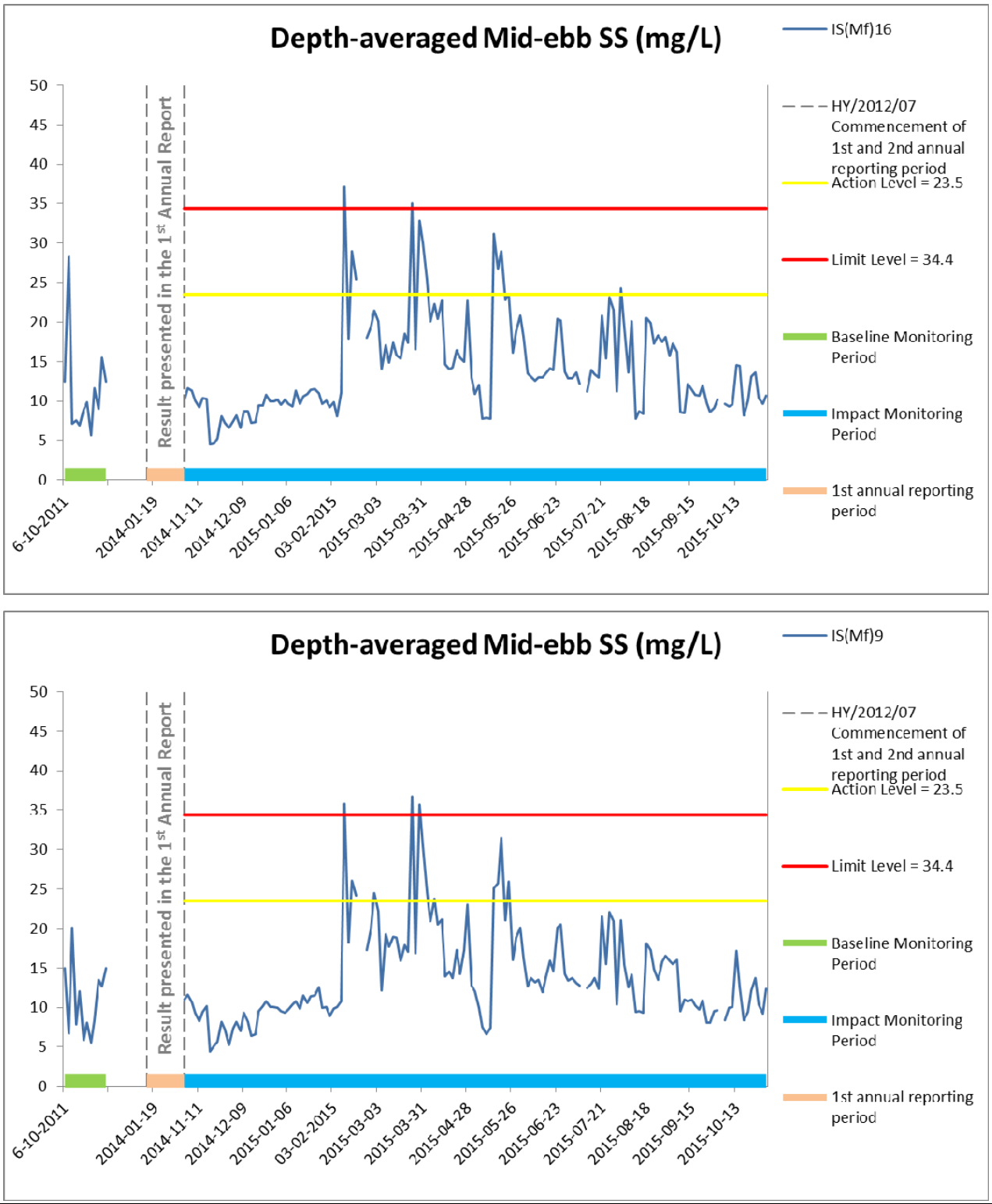


Figure F30 Impact Monitoring – Mean Level of depth-averaged Suspended Solids (mg/L) during mid-ebb tide between 1 November 2014 and 31 October 2015 at IS(Mf)16 and IS(Mf)9.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather. Results higher than corresponding Action Level but lower than 120% of upstream control station are not regarded as exceedance.

Environmental Resources Management

ERM

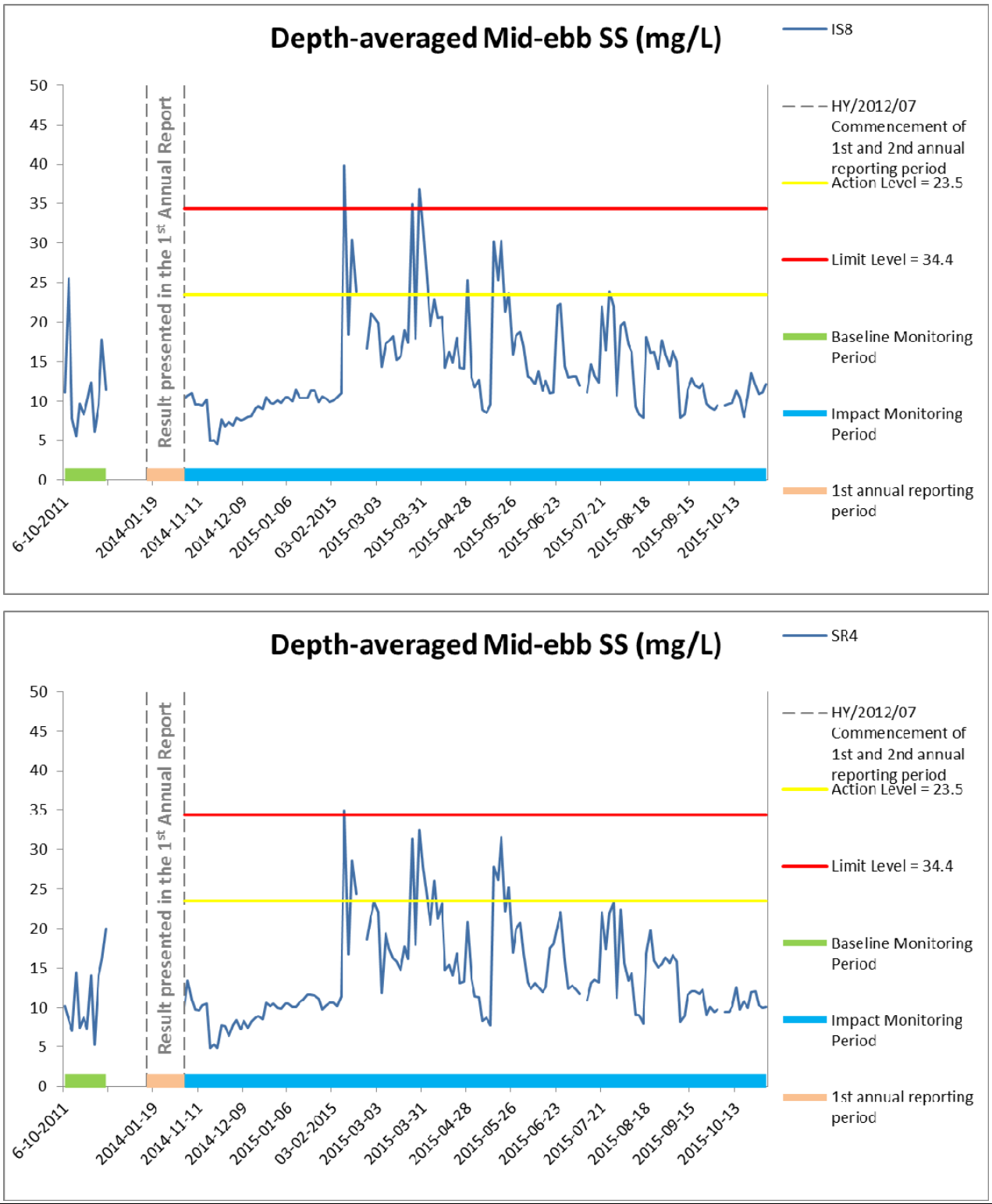


Figure F31 Impact Monitoring – Mean Level of depth-averaged Suspended Solids (mg/L) during mid-ebb tide between 1 November 2014 and 31 October 2015 at IS8 and SR4.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather. Results higher than corresponding Action Level but lower than 120% of upstream control station are not regarded as exceedance.

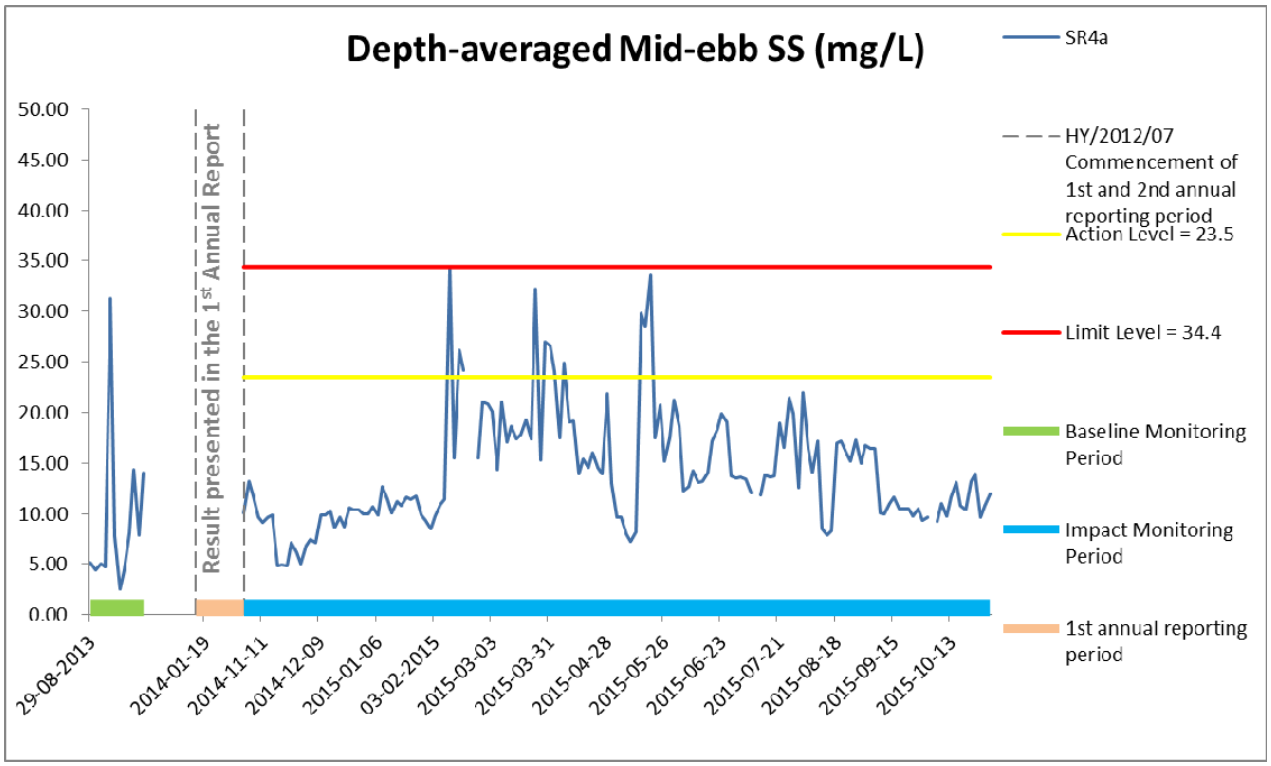
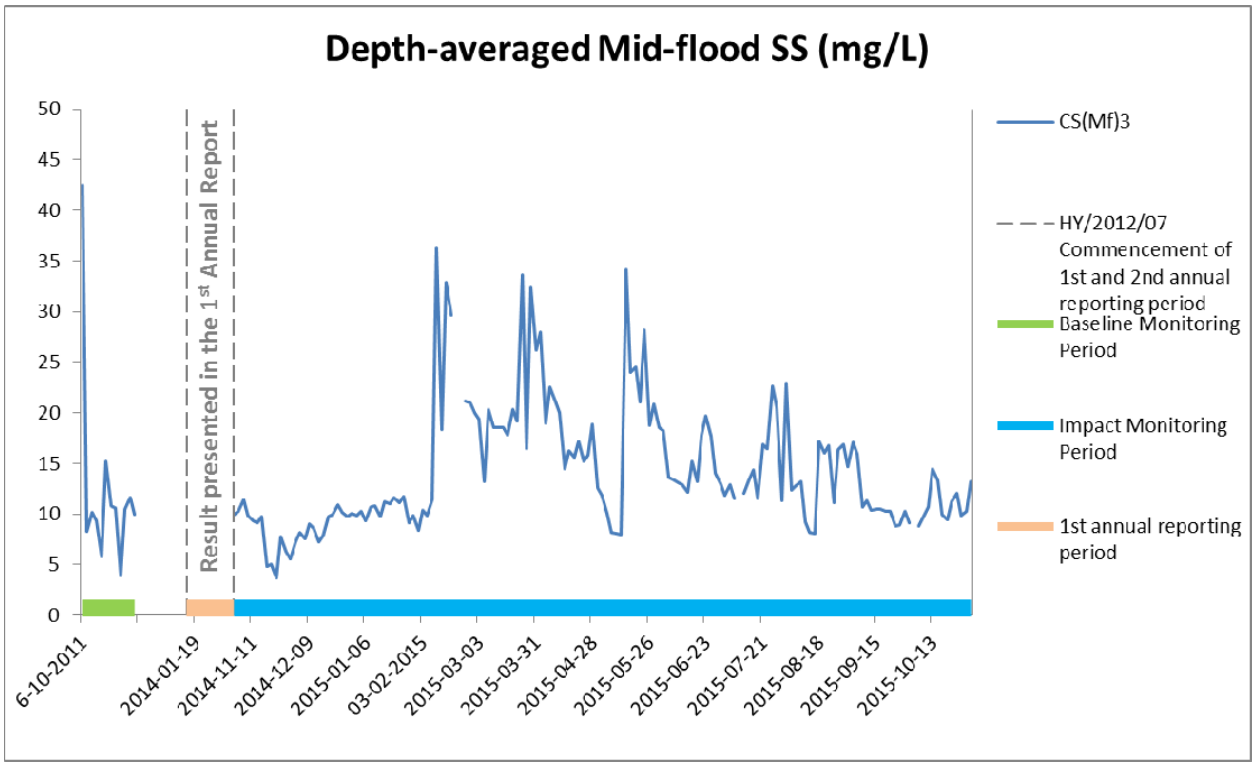


Figure F32 Impact Monitoring – Mean Level of depth-averaged Suspended Solids (mg/L) during mid-ebb tide between 1 November 2014 and 31 October 2015 at SR4a.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather. Except 19 May 2015, results higher than corresponding Action Level but lower than 120% of upstream control station are not regarded as exceedance.



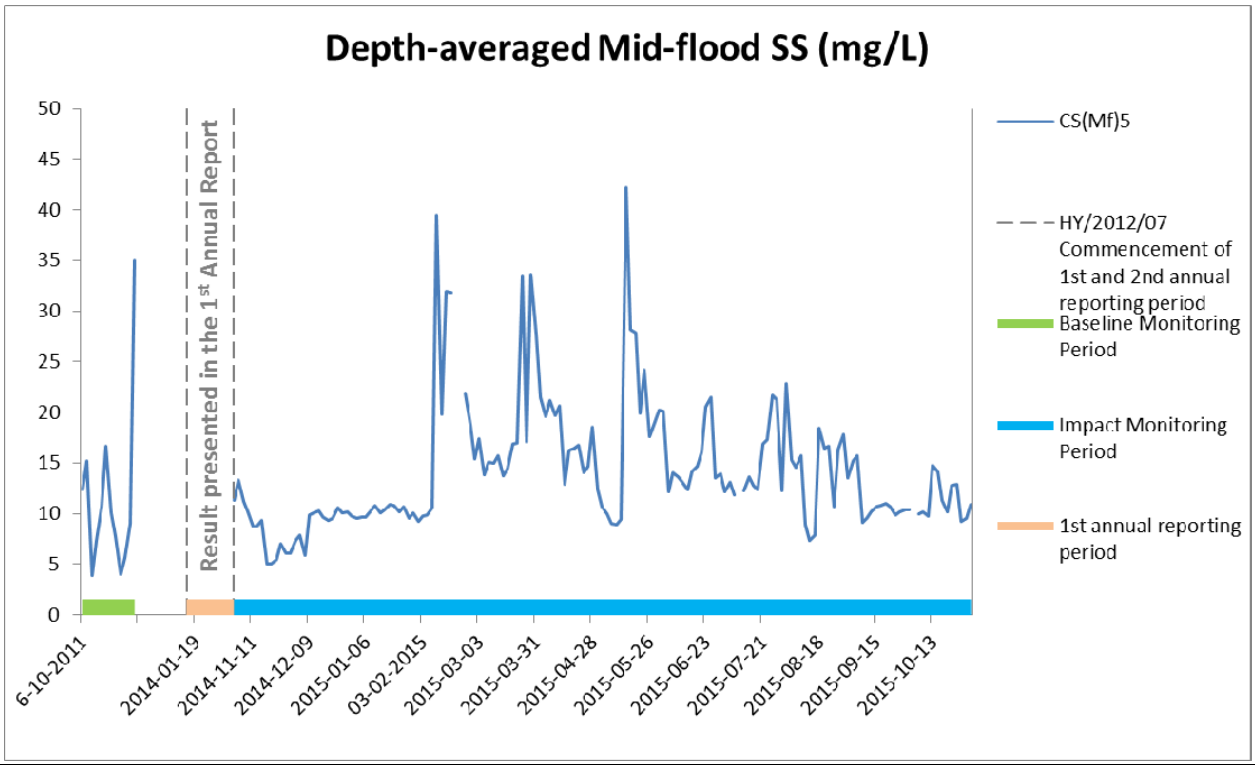


Figure F33 Impact Monitoring – Mean Level of depth-averaged Suspended Solids (mg/L) during mid-flood tide between 1 November 2014 and 31 October 2015 at CS(Mf)3 and CS(Mf)5.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather.

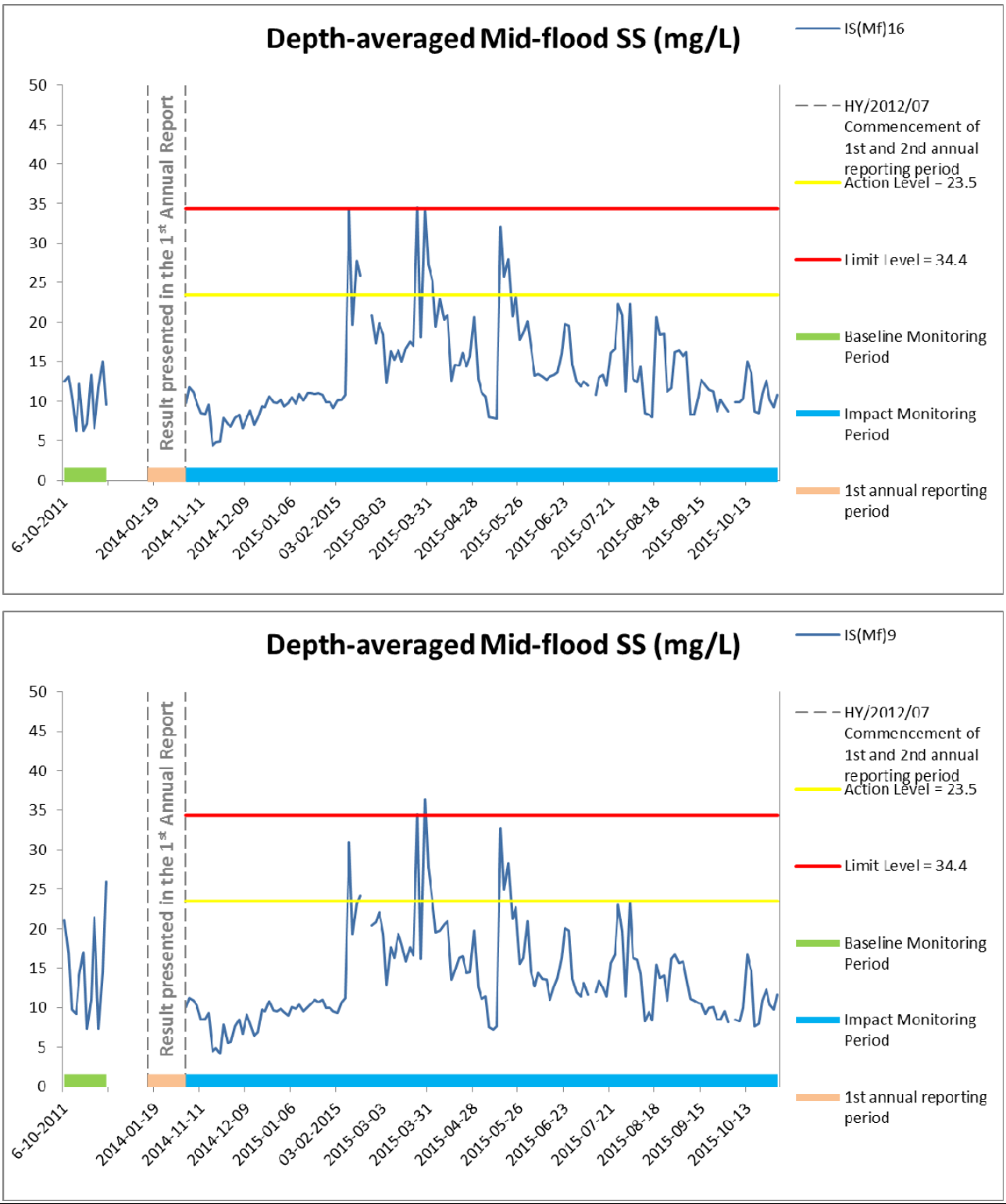
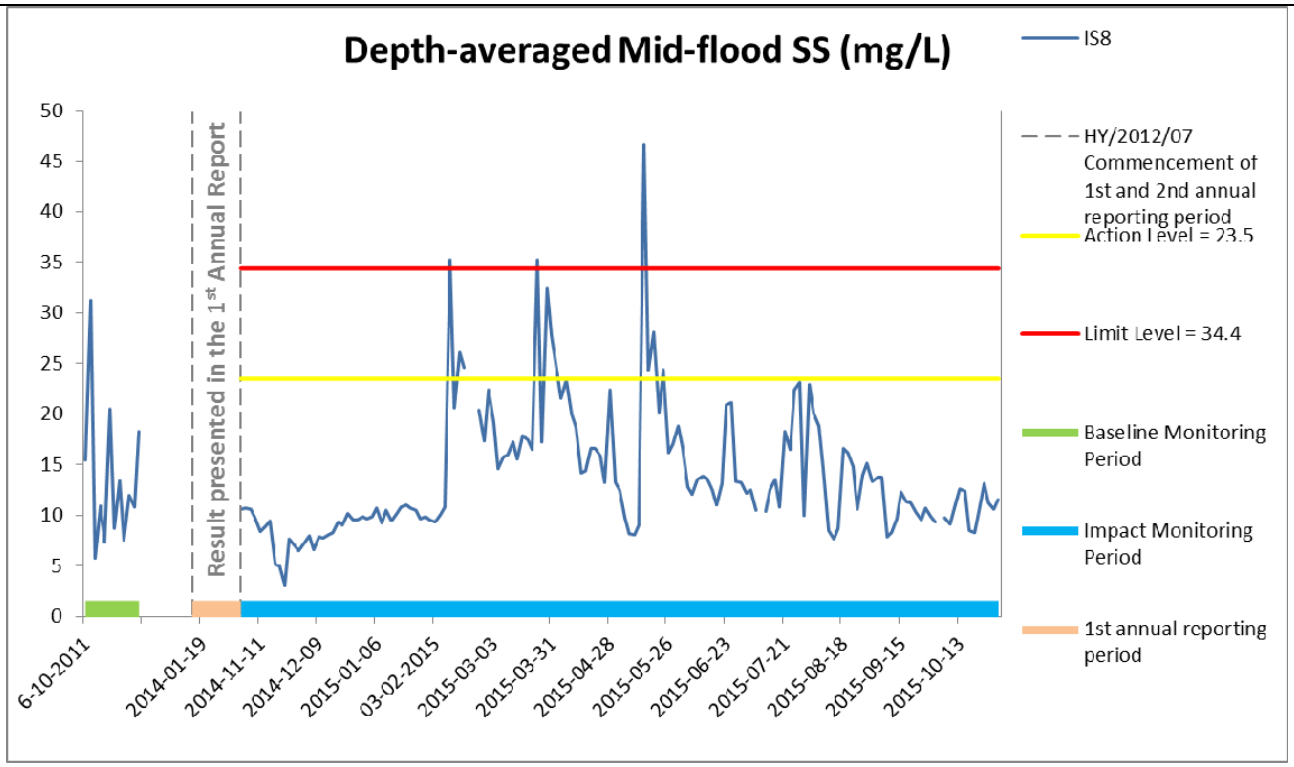


Figure F34 Impact Monitoring – Mean Level of depth-averaged Suspended Solids (mg/L) during mid-flood tide between 1 November 2014 and 31 October 2015 at IS(Mf)16 and IS(Mf)9 .

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather. Result higher than corresponding Action Level but lower than 120% of upstream control station is not regarded as exceedance.

Environmental Resources Management

ERM



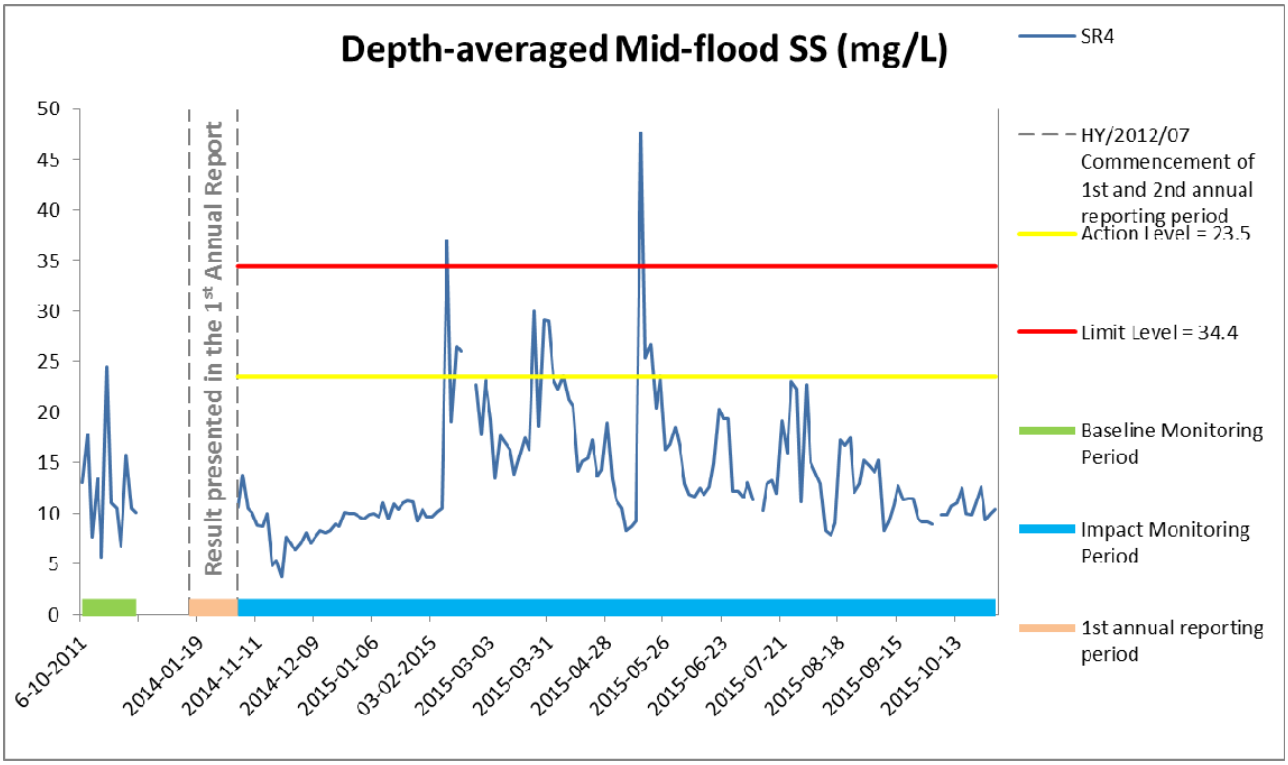


Figure F35 Impact Monitoring – Mean Level of depth-averaged Suspended Solids (mg/L) during mid-flood tide between 1 November 2014 and 31 October 2015 at IS8 and SR4.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather. Result higher than corresponding Action Level but lower than 120% of upstream control station is not regarded as exceedance.

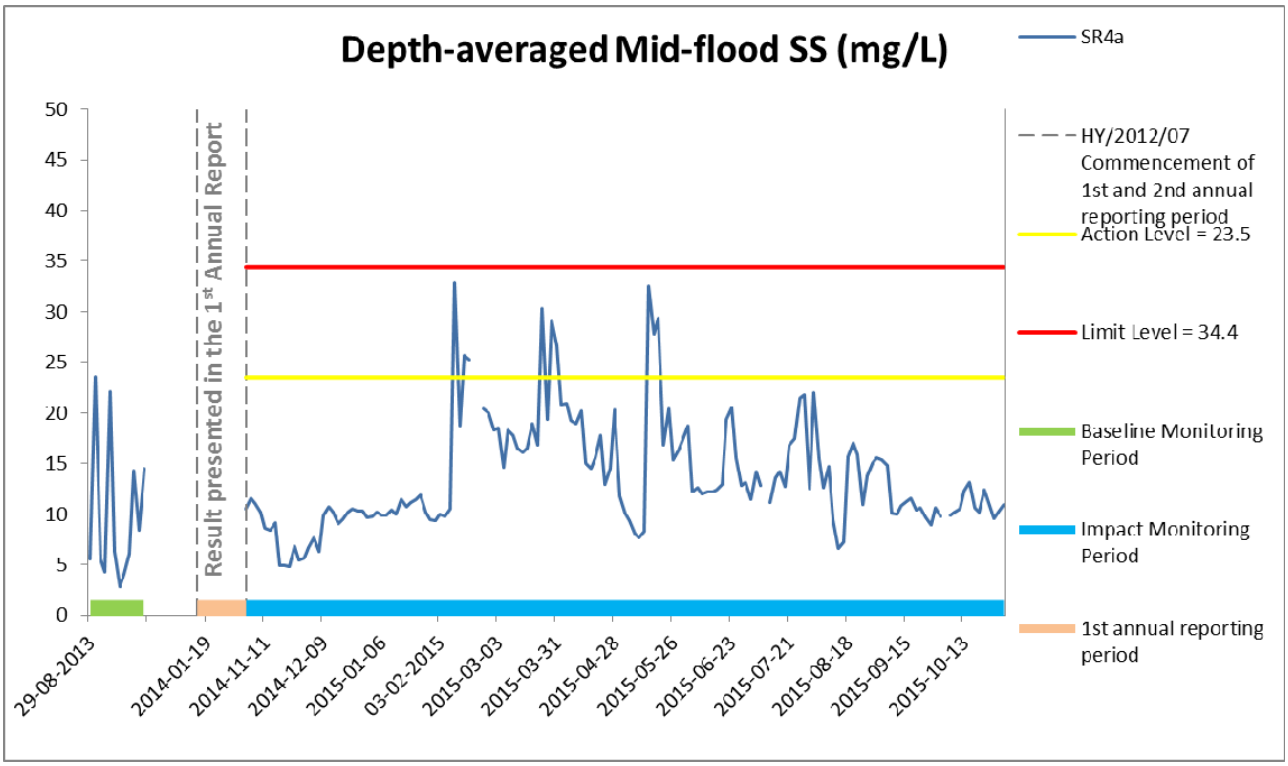


Figure F36 Impact Monitoring – Mean Level of depth-averaged Suspended Solids (mg/L) during mid-flood tide between 1 November 2014 and 31 October 2015 at SR4a.

Weather condition varied between sunny to rainy within the reporting period. Overall monitoring results were not affected by weather conditions. Marine works in the reporting period include Additional marine ground investigation (GI) and laboratory testing; Construction of pier head and deck segment; Launching gantry assembly; Marine Piling; Marine platform installation and uninstallation; and pier construction. WQM on 19 and 21 February 2015 were cancelled due to suspension of marine works, as well as WQM on 7 July and 3 October 2015 were cancelled due to adverse weather. Result higher than corresponding Action Level but lower than 120% of upstream control station is not regarded as exceedance.

Appendix G

Impact Dolphin Monitoring Survey Result

CONTRACT NO. HY/2012/07
Hong Kong-Zhuhai-Macao Bridge Tuen Mun – Chek Lap Kok Link (Southern Connection Viaduct Section)
Chinese White Dolphin Monitoring

Second Annual Progress Report (November 2014 - October 2015)
submitted to Gammon Construction Limited

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

10 May 2016

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 their 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 annual 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 November 2014 to October 2015, 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 of HZMB. 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 18 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung 2014, 2015). For each monitoring vessel survey, a 15-m inboard vessel with an open upper deck (about 4.5 m above water surface) was used to make observations from the flying bridge area.

2.1.3. Two experienced observers (a data recorder and a primary observer) made up the on-effort survey team, and the survey vessel transited different transect lines at a constant speed of 13-15 km per hour. The data recorder searched with unaided eyes and filled out the datasheets, while the primary observer searched for dolphins and porpoises continuously through 7 x 50 *Fujinon* marine binoculars. Both observers searched the sea ahead of the vessel, between 270^{o} and 90^{o} (in relation to the bow, which is defined as 0^{o}). One to two additional experienced observers were available on the boat to work in shift (i.e. rotate every 30 minutes) in order to minimize fatigue of the survey team members. All observers were experienced in small cetacean survey techniques and identifying local cetacean species.

2.1.4. During on-effort survey periods, the survey team recorded effort data including time, positions (latitude and longitude), weather conditions (Beaufort sea state and visibility), and distance traveled in each series (a continuous period of search effort) with the assistance of a handheld GPS (*Garmin eTrex Legend*).

2.1.5. Data including time, position and vessel speed were also automatically and continuously logged by handheld GPS throughout the entire survey for subsequent review.

2.1.6. When dolphins were sighted, the survey team would end the survey effort, and immediately record the initial sighting distance and angle of the dolphin group from the survey vessel, as well as the sighting time and position. Then the research vessel was diverted from its course to approach the animals for species identification, group size estimation, assessment of group composition, and behavioural observations. The perpendicular distance (PSD) of the dolphin group to the transect line was later calculated from the initial sighting distance and angle.

2.1.7. Survey effort being conducted along the parallel transect lines that were perpendicular to the coastlines (as indicated in Figure 1) was labeled as “primary” survey effort, while the survey effort conducted along the connecting lines between parallel lines was labeled as “secondary” survey effort. According to HKCRP long-term dolphin monitoring data, encounter rates of Chinese white dolphins deduced from effort and sighting data collected

along primary and secondary lines were similar in NEL and NWL survey areas. Therefore, both primary and secondary survey effort were presented as on-effort survey effort in this report.

2.2. Photo-identification Work

2.2.1. When a group of Chinese White Dolphins were sighted during the line-transect survey, the HKLR03 survey team would end effort and approach the group slowly from the side and behind to take photographs of them. Every attempt was made to photograph every dolphin in the group, and even photograph both sides of the dolphins, since the colouration and markings on both sides may not be symmetrical.

2.2.2. A professional digital camera (*Canon* EOS 7D 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. The following analyses were performed utilizing the HKLR03 dolphin monitoring data collected under the present impact phase (the second year of TMCLKL construction; i.e. November 2014 to October 2015). In addition, these analyses were also conducted for the one-year baseline phase (one year before any HZMB construction works have commenced; i.e. February 2011 to January 2012); the one-year transitional phase (one year after the HZMB construction works (HKBCF and HKLR works) have commenced, but before the commencement of TMCLKL construction works; i.e. November 2012 to October 2013); and the first year of TMCLKL construction (i.e. November 2013 to October 2014).

2.3.2. Along with the analyzed results from the baseline and transitional as well as the first year of impact phase, results from the second year of impact phase can then be interpreted from the examination of any temporal changes before and during the construction activities of

TMCLKL on dolphin usage in North Lantau waters. For the baseline phase, both baseline monitoring data collected under HZMB contract as well as the AFCD long-term dolphin monitoring data were included to increase the sample size in order to match the similar amount of survey effort in transitional and impact phases, both of which only HKLR03 monitoring data were included for the various analyses.

Distribution analysis

2.3.3. 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.

Encounter rate analysis

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

2.3.5. Firstly, for the comparison with the HZMB 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 the 24 six events during the present 12-month study period (i.e. 24 sets of line-transect surveys in North Lantau), which was also compared with the one deduced from the events during the first year of impact period, transitional period and baseline period.

2.3.6. Secondly, the encounter rates were also calculated using both primary and secondary survey effort as in AFCD long-term monitoring study. The encounter rate of sightings and dolphins were deduced by diving the total number of on-effort sightings (STG) and total number of dolphins (ANI) by the amount of survey effort for the present 12-month study period.

Quantitative grid analysis on habitat use

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

2.3.8. 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).

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

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

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

Behavioural analysis

2.3.10. 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. Sighting distribution 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.

Ranging pattern analysis

2.3.11. Location data of individual dolphins that occurred during the 12-month impact phase monitoring period were obtained from the dolphin sighting database and photo-identification catalogue. To deduce home ranges for individual dolphins using the fixed kernel methods, the program Animal Movement Analyst Extension, was loaded as an extension with ArcView© 3.1 along with another extension Spatial Analyst 2.0. Using the fixed kernel method, the program calculated kernel density estimates based on all sighting positions, and provided an active interface to display kernel density plots. The kernel estimator then calculated and displayed the overall ranging area at 95% UD level.

3. Monitoring Results

3.1. Summary of survey effort and dolphin sightings

3.1.1. During the second year of TMCLKL impact phase monitoring (November 2014 to October 2015), a total of 24 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 3,589.91 km of survey effort was collected, with 97.0% 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, 1,381.43 km and 2,208.48 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 2,612.04 km, while the effort on secondary lines was 977.87 km. The survey effort conducted on primary and secondary lines were both considered as on-effort survey data. Summary table of the survey effort is shown in Appendix I.

3.1.4. From the 24 sets of HKLR03 monitoring surveys from November 2014 to October 2015, a total of 54 groups of 229 Chinese White Dolphins were sighted. All except four dolphin sightings were made during on-effort search. Among the 50 on-effort sightings, 44 of them were made on primary lines, while the other six dolphin sightings were made on secondary lines.

3.1.5. During this 12-month period, all except one dolphin sighting were made in NWL, and the only rare sighting made in NEL on June 26th was a lone animal. A 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 November 2014 to October 2015 is shown in Figure 1.

3.2.2. Similar to the first year of impact phase, the majority of dolphin sightings made in the second year of impact phase were concentrated at the northwestern end of the North Lantau region, mainly around and to the north of Lung Kwu Chau (Figure 1). Some dolphin groups were also sighted near Sha Chau, to the west and north of the Chek Lap Kok Airport, and the lone sighting made in NEL was located to the north of Shum Shui Kok and Yam O (Figure 1).

3.2.3. None of the dolphin groups were sighted in the vicinity of TMCLKL southern viaduct and northern landfall construction sites, as well as the HKLR03 and HKBCF reclamation sites (Figure 1). On the contrary, a few sightings were made in the vicinity of the HKLR09 alignment (Figure 1). Generally speaking, dolphin appeared to have avoided the construction areas of HZMB works during the present impact phase monitoring period, which was consistent with the dolphin distribution during the first year of impact phase.

3.2.4. Dolphin sighting distribution of the present impact phase monitoring period (November 2014 to October 2015) was compared to the ones during the baseline phase (February 2011 to January 2012), the transitional phase (November 2012 to October 2013) and the first year of impact phase (November 2013 to October 2014). In the present impact phase period, dolphins have largely vacated from the NEL survey area and the eastern half of the NWL survey area, which was in stark contrast to their very frequent occurrence around the Brothers Islands, Shum Shui Kok, the waters between Pillar Point and airport platform, and the vicinity of HZMB-associated work sites during the baseline period (Figure 2). Even in the transitional phase, dolphins still utilized these waters in a moderate extent, but such usage has progressively diminished during the first and second years of the TMCLKL impact phase (Figure 2).

3.2.5. The only area where dolphin occurrence was consistent across the four phases was around the Lung Kwu Chau area (Figure 2). Notably, dolphin usage was also diminished progressively around Sha Chau and to the west of the airport platform, and the waters around Lung Kwu Chau appeared to be the remaining area in North Lantau region where dolphins consistently utilized during the second year of impact phase (Figure 2).

3.3. Encounter rate

3.3.1. During the present 12-month impact phase monitoring period, the average daily encounter rates of Chinese White Dolphins were deduced in NEL and NWL survey areas, and compared to the ones deduced from the baseline, transitional and first year of impact phases (Table 2).

Table 2. Comparison of average daily dolphin encounter rates from first and second years of impact phase, transitional phase and baseline phase monitoring periods (Note: encounter rates deduced from the three periods were calculated based on survey and on-effort sighting data made along the primary transect lines under favourable conditions; ± denotes the standard deviation of the average encounter rates)

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)		**Encounter rate (ANI)** (no. of dolphins from all on-effort sightings per 100 km of survey effort)	
	Northeast Lantau	**Northwest Lantau**	**Northeast Lantau**	**Northwest Lantau**
Impact Phase (2014-15)	0.11 ± 0.54	2.54 ± 2.49	0.11 ± 0.54	11.64 ± 14.04
Impact Phase (2013-14)	0.22 ± 0.74	6.93 ± 4.08	0.76 ± 2.59	26.31 ± 17.56
Transitional Phase (2012-13)	1.70 ± 2.26	7.68 ± 4.36	4.75 ± 7.61	27.51 ± 18.06
Baseline Phase (2011-12)	6.05 ± 5.04	7.75 ± 5.69	19.91 ± 21.30	29.57 ± 26.96

3.3.2. To facilitate the comparison with the AFCD long-term monitoring results, the encounter rates were also calculated for the present 12-month study period using both primary and secondary survey effort. The encounter rates of sightings (STG) and dolphins (ANI) in NWL were 2.27 sightings and 10.10 dolphins per 100 km of survey effort respectively, while the encounter rates of sightings (STG) and dolphins (ANI) in NEL were both 0.07.

3.3.3. 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, transitional and impact phase periods. The two variables that were examined included the different periods and the two locations (i.e. NEL and NWL).

3.3.4. For the comparison between the different monitoring periods, the p-value for the differences in average dolphin encounter rates of STG and ANI were 0.000001 and 0.00279 respectively. Even if the alpha value is set at 0.005, significant differences were detected among the different periods in both dolphin encounter rates of STG and ANI.

3.3.5. In NEL, the dolphin encounter rates (both STG and ANI) in the second year of TMCLKL impact monitoring period were close to nil, which was only a tiny fraction of the averages during the baseline phase and transitional phase (Table 2). Such decline has actually existed in this area during the transitional phase (i.e. well before the TMCLKL construction works commenced), with the averages in the transitional phase being much lower than the ones in the baseline phase (reductions of 71.9% for STG and 76.1% respectively). Since then, dolphin occurrence has further diminished to an extremely low level during the first and second years of TMCLKL construction works.

3.3.6. In NWL, the average dolphin encounter rates (STG and ANI) during the present impact phase monitoring period were much lower (reductions of 67.2% and 60.6% respectively) than the ones recorded in the baseline period, indicating a dramatic decline in dolphin usage of this survey area during the second year of TMCLKL impact phase monitoring period (Table 2). Notably, the encounter rates in NWL during the first year of impact phase (2013-14) were only slightly lower than the baseline period, but such decline has quickly escalated during the second year of impact phase (2014-15), signaling a further widespread of declining usage by the dolphins throughout the entire North Lantau region.

3.4. Group size

3.4.1. Group size of Chinese White Dolphins ranged from one to 13 individuals per group in North Lantau region during November 2014 – October 2015. The average dolphin group sizes from the 12-month impact phase monitoring period were compared with the ones deduced from baseline, transitional and first year of impact phases, as shown in Table 3.

3.4.2. The average dolphin group sizes in the entire North Lantau region as well as in NWL waters during the present impact phase monitoring period were higher than the ones recorded during the baseline and transitional phases (Table 3). On the other hand, there was only one group of a lone animal found in NEL during the present impact phase monitoring period, and such group size was much lower than the ones during the baseline and transitional phases. Among the 136 dolphin groups sighted during the impact phase, 93 of them were composed of 1-4 individuals only, while there were only four dolphin groups with more than 10 individuals.

Table 3. Comparison of average dolphin group sizes from the first two years of impact phase, transitional phase and baseline phase monitoring periods (± denotes the standard deviation of the average encounter rates)

	Average Dolphin Group Size		
	Overall	**Northeast Lantau**	**Northwest Lantau**
Impact Phase (2014-15)	4.24 ± 3.15 (n = 54)	1.00 (n = 1)	4.30 ± 3.15 (n = 53)
Impact Phase (2013-14)	3.76 ± 2.57 (n = 136)	5.00 ± 2.71 (n = 4)	3.73 ± 2.57 (n = 132)
Transitional Phase (2012-13)	3.37 ± 2.98 (n = 186)	2.64 ± 2.38 (n = 22)	3.47 ± 3.05 (n = 164)
Baseline Phase (2011-12)	3.32 ± 2.86 (n = 288)	2.80 ± 2.35 (n = 79)	3.52 ± 3.01 (n = 209)

3.4.3. Distribution of dolphins with larger group sizes (i.e. five individuals or more per group) during the present quarter is shown in Figure 3, with comparison to the ones in the first year of impact phase, transitional phase and baseline phase. During the impact phase in 2014-15, distribution of the larger dolphin groups were mainly concentrated around Lung Kwu Chau and to the north of the island (Figure 3).

3.4.4. Notably, since the transitional phase and the first year of impact phase, distribution of these larger groups has already been restricted to the northwestern portion of North Lantau region. Such restriction was drastically different from the baseline phase, when the larger dolphin groups were distributed more evenly in NWL waters with many also sighted in NEL waters (Figure 3).

3.5. Habitat use

3.5.1. During the impact phase monitoring period in 2014-15, the most heavily utilized habitat by Chinese White Dolphins was only found around Lung Kwu Chau (Figures 4a and 4b). For the rest of North Lantau region, only one grid in NEL as well as a few grids to the north and west of the airport platform in NWL recorded the presence of dolphins in very low density. Moreover, all grids along the alignments of TMCLKL and HKLR09 projects as well as the reclamation sites of HKLR03 and HKBCF projects sites rarely recorded the presence of dolphins in the present 12-month impact monitoring period in 2014-15 (Figures 4a and 4b).

3.5.2. When compared with the habitat use patterns during the baseline phase, dolphin usage in NEL has progressively diminished in the transitional phase and the two periods of impact phases (Figure 5). During the baseline period, a number of grids between Siu Mo To and Shum Shui Kok recorded moderately high to high dolphin densities, and most grids in NEL recorded dolphin usage. This was in stark contrast to the extremely low dolphin usage in this area with only one grid recorded with very low dolphin density during the present impact phase period (Figure 5).

3.5.3. Moreover, usage of NWL waters also declined dramatically during the present impact

phase monitoring period, with the only higher dolphin densities occurred right around the Lung Kwu Chau area, in contrast to a more evenly spread usage in NWL during the baseline phase, transitional phase and first year of impact phase monitoring. It appeared that there was a more widespread decline of dolphin usage throughout the North Lantau waters during 2014-15 in the midst of the on-going TMCLKL construction works in addition to other HZMB-related construction activities.

3.6. Mother-calf pairs

3.6.1. During the present 12-month impact phase monitoring period, only three unspotted juveniles (UJ) were sighted with their mothers in North Lantau waters. These young calves comprised of 1.3% of all animals sighted, which was a small fraction of the percentages recorded during the previous impact phase in 2013-14 (5.7%), transitional phase (6.7%) and baseline phase (4.5%).

3.6.2. Not surprisingly, these three young calves were only sighted around Lung Kwu Chau, which was drastically different from the distribution patterns during the baseline and transitional phases when the young calves were sighted throughout NWL waters (Figure 6). Their distribution was even further restricted in the second year of impact phase when compared to the one during the first year of impact phase (Figure 6).

3.6.3. None of the young calves were sighted in the vicinity of the TMCLKL/HKLR09 alignments and HKBCF/HKLR03 reclamation sites during the present impact phase monitoring period (Figure 6).

3.7. Activities and associations with fishing boats

3.7.1. Ten and three dolphin sightings were associated with feeding and socializing activities respectively during the 12-month impact phase monitoring period. The percentage of sightings associated with feeding activities during the present impact phase (18.5%) was much higher than the previous impact phase in 2013-14 (5.9%), transitional phase (8.6%) and baseline phase (12.8%).

3.7.2. On the other hand, the percentage of socializing activities during the present impact phase monitoring period (5.5%) was similar to the first year of impact phase (5.9%), but was higher than the one during the baseline period (3.8%) and slightly lower than the one during the transitional period (6.4%). Notably, none of the 54 dolphin groups were engaged in either traveling or resting activity during the present impact phase monitoring period in 2014-15.

3.7.3. Distribution of dolphins engaged in feeding and socializing activities during the present impact phase monitoring period is shown in Figure 7. The sightings associated with feeding activities occurred near Sha Chau and Lung Kwu Chau, as well as to the west and north of the airport platform, while the ones associated with socializing activities were mainly found near Lung Kwu Chau and Black Point (Figure 7). In comparison, feeding activities were frequently sighted along the Urmston Road, within the marine park, to the west of airport platform and around the Brothers Islands during the baseline phase, while the socializing activities were more scattered throughout the North Lantau region in the same period as well as in the transitional phase (Figure 7). It is apparent that the

"hotspots" where dolphins engaged in different activities were very different between the baseline, transitional and impact phases.

3.7.4. During the impact phase monitoring period in 2014-15, only one of the 54 dolphin groups were found to be associated with an operating fishing vessel (a purse-seiner) near Lung Kwu Chau. The extremely rare event of fishing boat association during the two periods of impact phase as well as the transitional phase was quite different from the baseline period with 14 of 288 dolphin groups associated with fishing boats. This was likely related to the trawl ban being implemented in December 2012 in Hong Kong waters.

3.8. Summary of photo-identification works

3.8.1. During the 12-month impact phase monitoring period in 2014-15, a total of 54 individuals sighted 154 times altogether were identified (see Appendix III). All of these re-sightings were made in NWL and the lone individual sighted in NEL was not identified

3.8.2. About two-third of the 54 identified individuals were sighted only once or twice, while the rest were sighted frequently during the 12-month period. For example, seven individuals were sighted more than five to nine times (CH34, NL48, NL104, NL136, NL182, NL284 and WL05), while two individuals (NL202 and NL286) were sighted thirteen times each. Their frequent occurrences during the second year of impact phase monitoring indicated strong reliance of North Lantau waters as their home ranges.

3.8.3. Notably, eight recognized females (i.e. NL33, NL98, NL104, NL123, NL202, NL220, WL05 and WL17) were accompanied with their calves during their re-sightings, and many of these calves are older and already in their juvenile stage. For example, the calves of NL123 (i.e. NL285) and NL202 (NL286) have been accompanying their mothers for over 7-8 years.

3.9. Individual range use

3.9.1. Ranging patterns of the 54 individuals identified during the 12-month impact phase monitoring period in 2014-15 were determined by fixed kernel method, and are shown in Appendix IV.

3.9.2. All identified dolphins sighted in this 12-month period were utilizing their ranges primarily in NWL, while 25 of them have extended their range use to West Lantau waters (e.g. NL33, NL49, NL165, NL210) based on the HKLR09 monitoring data collected during the same period (Appendix IV). All of these identified dolphins have avoided the NEL waters, the area where many of them have utilized as their core areas of activities in the past.

3.9.3. Temporal changes in range use of 28 individual dolphins that ranged across different survey areas in North, West and South Lantau waters were examined in details during baseline phase, transitional phase and two periods of impact phases (Appendix V). It is apparent that at least 10 individuals (e.g. CH34, NL98, NL136, NL261) have gradually shifted their range use away from their previously important habitat in NEL, while another six individuals (e.g. NL49, NL220, NL259) have utilized NEL waters in the past but have been completely absent from there across the four phases (Appendix V).

3.9.4. Moreover, 21 individual dolphins have diminished their utilization of NWL waters during the TMCLKL impact phases, and at the same time 12 of them (NL33, NL49, NL98, NL123, NL145, NL150, NL210, NL236, NL259, NL261, NL284 and NL287) have increased their utilization of WL waters, apparently expanding their range use into West Lantau waters. Two individuals (NL98 and NL287) were even expanding their range use to Southwest Lantau waters as well during the 2014-15 impact phase period.

3.9.5. Notably, while some individuals have expanded their range use in WL and diminished their range use in NWL, other individuals (e.g. NL37, NL103, NL104, NL220) have utilized waters of Hong Kong generally less during the 2014-15 impact phase period. This corresponded well with a much lower dolphin encounter rate in NWL in 2014-15 impact phase period as explained in Section 3.3.4.

3.9.6. When compared with the list of individuals identified in the previous period of TMCLKL phase in 2013-14, 38 individual dolphins were sighted in 2013-14 but not in 2014-15. After examining the HKCRP photo-identification catalogue which included the long-term monitoring data from other concurrent projects, it was found that 14 of them were not sighted at all in Hong Kong waters in 2014-15. For the other 24 individuals, almost all of them were sighted exclusively in WL and SWL waters during the TMCLKL impact phase in 2014-15. For example, EL01 were sighted eight times in North Lantau waters during 2013-14, but was only sighted once in SWL in 2014-15. NL120 were sighted four times in North Lantau waters during 2013-14, but was sighted seven times in West and Southwest Lantau in 2014-15. NL226 was sighted four times in North Lantau waters during 2013-14, but was sighted eight times in West and Southwest Lantau in 2014-15. These examples indicated that a number of individuals have vacated from North Lantau waters during the TMCLKL impact phase in 2014-15, and have shifted their range use to WL and SWL waters instead.

3.9.7. The apparent range shifts of many identified individual dolphins examined above were also documented in Hung (2015), and could be related to the disturbance of construction activities and other existing threats in the North Lantau region. This should be continuously monitored for the rest of the TMCLKL impact phase monitoring period to determine whether such range shifts are temporary or permanent, and whether the dolphins would continue the North Lantau waters once the HZMB-related construction works have completed.

4. Conclusion

4.1. During the second year of TMCLKL impact phase monitoring of Chinese white dolphins, no adverse impact from the activities of the TMCLKL construction project on the 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 drastically reduced in the entire North Lantau region, and many individuals have shifted away from the important habitats around the Brothers Islands and the rest of North Lantau waters.

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

5. References

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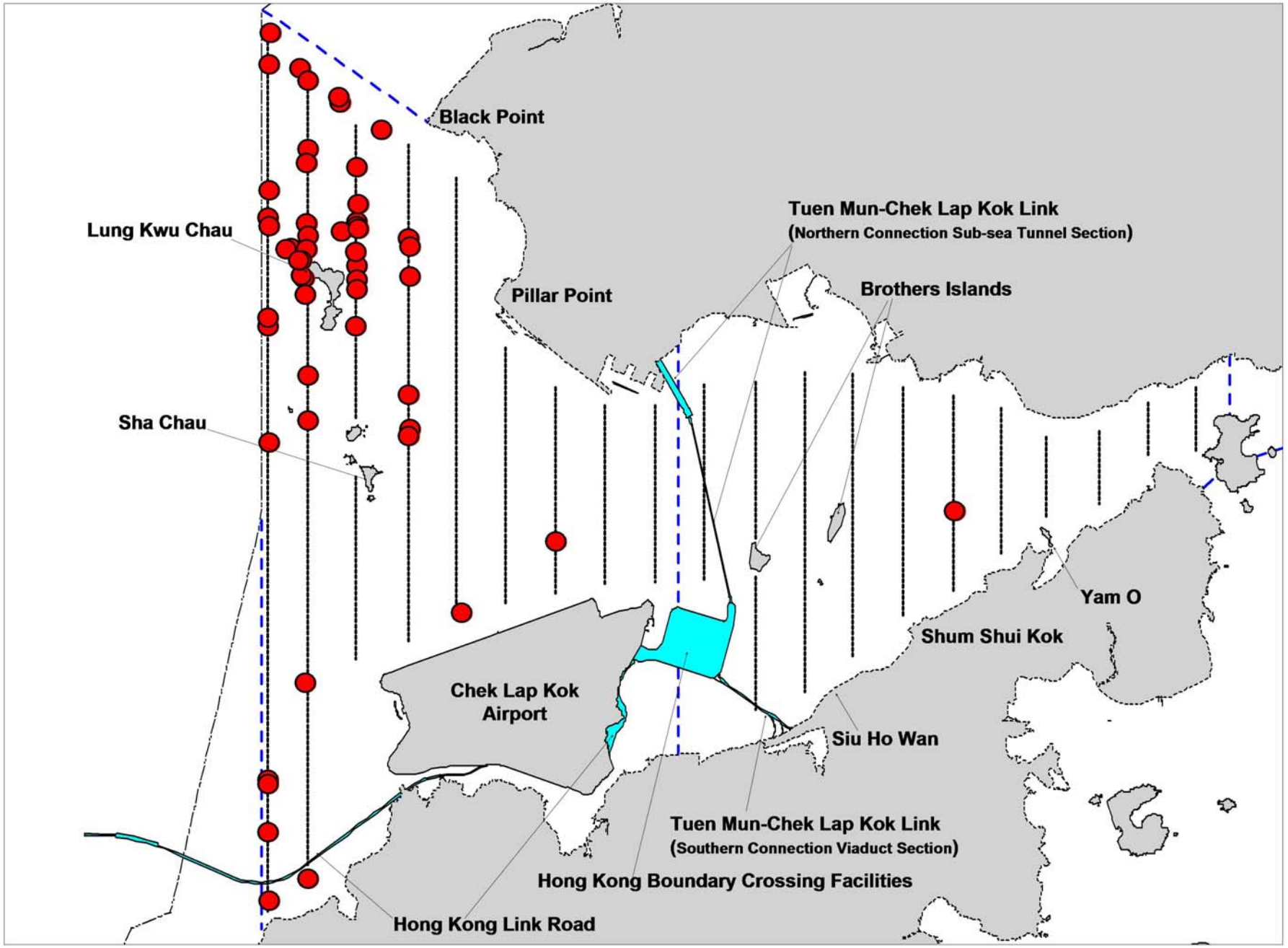


Figure 1. Distribution of Chinese white dolphin sightings in North Lantau region during the second year of TMCLKL construction works (November 2014 to October 2015), utilizing the HKLR03 monitoring data

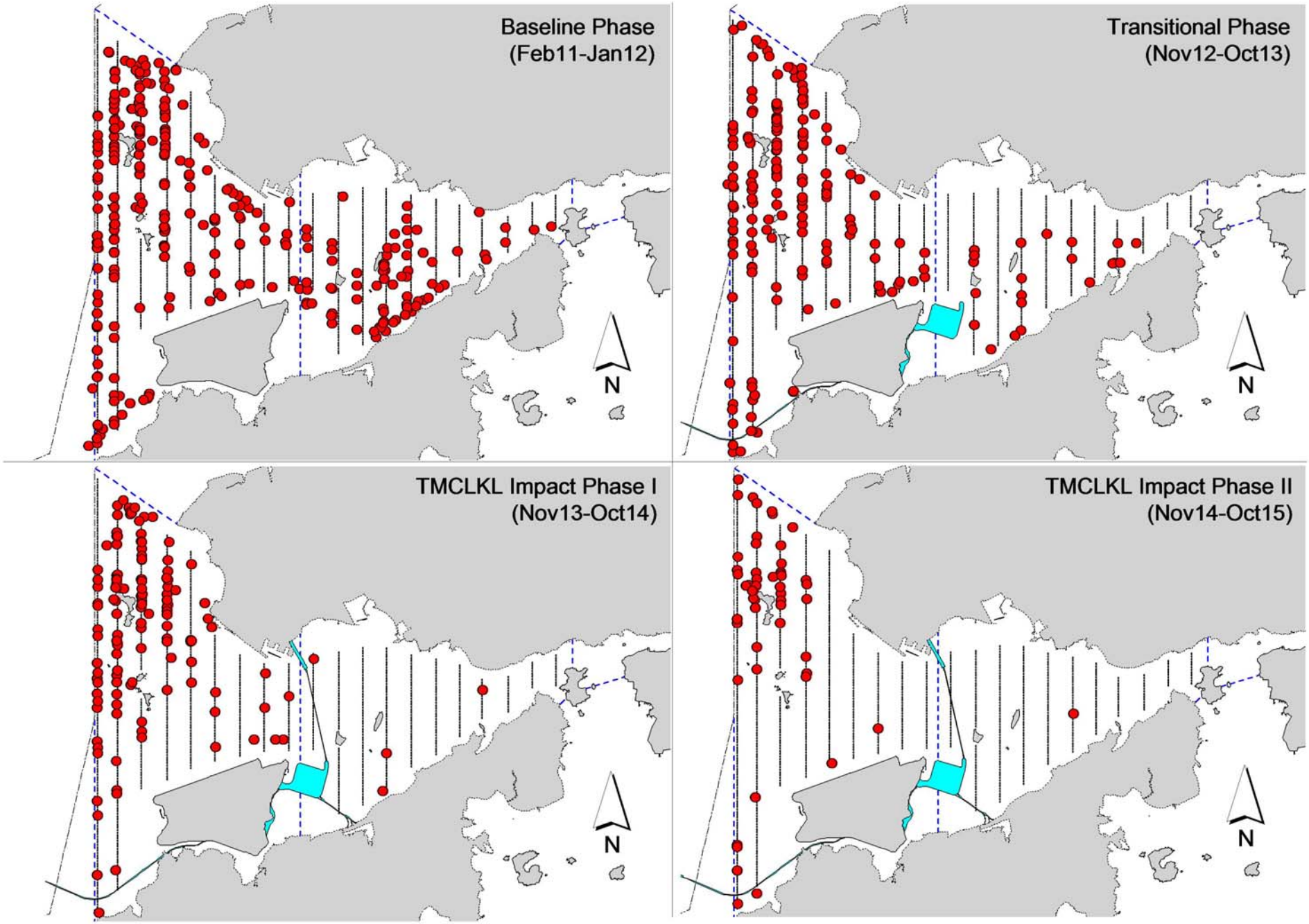


Figure 2. A comparison on distribution of Chinese white dolphin sightings in North Lantau region during the baseline, transitional and two impact phases of TMCLKL construction works

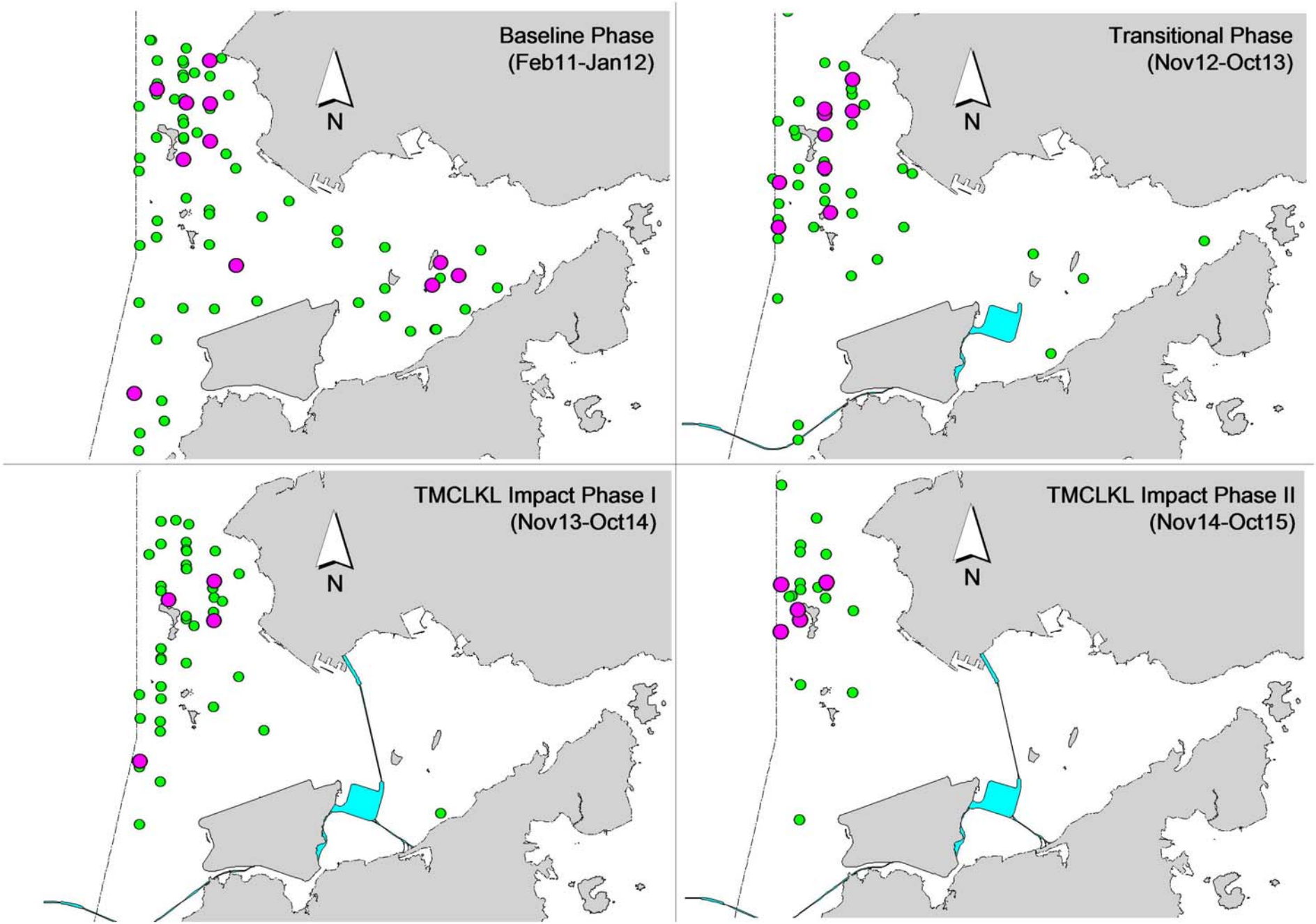


Figure 3. Distribution of dolphins with larger group sizes during different phases of TMCLKL construction works
(green dots: group sizes of 5 or more; purple dots: group sizes of 10 or more)

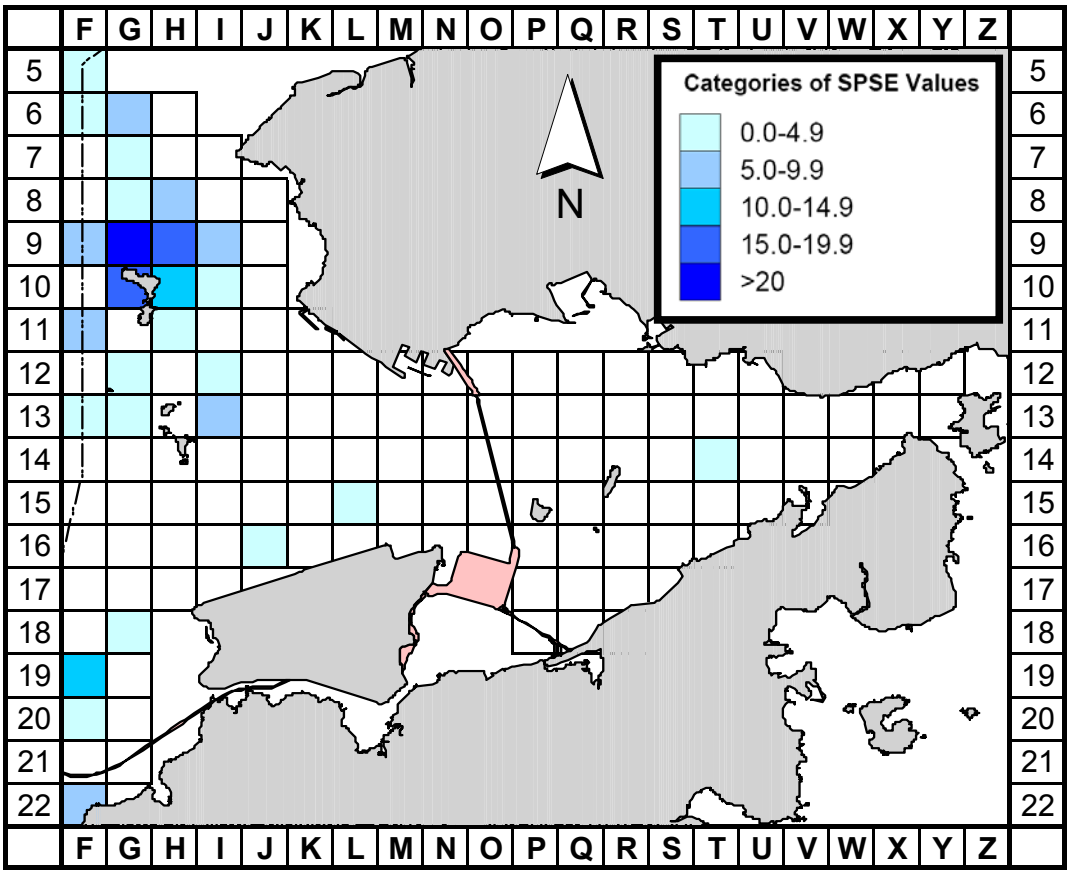


Figure 4a. Sighting density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period monitoring period (Nov14 - Oct15) (SPSE = no. of on-effort sightings per 100 units of survey effort)

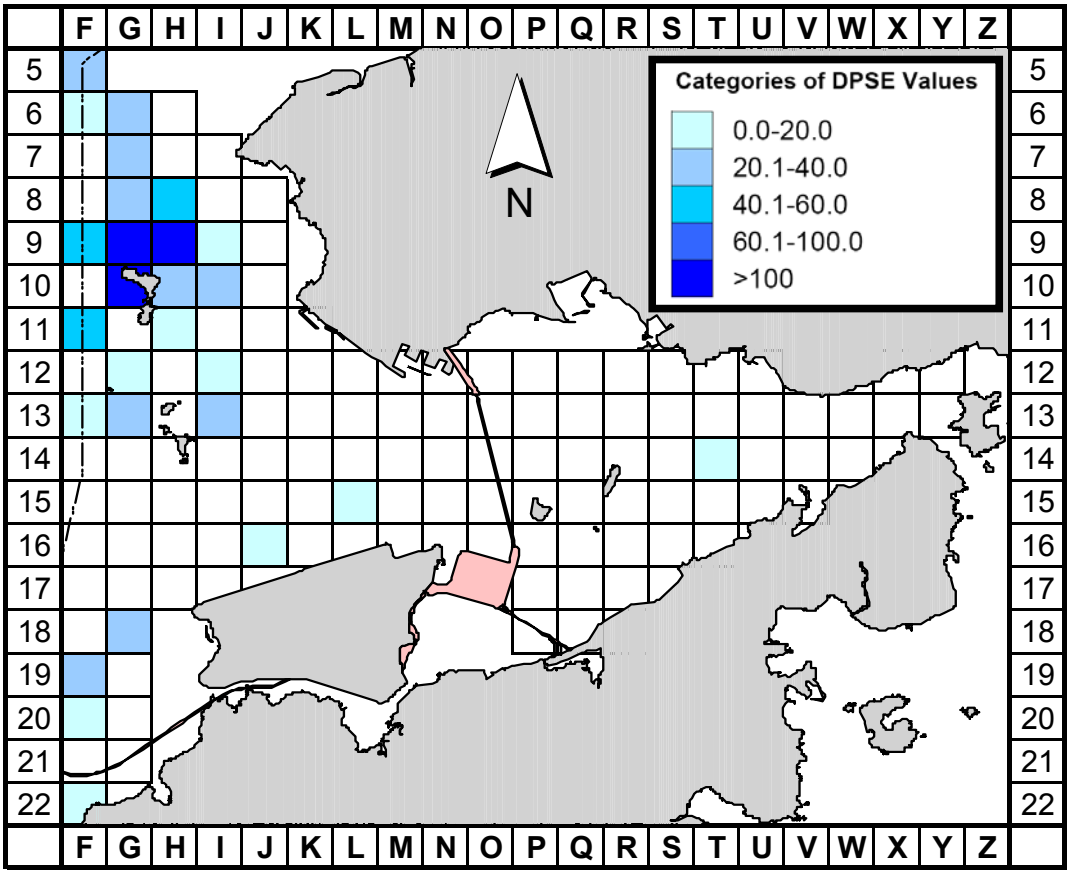


Figure 4b. Density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (Nov14 -Oct15) (DPSE = no. of dolphins per 100 units of survey effort)

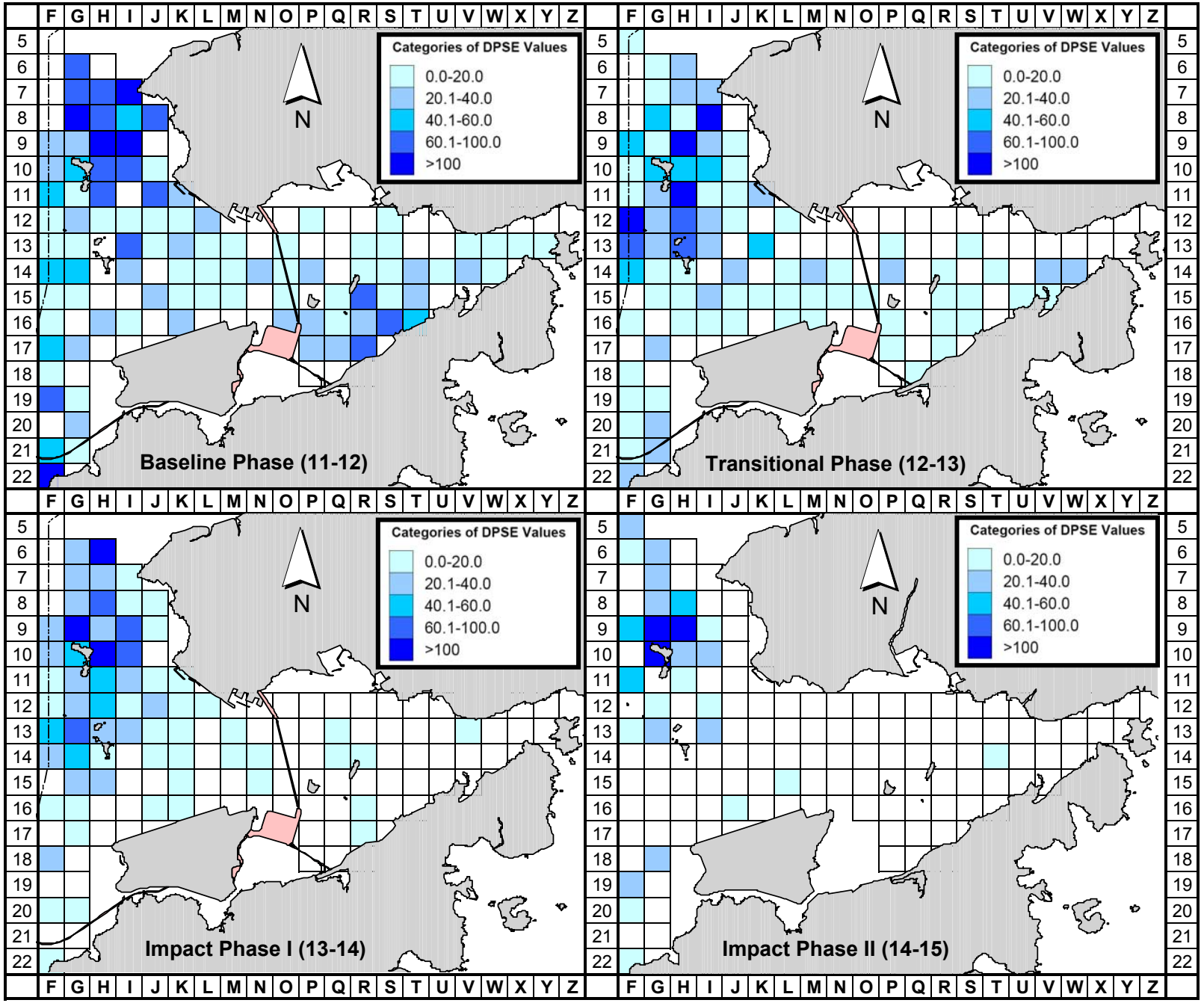


Figure 5. Comparison of density of Chinese white dolphins with corrected survey effort per km^2 in NWL and NEL survey areas between the two impact phases (Nov14-Oct15 and Nov13-Oct14), transitional phase (Nov12-Oct13) and baseline phase (Feb11-Jan12) monitoring periods (DPSE = no. of dolphins per 100 units of survey effort)

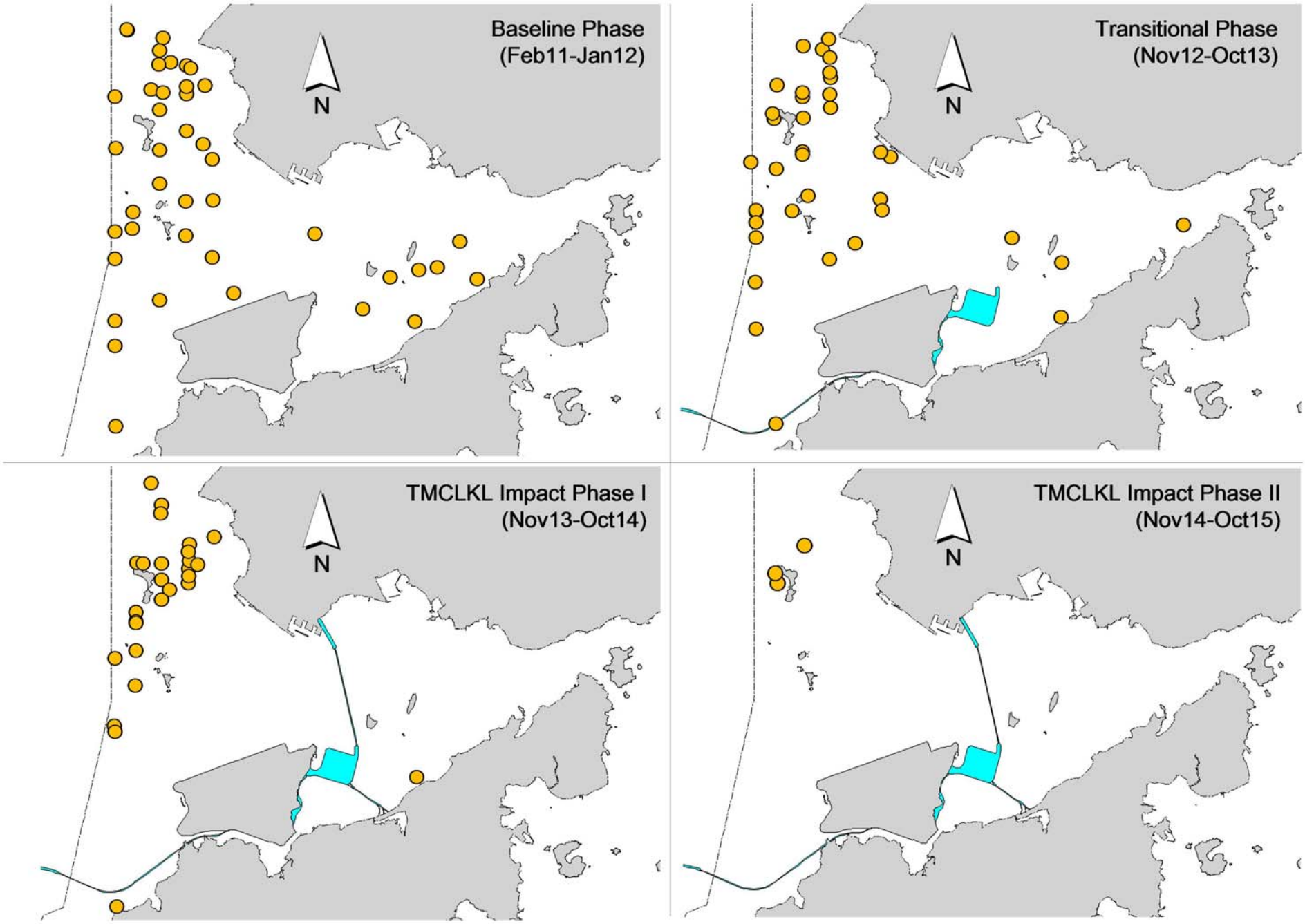


Figure 6. Distribution of young calves of Chinese white dolphins during different phases of TMCLKL construction works

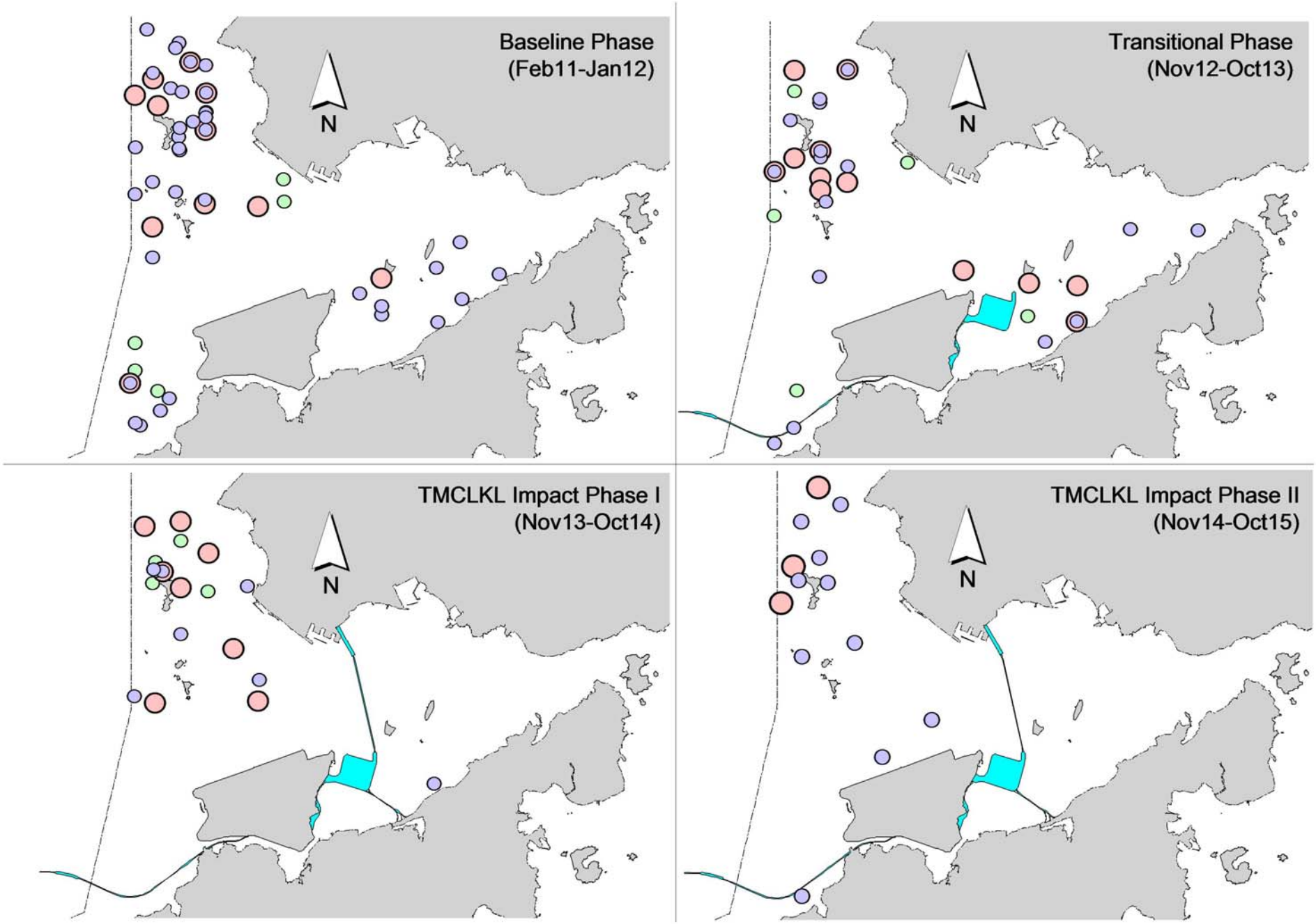


Figure 7. Distribution of dolphins engaged in feeding (purple dots), socializing (pink dots) and traveling (green dots) activities during different phases of TMCLKL construction works

Appendix I. HKLR03 Survey Effort Database (November 2014 - October 201

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
4-Nov-14	NE LANTAU	2	7.47	AUTUMN	STANDARD31516	HKLR	P
4-Nov-14	NE LANTAU	3	9.93	AUTUMN	STANDARD31516	HKLR	P
4-Nov-14	NE LANTAU	2	7.41	AUTUMN	STANDARD31516	HKLR	S
4-Nov-14	NE LANTAU	3	1.59	AUTUMN	STANDARD31516	HKLR	S
4-Nov-14	NW LANTAU	1	1.50	AUTUMN	STANDARD31516	HKLR	P
4-Nov-14	NW LANTAU	2	25.21	AUTUMN	STANDARD31516	HKLR	P
4-Nov-14	NW LANTAU	3	12.20	AUTUMN	STANDARD31516	HKLR	P
4-Nov-14	NW LANTAU	2	12.82	AUTUMN	STANDARD31516	HKLR	S
4-Nov-14	NW LANTAU	3	0.60	AUTUMN	STANDARD31516	HKLR	S
10-Nov-14	NE LANTAU	2	8.28	AUTUMN	STANDARD31516	HKLR	P
10-Nov-14	NE LANTAU	3	9.93	AUTUMN	STANDARD31516	HKLR	P
10-Nov-14	NE LANTAU	2	9.49	AUTUMN	STANDARD31516	HKLR	S
10-Nov-14	NE LANTAU	3	1.00	AUTUMN	STANDARD31516	HKLR	S
10-Nov-14	NW LANTAU	3	26.28	AUTUMN	STANDARD31516	HKLR	P
10-Nov-14	NW LANTAU	4	6.12	AUTUMN	STANDARD31516	HKLR	P
10-Nov-14	NW LANTAU	3	4.40	AUTUMN	STANDARD31516	HKLR	S
10-Nov-14	NW LANTAU	4	1.20	AUTUMN	STANDARD31516	HKLR	S
10-Nov-14	NW LANTAU	5	1.10	AUTUMN	STANDARD31516	HKLR	S
12-Nov-14	NW LANTAU	2	1.30	AUTUMN	STANDARD31516	HKLR	P
12-Nov-14	NW LANTAU	3	30.29	AUTUMN	STANDARD31516	HKLR	P
12-Nov-14	NW LANTAU	2	0.60	AUTUMN	STANDARD31516	HKLR	S
12-Nov-14	NW LANTAU	3	5.98	AUTUMN	STANDARD31516	HKLR	S
12-Nov-14	NW LANTAU	4	0.63	AUTUMN	STANDARD31516	HKLR	S
12-Nov-14	NE LANTAU	2	8.30	AUTUMN	STANDARD31516	HKLR	P
12-Nov-14	NE LANTAU	3	9.41	AUTUMN	STANDARD31516	HKLR	P
12-Nov-14	NE LANTAU	4	2.40	AUTUMN	STANDARD31516	HKLR	P
12-Nov-14	NE LANTAU	2	7.11	AUTUMN	STANDARD31516	HKLR	S
12-Nov-14	NE LANTAU	3	3.48	AUTUMN	STANDARD31516	HKLR	S
18-Nov-14	NW LANTAU	2	13.70	AUTUMN	STANDARD31516	HKLR	P
18-Nov-14	NW LANTAU	3	25.02	AUTUMN	STANDARD31516	HKLR	P
18-Nov-14	NW LANTAU	4	1.76	AUTUMN	STANDARD31516	HKLR	P
18-Nov-14	NW LANTAU	2	2.19	AUTUMN	STANDARD31516	HKLR	S
18-Nov-14	NW LANTAU	3	10.43	AUTUMN	STANDARD31516	HKLR	S
18-Nov-14	NE LANTAU	1	1.78	AUTUMN	STANDARD31516	HKLR	P
18-Nov-14	NE LANTAU	2	14.94	AUTUMN	STANDARD31516	HKLR	P
18-Nov-14	NE LANTAU	3	2.00	AUTUMN	STANDARD31516	HKLR	P
18-Nov-14	NE LANTAU	1	1.20	AUTUMN	STANDARD31516	HKLR	S
18-Nov-14	NE LANTAU	2	7.09	AUTUMN	STANDARD31516	HKLR	S
2-Dec-14	NE LANTAU	2	15.30	WINTER	STANDARD31516	HKLR	P
2-Dec-14	NE LANTAU	3	2.28	WINTER	STANDARD31516	HKLR	P
2-Dec-14	NE LANTAU	2	7.54	WINTER	STANDARD31516	HKLR	S
2-Dec-14	NE LANTAU	3	2.28	WINTER	STANDARD31516	HKLR	S
2-Dec-14	NW LANTAU	2	18.17	WINTER	STANDARD31516	HKLR	P
2-Dec-14	NW LANTAU	3	23.09	WINTER	STANDARD31516	HKLR	P
2-Dec-14	NW LANTAU	2	10.54	WINTER	STANDARD31516	HKLR	S
2-Dec-14	NW LANTAU	3	2.10	WINTER	STANDARD31516	HKLR	S
9-Dec-14	NE LANTAU	1	5.79	WINTER	STANDARD31516	HKLR	P
9-Dec-14	NE LANTAU	2	14.41	WINTER	STANDARD31516	HKLR	P
9-Dec-14	NE LANTAU	1	2.20	WINTER	STANDARD31516	HKLR	S
9-Dec-14	NE LANTAU	2	8.30	WINTER	STANDARD31516	HKLR	S
9-Dec-14	NW LANTAU	1	2.11	WINTER	STANDARD31516	HKLR	P
9-Dec-14	NW LANTAU	2	28.31	WINTER	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
9-Dec-14	NW LANTAU	2	5.13	WINTER	STANDARD31516	HKLR	S
9-Dec-14	NW LANTAU	3	2.45	WINTER	STANDARD31516	HKLR	S
15-Dec-14	NW LANTAU	2	31.56	WINTER	STANDARD31516	HKLR	P
15-Dec-14	NW LANTAU	3	9.34	WINTER	STANDARD31516	HKLR	P
15-Dec-14	NW LANTAU	2	12.90	WINTER	STANDARD31516	HKLR	S
15-Dec-14	NE LANTAU	1	3.57	WINTER	STANDARD31516	HKLR	P
15-Dec-14	NE LANTAU	2	13.37	WINTER	STANDARD31516	HKLR	P
15-Dec-14	NE LANTAU	1	3.76	WINTER	STANDARD31516	HKLR	S
15-Dec-14	NE LANTAU	2	6.50	WINTER	STANDARD31516	HKLR	S
23-Dec-14	NE LANTAU	2	19.81	WINTER	STANDARD31516	HKLR	P
23-Dec-14	NE LANTAU	2	9.69	WINTER	STANDARD31516	HKLR	S
23-Dec-14	NE LANTAU	3	0.90	WINTER	STANDARD31516	HKLR	S
23-Dec-14	NW LANTAU	2	13.36	WINTER	STANDARD31516	HKLR	P
23-Dec-14	NW LANTAU	3	16.71	WINTER	STANDARD31516	HKLR	P
23-Dec-14	NW LANTAU	2	5.81	WINTER	STANDARD31516	HKLR	S
23-Dec-14	NW LANTAU	3	1.82	WINTER	STANDARD31516	HKLR	S
8-Jan-15	NE LANTAU	2	20.00	WINTER	STANDARD31516	HKLR	P
8-Jan-15	NE LANTAU	2	10.40	WINTER	STANDARD31516	HKLR	S
8-Jan-15	NW LANTAU	2	10.06	WINTER	STANDARD31516	HKLR	P
8-Jan-15	NW LANTAU	3	21.99	WINTER	STANDARD31516	HKLR	P
8-Jan-15	NW LANTAU	2	5.53	WINTER	STANDARD31516	HKLR	S
8-Jan-15	NW LANTAU	3	1.94	WINTER	STANDARD31516	HKLR	S
15-Jan-15	NW LANTAU	2	0.89	WINTER	STANDARD31516	HKLR	P
15-Jan-15	NW LANTAU	3	36.39	WINTER	STANDARD31516	HKLR	P
15-Jan-15	NW LANTAU	2	1.05	WINTER	STANDARD31516	HKLR	S
15-Jan-15	NW LANTAU	3	11.06	WINTER	STANDARD31516	HKLR	S
15-Jan-15	NE LANTAU	2	9.56	WINTER	STANDARD31516	HKLR	P
15-Jan-15	NE LANTAU	3	7.91	WINTER	STANDARD31516	HKLR	P
15-Jan-15	NE LANTAU	2	8.56	WINTER	STANDARD31516	HKLR	S
15-Jan-15	NE LANTAU	3	1.17	WINTER	STANDARD31516	HKLR	S
27-Jan-15	NE LANTAU	2	10.35	WINTER	STANDARD31516	HKLR	P
27-Jan-15	NE LANTAU	3	7.00	WINTER	STANDARD31516	HKLR	P
27-Jan-15	NE LANTAU	2	6.55	WINTER	STANDARD31516	HKLR	S
27-Jan-15	NE LANTAU	3	3.90	WINTER	STANDARD31516	HKLR	S
27-Jan-15	NW LANTAU	2	10.38	WINTER	STANDARD31516	HKLR	P
27-Jan-15	NW LANTAU	3	26.22	WINTER	STANDARD31516	HKLR	P
27-Jan-15	NW LANTAU	4	3.10	WINTER	STANDARD31516	HKLR	P
27-Jan-15	NW LANTAU	2	7.53	WINTER	STANDARD31516	HKLR	S
27-Jan-15	NW LANTAU	3	4.15	WINTER	STANDARD31516	HKLR	S
27-Jan-15	NW LANTAU	4	0.80	WINTER	STANDARD31516	HKLR	S
29-Jan-15	NW LANTAU	1	1.41	WINTER	STANDARD31516	HKLR	P
29-Jan-15	NW LANTAU	2	15.47	WINTER	STANDARD31516	HKLR	P
29-Jan-15	NW LANTAU	3	13.03	WINTER	STANDARD31516	HKLR	P
29-Jan-15	NW LANTAU	1	2.34	WINTER	STANDARD31516	HKLR	S
29-Jan-15	NW LANTAU	2	4.25	WINTER	STANDARD31516	HKLR	S
29-Jan-15	NW LANTAU	3	0.60	WINTER	STANDARD31516	HKLR	S
29-Jan-15	NE LANTAU	1	4.67	WINTER	STANDARD31516	HKLR	P
29-Jan-15	NE LANTAU	2	15.57	WINTER	STANDARD31516	HKLR	P
29-Jan-15	NE LANTAU	2	10.56	WINTER	STANDARD31516	HKLR	S
5-Feb-15	NE LANTAU	2	11.79	WINTER	STANDARD31516	HKLR	P
5-Feb-15	NE LANTAU	3	8.03	WINTER	STANDARD31516	HKLR	P
5-Feb-15	NE LANTAU	1	0.20	WINTER	STANDARD31516	HKLR	S
5-Feb-15	NE LANTAU	2	7.00	WINTER	STANDARD31516	HKLR	S
5-Feb-15	NE LANTAU	3	3.88	WINTER	STANDARD31516	HKLR	S

Appendix I. (cont'd)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
5-Feb-15	NW LANTAU	2	11.86	WINTER	STANDARD31516	HKLR	P
5-Feb-15	NW LANTAU	3	19.78	WINTER	STANDARD31516	HKLR	P
5-Feb-15	NW LANTAU	2	3.96	WINTER	STANDARD31516	HKLR	S
5-Feb-15	NW LANTAU	3	4.10	WINTER	STANDARD31516	HKLR	S
13-Feb-15	NW LANTAU	1	10.31	WINTER	STANDARD31516	HKLR	P
13-Feb-15	NW LANTAU	2	24.74	WINTER	STANDARD31516	HKLR	P
13-Feb-15	NW LANTAU	3	4.98	WINTER	STANDARD31516	HKLR	P
13-Feb-15	NW LANTAU	1	4.92	WINTER	STANDARD31516	HKLR	S
13-Feb-15	NW LANTAU	2	8.01	WINTER	STANDARD31516	HKLR	S
13-Feb-15	NE LANTAU	2	16.97	WINTER	STANDARD31516	HKLR	P
13-Feb-15	NE LANTAU	2	9.83	WINTER	STANDARD31516	HKLR	S
16-Feb-15	NE LANTAU	2	17.07	WINTER	STANDARD31516	HKLR	P
16-Feb-15	NE LANTAU	1	2.87	WINTER	STANDARD31516	HKLR	S
16-Feb-15	NE LANTAU	2	7.61	WINTER	STANDARD31516	HKLR	S
16-Feb-15	NW LANTAU	1	0.90	WINTER	STANDARD31516	HKLR	P
16-Feb-15	NW LANTAU	2	36.33	WINTER	STANDARD31516	HKLR	P
16-Feb-15	NW LANTAU	3	2.60	WINTER	STANDARD31516	HKLR	P
16-Feb-15	NW LANTAU	2	10.57	WINTER	STANDARD31516	HKLR	S
16-Feb-15	NW LANTAU	3	2.60	WINTER	STANDARD31516	HKLR	S
25-Feb-15	NW LANTAU	2	9.92	WINTER	STANDARD31516	HKLR	P
25-Feb-15	NW LANTAU	3	19.49	WINTER	STANDARD31516	HKLR	P
25-Feb-15	NW LANTAU	2	3.49	WINTER	STANDARD31516	HKLR	S
25-Feb-15	NW LANTAU	3	4.30	WINTER	STANDARD31516	HKLR	S
25-Feb-15	NE LANTAU	1	1.24	WINTER	STANDARD31516	HKLR	P
25-Feb-15	NE LANTAU	2	16.34	WINTER	STANDARD31516	HKLR	P
25-Feb-15	NE LANTAU	3	1.96	WINTER	STANDARD31516	HKLR	P
25-Feb-15	NE LANTAU	2	10.36	WINTER	STANDARD31516	HKLR	S
4-Mar-15	NW LANTAU	1	1.07	SPRING	STANDARD31516	HKLR	P
4-Mar-15	NW LANTAU	2	12.71	SPRING	STANDARD31516	HKLR	P
4-Mar-15	NW LANTAU	3	25.62	SPRING	STANDARD31516	HKLR	P
4-Mar-15	NW LANTAU	4	1.40	SPRING	STANDARD31516	HKLR	P
4-Mar-15	NW LANTAU	2	8.00	SPRING	STANDARD31516	HKLR	S
4-Mar-15	NW LANTAU	3	3.30	SPRING	STANDARD31516	HKLR	S
4-Mar-15	NW LANTAU	4	1.00	SPRING	STANDARD31516	HKLR	S
4-Mar-15	NE LANTAU	2	5.38	SPRING	STANDARD31516	HKLR	P
4-Mar-15	NE LANTAU	3	12.87	SPRING	STANDARD31516	HKLR	P
4-Mar-15	NE LANTAU	2	3.40	SPRING	STANDARD31516	HKLR	S
4-Mar-15	NE LANTAU	3	5.39	SPRING	STANDARD31516	HKLR	S
11-Mar-15	NW LANTAU	2	25.99	SPRING	STANDARD31516	HKLR	P
11-Mar-15	NW LANTAU	3	5.09	SPRING	STANDARD31516	HKLR	P
11-Mar-15	NW LANTAU	2	7.53	SPRING	STANDARD31516	HKLR	S
11-Mar-15	NE LANTAU	2	20.05	SPRING	STANDARD31516	HKLR	P
11-Mar-15	NE LANTAU	2	10.95	SPRING	STANDARD31516	HKLR	S
17-Mar-15	NW LANTAU	2	3.26	SPRING	STANDARD31516	HKLR	P
17-Mar-15	NW LANTAU	3	36.14	SPRING	STANDARD31516	HKLR	P
17-Mar-15	NW LANTAU	4	0.80	SPRING	STANDARD31516	HKLR	P
17-Mar-15	NW LANTAU	2	2.20	SPRING	STANDARD31516	HKLR	S
17-Mar-15	NW LANTAU	3	10.40	SPRING	STANDARD31516	HKLR	S
17-Mar-15	NE LANTAU	2	14.63	SPRING	STANDARD31516	HKLR	P
17-Mar-15	NE LANTAU	3	1.97	SPRING	STANDARD31516	HKLR	P
17-Mar-15	NE LANTAU	1	1.94	SPRING	STANDARD31516	HKLR	S
17-Mar-15	NE LANTAU	2	7.69	SPRING	STANDARD31516	HKLR	S
17-Mar-15	NE LANTAU	3	0.68	SPRING	STANDARD31516	HKLR	S
26-Mar-15	NW LANTAU	1	20.26	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
26-Mar-15	NW LANTAU	2	10.63	SPRING	STANDARD31516	HKLR	P
26-Mar-15	NW LANTAU	2	6.76	SPRING	STANDARD31516	HKLR	S
26-Mar-15	NE LANTAU	1	11.38	SPRING	STANDARD31516	HKLR	P
26-Mar-15	NE LANTAU	2	8.40	SPRING	STANDARD31516	HKLR	P
26-Mar-15	NE LANTAU	1	4.32	SPRING	STANDARD31516	HKLR	S
26-Mar-15	NE LANTAU	2	6.20	SPRING	STANDARD31516	HKLR	S
8-Apr-15	NE LANTAU	2	14.22	SPRING	STANDARD31516	HKLR	P
8-Apr-15	NE LANTAU	3	5.10	SPRING	STANDARD31516	HKLR	P
8-Apr-15	NE LANTAU	1	0.50	SPRING	STANDARD31516	HKLR	S
8-Apr-15	NE LANTAU	2	9.09	SPRING	STANDARD31516	HKLR	S
8-Apr-15	NE LANTAU	3	0.99	SPRING	STANDARD31516	HKLR	S
8-Apr-15	NW LANTAU	2	4.96	SPRING	STANDARD31516	HKLR	P
8-Apr-15	NW LANTAU	3	25.95	SPRING	STANDARD31516	HKLR	P
8-Apr-15	NW LANTAU	4	0.84	SPRING	STANDARD31516	HKLR	P
8-Apr-15	NW LANTAU	2	2.29	SPRING	STANDARD31516	HKLR	S
8-Apr-15	NW LANTAU	3	5.26	SPRING	STANDARD31516	HKLR	S
10-Apr-15	NW LANTAU	2	14.40	SPRING	STANDARD31516	HKLR	P
10-Apr-15	NW LANTAU	3	26.10	SPRING	STANDARD31516	HKLR	P
10-Apr-15	NW LANTAU	2	9.40	SPRING	STANDARD31516	HKLR	S
10-Apr-15	NW LANTAU	3	4.20	SPRING	STANDARD31516	HKLR	S
10-Apr-15	NE LANTAU	2	15.44	SPRING	STANDARD31516	HKLR	P
10-Apr-15	NE LANTAU	3	1.30	SPRING	STANDARD31516	HKLR	P
10-Apr-15	NE LANTAU	2	10.06	SPRING	STANDARD31516	HKLR	S
17-Apr-15	NW LANTAU	2	4.84	SPRING	STANDARD31516	HKLR	P
17-Apr-15	NW LANTAU	3	29.76	SPRING	STANDARD31516	HKLR	P
17-Apr-15	NW LANTAU	4	5.80	SPRING	STANDARD31516	HKLR	P
17-Apr-15	NW LANTAU	2	0.30	SPRING	STANDARD31516	HKLR	S
17-Apr-15	NW LANTAU	3	7.60	SPRING	STANDARD31516	HKLR	S
17-Apr-15	NW LANTAU	4	4.80	SPRING	STANDARD31516	HKLR	S
17-Apr-15	NE LANTAU	2	3.60	SPRING	STANDARD31516	HKLR	P
17-Apr-15	NE LANTAU	3	11.51	SPRING	STANDARD31516	HKLR	P
17-Apr-15	NE LANTAU	4	2.21	SPRING	STANDARD31516	HKLR	P
17-Apr-15	NE LANTAU	2	4.41	SPRING	STANDARD31516	HKLR	S
17-Apr-15	NE LANTAU	3	5.07	SPRING	STANDARD31516	HKLR	S
22-Apr-15	NE LANTAU	2	20.00	SPRING	STANDARD31516	HKLR	P
22-Apr-15	NE LANTAU	2	10.90	SPRING	STANDARD31516	HKLR	S
22-Apr-15	NW LANTAU	1	3.24	SPRING	STANDARD31516	HKLR	P
22-Apr-15	NW LANTAU	2	25.27	SPRING	STANDARD31516	HKLR	P
22-Apr-15	NW LANTAU	3	3.37	SPRING	STANDARD31516	HKLR	P
22-Apr-15	NW LANTAU	2	7.07	SPRING	STANDARD31516	HKLR	S
22-Apr-15	NW LANTAU	3	0.85	SPRING	STANDARD31516	HKLR	S
4-May-15	NW LANTAU	2	18.60	SPRING	STANDARD31516	HKLR	P
4-May-15	NW LANTAU	3	13.60	SPRING	STANDARD31516	HKLR	P
4-May-15	NW LANTAU	2	2.30	SPRING	STANDARD31516	HKLR	S
4-May-15	NW LANTAU	3	4.80	SPRING	STANDARD31516	HKLR	S
4-May-15	NE LANTAU	1	3.54	SPRING	STANDARD31516	HKLR	P
4-May-15	NE LANTAU	2	10.73	SPRING	STANDARD31516	HKLR	P
4-May-15	NE LANTAU	3	5.40	SPRING	STANDARD31516	HKLR	P
4-May-15	NE LANTAU	2	8.13	SPRING	STANDARD31516	HKLR	S
4-May-15	NE LANTAU	3	2.70	SPRING	STANDARD31516	HKLR	S
8-May-15	NW LANTAU	2	7.57	SPRING	STANDARD31516	HKLR	P
8-May-15	NW LANTAU	3	33.53	SPRING	STANDARD31516	HKLR	P
8-May-15	NW LANTAU	2	2.30	SPRING	STANDARD31516	HKLR	S
8-May-15	NW LANTAU	3	11.20	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
8-May-15	NE LANTAU	2	4.55	SPRING	STANDARD31516	HKLR	P
8-May-15	NE LANTAU	3	12.74	SPRING	STANDARD31516	HKLR	P
8-May-15	NE LANTAU	2	6.25	SPRING	STANDARD31516	HKLR	S
8-May-15	NE LANTAU	3	3.66	SPRING	STANDARD31516	HKLR	S
14-May-15	NE LANTAU	2	12.61	SPRING	STANDARD31516	HKLR	P
14-May-15	NE LANTAU	3	4.43	SPRING	STANDARD31516	HKLR	P
14-May-15	NE LANTAU	2	9.96	SPRING	STANDARD31516	HKLR	S
14-May-15	NW LANTAU	2	5.56	SPRING	STANDARD31516	HKLR	P
14-May-15	NW LANTAU	3	34.27	SPRING	STANDARD31516	HKLR	P
14-May-15	NW LANTAU	4	0.60	SPRING	STANDARD31516	HKLR	P
14-May-15	NW LANTAU	2	8.17	SPRING	STANDARD31516	HKLR	S
14-May-15	NW LANTAU	3	4.80	SPRING	STANDARD31516	HKLR	S
18-May-15	NW LANTAU	2	5.11	SPRING	STANDARD31516	HKLR	P
18-May-15	NW LANTAU	3	24.12	SPRING	STANDARD31516	HKLR	P
18-May-15	NW LANTAU	4	3.37	SPRING	STANDARD31516	HKLR	P
18-May-15	NW LANTAU	2	2.20	SPRING	STANDARD31516	HKLR	S
18-May-15	NW LANTAU	3	4.70	SPRING	STANDARD31516	HKLR	S
18-May-15	NE LANTAU	2	15.13	SPRING	STANDARD31516	HKLR	P
18-May-15	NE LANTAU	3	4.30	SPRING	STANDARD31516	HKLR	P
18-May-15	NE LANTAU	2	10.77	SPRING	STANDARD31516	HKLR	S
2-Jun-15	NW LANTAU	2	10.00	SUMMER	STANDARD31516	HKLR	P
2-Jun-15	NW LANTAU	3	30.49	SUMMER	STANDARD31516	HKLR	P
2-Jun-15	NW LANTAU	2	7.70	SUMMER	STANDARD31516	HKLR	S
2-Jun-15	NW LANTAU	3	5.61	SUMMER	STANDARD31516	HKLR	S
2-Jun-15	NE LANTAU	2	6.93	SUMMER	STANDARD31516	HKLR	P
2-Jun-15	NE LANTAU	3	10.05	SUMMER	STANDARD31516	HKLR	P
2-Jun-15	NE LANTAU	2	9.12	SUMMER	STANDARD31516	HKLR	S
2-Jun-15	NE LANTAU	3	0.80	SUMMER	STANDARD31516	HKLR	S
10-Jun-15	NE LANTAU	2	17.06	SUMMER	STANDARD31516	HKLR	P
10-Jun-15	NE LANTAU	3	3.30	SUMMER	STANDARD31516	HKLR	P
10-Jun-15	NE LANTAU	2	9.14	SUMMER	STANDARD31516	HKLR	S
10-Jun-15	NE LANTAU	3	1.30	SUMMER	STANDARD31516	HKLR	S
10-Jun-15	NW LANTAU	2	8.02	SUMMER	STANDARD31516	HKLR	P
10-Jun-15	NW LANTAU	3	17.50	SUMMER	STANDARD31516	HKLR	P
10-Jun-15	NW LANTAU	4	5.86	SUMMER	STANDARD31516	HKLR	P
10-Jun-15	NW LANTAU	2	3.48	SUMMER	STANDARD31516	HKLR	S
10-Jun-15	NW LANTAU	3	1.65	SUMMER	STANDARD31516	HKLR	S
10-Jun-15	NW LANTAU	4	2.39	SUMMER	STANDARD31516	HKLR	S
24-Jun-15	NW LANTAU	2	12.10	SUMMER	STANDARD31516	HKLR	P
24-Jun-15	NW LANTAU	3	19.70	SUMMER	STANDARD31516	HKLR	P
24-Jun-15	NW LANTAU	2	4.80	SUMMER	STANDARD31516	HKLR	S
24-Jun-15	NW LANTAU	3	2.40	SUMMER	STANDARD31516	HKLR	S
24-Jun-15	NE LANTAU	2	20.32	SUMMER	STANDARD31516	HKLR	P
24-Jun-15	NE LANTAU	2	10.68	SUMMER	STANDARD31516	HKLR	S
26-Jun-15	NW LANTAU	3	30.27	SUMMER	STANDARD31516	HKLR	P
26-Jun-15	NW LANTAU	4	10.98	SUMMER	STANDARD31516	HKLR	P
26-Jun-15	NW LANTAU	3	6.40	SUMMER	STANDARD31516	HKLR	S
26-Jun-15	NW LANTAU	4	6.05	SUMMER	STANDARD31516	HKLR	S
26-Jun-15	NE LANTAU	2	14.33	SUMMER	STANDARD31516	HKLR	P
26-Jun-15	NE LANTAU	3	3.16	SUMMER	STANDARD31516	HKLR	P
26-Jun-15	NE LANTAU	2	6.53	SUMMER	STANDARD31516	HKLR	S
26-Jun-15	NE LANTAU	3	3.18	SUMMER	STANDARD31516	HKLR	S
2-Jul-15	NW LANTAU	2	1.80	SUMMER	STANDARD31516	HKLR	P
2-Jul-15	NW LANTAU	3	29.96	SUMMER	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
2-Jul-15	NW LANTAU	4	6.90	SUMMER	STANDARD31516	HKLR	P
2-Jul-15	NW LANTAU	5	2.30	SUMMER	STANDARD31516	HKLR	P
2-Jul-15	NW LANTAU	3	6.30	SUMMER	STANDARD31516	HKLR	S
2-Jul-15	NW LANTAU	4	6.26	SUMMER	STANDARD31516	HKLR	S
2-Jul-15	NE LANTAU	2	14.61	SUMMER	STANDARD31516	HKLR	P
2-Jul-15	NE LANTAU	3	2.80	SUMMER	STANDARD31516	HKLR	P
2-Jul-15	NE LANTAU	2	6.35	SUMMER	STANDARD31516	HKLR	S
2-Jul-15	NE LANTAU	3	3.44	SUMMER	STANDARD31516	HKLR	S
7-Jul-15	NE LANTAU	2	15.85	SUMMER	STANDARD31516	HKLR	P
7-Jul-15	NE LANTAU	3	4.59	SUMMER	STANDARD31516	HKLR	P
7-Jul-15	NE LANTAU	2	6.60	SUMMER	STANDARD31516	HKLR	S
7-Jul-15	NE LANTAU	3	4.36	SUMMER	STANDARD31516	HKLR	S
7-Jul-15	NW LANTAU	3	27.41	SUMMER	STANDARD31516	HKLR	P
7-Jul-15	NW LANTAU	4	4.20	SUMMER	STANDARD31516	HKLR	P
7-Jul-15	NW LANTAU	3	5.89	SUMMER	STANDARD31516	HKLR	S
7-Jul-15	NW LANTAU	4	1.90	SUMMER	STANDARD31516	HKLR	S
22-Jul-15	NW LANTAU	2	17.06	SUMMER	STANDARD31516	HKLR	P
22-Jul-15	NW LANTAU	3	14.40	SUMMER	STANDARD31516	HKLR	P
22-Jul-15	NW LANTAU	2	4.32	SUMMER	STANDARD31516	HKLR	S
22-Jul-15	NW LANTAU	3	2.62	SUMMER	STANDARD31516	HKLR	S
22-Jul-15	NE LANTAU	2	14.48	SUMMER	STANDARD31516	HKLR	P
22-Jul-15	NE LANTAU	3	5.54	SUMMER	STANDARD31516	HKLR	P
22-Jul-15	NE LANTAU	2	8.78	SUMMER	STANDARD31516	HKLR	S
22-Jul-15	NE LANTAU	3	2.00	SUMMER	STANDARD31516	HKLR	S
27-Jul-15	NW LANTAU	2	1.68	SUMMER	STANDARD31516	HKLR	P
27-Jul-15	NW LANTAU	3	24.69	SUMMER	STANDARD31516	HKLR	P
27-Jul-15	NW LANTAU	4	14.63	SUMMER	STANDARD31516	HKLR	P
27-Jul-15	NW LANTAU	2	2.10	SUMMER	STANDARD31516	HKLR	S
27-Jul-15	NW LANTAU	3	8.60	SUMMER	STANDARD31516	HKLR	S
27-Jul-15	NW LANTAU	4	2.50	SUMMER	STANDARD31516	HKLR	S
27-Jul-15	NE LANTAU	2	8.93	SUMMER	STANDARD31516	HKLR	P
27-Jul-15	NE LANTAU	3	7.93	SUMMER	STANDARD31516	HKLR	P
27-Jul-15	NE LANTAU	2	7.74	SUMMER	STANDARD31516	HKLR	S
27-Jul-15	NE LANTAU	3	2.10	SUMMER	STANDARD31516	HKLR	S
10-Aug-15	NW LANTAU	2	19.11	SUMMER	STANDARD31516	HKLR	P
10-Aug-15	NW LANTAU	3	21.29	SUMMER	STANDARD31516	HKLR	P
10-Aug-15	NW LANTAU	2	7.50	SUMMER	STANDARD31516	HKLR	S
10-Aug-15	NW LANTAU	3	5.90	SUMMER	STANDARD31516	HKLR	S
10-Aug-15	NE LANTAU	2	11.97	SUMMER	STANDARD31516	HKLR	P
10-Aug-15	NE LANTAU	3	4.50	SUMMER	STANDARD31516	HKLR	P
10-Aug-15	NE LANTAU	2	8.13	SUMMER	STANDARD31516	HKLR	S
10-Aug-15	NE LANTAU	3	2.10	SUMMER	STANDARD31516	HKLR	S
14-Aug-15	NW LANTAU	1	3.92	SUMMER	STANDARD31516	HKLR	P
14-Aug-15	NW LANTAU	2	20.74	SUMMER	STANDARD31516	HKLR	P
14-Aug-15	NW LANTAU	3	7.02	SUMMER	STANDARD31516	HKLR	P
14-Aug-15	NW LANTAU	2	3.00	SUMMER	STANDARD31516	HKLR	S
14-Aug-15	NW LANTAU	3	4.52	SUMMER	STANDARD31516	HKLR	S
14-Aug-15	NE LANTAU	2	18.24	SUMMER	STANDARD31516	HKLR	P
14-Aug-15	NE LANTAU	3	1.90	SUMMER	STANDARD31516	HKLR	P
14-Aug-15	NE LANTAU	2	8.36	SUMMER	STANDARD31516	HKLR	S
14-Aug-15	NE LANTAU	3	2.10	SUMMER	STANDARD31516	HKLR	S
19-Aug-15	NW LANTAU	2	26.22	SUMMER	STANDARD31516	HKLR	P
19-Aug-15	NW LANTAU	3	12.61	SUMMER	STANDARD31516	HKLR	P
19-Aug-15	NW LANTAU	2	8.42	SUMMER	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
19-Aug-15	NW LANTAU	3	4.39	SUMMER	STANDARD31516	HKLR	S
19-Aug-15	NE LANTAU	2	16.55	SUMMER	STANDARD31516	HKLR	P
19-Aug-15	NE LANTAU	2	9.95	SUMMER	STANDARD31516	HKLR	S
28-Aug-15	NE LANTAU	1	1.65	SUMMER	STANDARD31516	HKLR	P
28-Aug-15	NE LANTAU	2	17.34	SUMMER	STANDARD31516	HKLR	P
28-Aug-15	NE LANTAU	1	3.09	SUMMER	STANDARD31516	HKLR	S
28-Aug-15	NE LANTAU	2	7.70	SUMMER	STANDARD31516	HKLR	S
28-Aug-15	NW LANTAU	2	16.74	SUMMER	STANDARD31516	HKLR	P
28-Aug-15	NW LANTAU	3	14.81	SUMMER	STANDARD31516	HKLR	P
28-Aug-15	NW LANTAU	4	1.30	SUMMER	STANDARD31516	HKLR	P
28-Aug-15	NW LANTAU	2	6.65	SUMMER	STANDARD31516	HKLR	S
2-Sep-15	NW LANTAU	2	1.92	AUTUMN	STANDARD31516	HKLR	P
2-Sep-15	NW LANTAU	3	30.24	AUTUMN	STANDARD31516	HKLR	P
2-Sep-15	NW LANTAU	3	6.89	AUTUMN	STANDARD31516	HKLR	S
2-Sep-15	NE LANTAU	2	11.59	AUTUMN	STANDARD31516	HKLR	P
2-Sep-15	NE LANTAU	3	7.98	AUTUMN	STANDARD31516	HKLR	P
2-Sep-15	NE LANTAU	2	8.83	AUTUMN	STANDARD31516	HKLR	S
2-Sep-15	NE LANTAU	3	2.00	AUTUMN	STANDARD31516	HKLR	S
11-Sep-15	NW LANTAU	2	30.26	AUTUMN	STANDARD31516	HKLR	P
11-Sep-15	NW LANTAU	3	10.73	AUTUMN	STANDARD31516	HKLR	P
11-Sep-15	NW LANTAU	2	4.41	AUTUMN	STANDARD31516	HKLR	S
11-Sep-15	NW LANTAU	3	8.40	AUTUMN	STANDARD31516	HKLR	S
11-Sep-15	NE LANTAU	2	7.75	AUTUMN	STANDARD31516	HKLR	P
11-Sep-15	NE LANTAU	3	8.95	AUTUMN	STANDARD31516	HKLR	P
11-Sep-15	NE LANTAU	2	7.97	AUTUMN	STANDARD31516	HKLR	S
11-Sep-15	NE LANTAU	3	2.11	AUTUMN	STANDARD31516	HKLR	S
17-Sep-15	NE LANTAU	2	9.43	AUTUMN	STANDARD31516	HKLR	P
17-Sep-15	NE LANTAU	3	10.80	AUTUMN	STANDARD31516	HKLR	P
17-Sep-15	NE LANTAU	2	5.51	AUTUMN	STANDARD31516	HKLR	S
17-Sep-15	NE LANTAU	3	5.22	AUTUMN	STANDARD31516	HKLR	S
17-Sep-15	NW LANTAU	2	4.70	AUTUMN	STANDARD31516	HKLR	P
17-Sep-15	NW LANTAU	3	28.06	AUTUMN	STANDARD31516	HKLR	P
17-Sep-15	NW LANTAU	3	7.34	AUTUMN	STANDARD31516	HKLR	S
29-Sep-15	NE LANTAU	2	3.00	AUTUMN	STANDARD31516	HKLR	P
29-Sep-15	NE LANTAU	3	12.12	AUTUMN	STANDARD31516	HKLR	P
29-Sep-15	NE LANTAU	4	1.90	AUTUMN	STANDARD31516	HKLR	P
29-Sep-15	NE LANTAU	2	3.06	AUTUMN	STANDARD31516	HKLR	S
29-Sep-15	NE LANTAU	3	6.02	AUTUMN	STANDARD31516	HKLR	S
29-Sep-15	NE LANTAU	4	1.10	AUTUMN	STANDARD31516	HKLR	S
29-Sep-15	NW LANTAU	2	25.66	AUTUMN	STANDARD31516	HKLR	P
29-Sep-15	NW LANTAU	3	16.42	AUTUMN	STANDARD31516	HKLR	P
29-Sep-15	NW LANTAU	2	1.60	AUTUMN	STANDARD31516	HKLR	S
29-Sep-15	NW LANTAU	3	11.49	AUTUMN	STANDARD31516	HKLR	S
6-Oct-15	NW LANTAU	2	10.62	AUTUMN	STANDARD31516	HKLR	P
6-Oct-15	NW LANTAU	3	18.78	AUTUMN	STANDARD31516	HKLR	P
6-Oct-15	NW LANTAU	2	0.59	AUTUMN	STANDARD31516	HKLR	S
6-Oct-15	NW LANTAU	3	7.02	AUTUMN	STANDARD31516	HKLR	S
6-Oct-15	NE LANTAU	2	20.01	AUTUMN	STANDARD31516	HKLR	P
6-Oct-15	NE LANTAU	3	10.79	AUTUMN	STANDARD31516	HKLR	S
13-Oct-15	NW LANTAU	2	23.12	AUTUMN	STANDARD31516	HKLR	P
13-Oct-15	NW LANTAU	3	15.72	AUTUMN	STANDARD31516	HKLR	P
13-Oct-15	NW LANTAU	2	8.61	AUTUMN	STANDARD31516	HKLR	S
13-Oct-15	NW LANTAU	3	4.20	AUTUMN	STANDARD31516	HKLR	S
13-Oct-15	NE LANTAU	2	7.15	AUTUMN	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
13-Oct-15	NE LANTAU	3	9.80	AUTUMN	STANDARD31516	HKLR	P
13-Oct-15	NE LANTAU	2	4.56	AUTUMN	STANDARD31516	HKLR	S
13-Oct-15	NE LANTAU	3	5.59	AUTUMN	STANDARD31516	HKLR	S
19-Oct-15	NE LANTAU	2	14.52	AUTUMN	STANDARD31516	HKLR	P
19-Oct-15	NE LANTAU	3	2.90	AUTUMN	STANDARD31516	HKLR	P
19-Oct-15	NE LANTAU	1	2.10	AUTUMN	STANDARD31516	HKLR	S
19-Oct-15	NE LANTAU	2	7.68	AUTUMN	STANDARD31516	HKLR	S
19-Oct-15	NW LANTAU	2	14.07	AUTUMN	STANDARD31516	HKLR	P
19-Oct-15	NW LANTAU	3	27.17	AUTUMN	STANDARD31516	HKLR	P
19-Oct-15	NW LANTAU	2	6.61	AUTUMN	STANDARD31516	HKLR	S
19-Oct-15	NW LANTAU	3	6.25	AUTUMN	STANDARD31516	HKLR	S
26-Oct-15	NE LANTAU	2	10.41	AUTUMN	STANDARD31516	HKLR	P
26-Oct-15	NE LANTAU	3	10.00	AUTUMN	STANDARD31516	HKLR	P
26-Oct-15	NE LANTAU	2	8.99	AUTUMN	STANDARD31516	HKLR	S
26-Oct-15	NE LANTAU	3	1.60	AUTUMN	STANDARD31516	HKLR	S
26-Oct-15	NW LANTAU	2	1.22	AUTUMN	STANDARD31516	HKLR	P
26-Oct-15	NW LANTAU	3	30.67	AUTUMN	STANDARD31516	HKLR	P
26-Oct-15	NW LANTAU	2	0.10	AUTUMN	STANDARD31516	HKLR	S
26-Oct-15	NW LANTAU	3	7.51	AUTUMN	STANDARD31516	HKLR	S

Appendix II. HKLR03 Chinese White Dolphin Sighting Database (November 2014 - October 2015)

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

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
04-Nov-14	1	1435	13	NW LANTAU	1	73	ON	HKLR	827747	806468	AUTUMN	NONE	P
04-Nov-14	2	1539	1	NW LANTAU	2	0	ON	HKLR	827839	804666	AUTUMN	NONE	P
04-Nov-14	3	1558	2	NW LANTAU	2	118	ON	HKLR	825757	804662	AUTUMN	NONE	P
12-Nov-14	1	1050	4	NW LANTAU	3	105	ON	HKLR	826686	805385	AUTUMN	NONE	P
18-Nov-14	1	1255	2	NW LANTAU	2	334	ON	HKLR	827669	806479	AUTUMN	NONE	P
18-Nov-14	2	1307	7	NW LANTAU	3	ND	OFF	HKLR	827559	806149	AUTUMN	NONE	
02-Dec-14	1	1428	1	NW LANTAU	3	207	ON	HKLR	826916	806457	WINTER	NONE	P
09-Dec-14	1	1315	3	NW LANTAU	2	280	ON	HKLR	824445	807513	WINTER	NONE	P
23-Dec-14	1	1335	1	NW LANTAU	3	151	ON	HKLR	827424	807518	WINTER	NONE	P
08-Jan-15	1	1355	1	NW LANTAU	2	148	ON	HKLR	830029	806123	WINTER	NONE	S
08-Jan-15	2	1421	8	NW LANTAU	3	556	ON	HKLR	827716	805449	WINTER	NONE	P
15-Jan-15	1	1132	2	NW LANTAU	3	189	ON	HKLR	830762	804693	WINTER	NONE	P
15-Jan-15	2	1143	5	NW LANTAU	3	24	ON	HKLR	831349	804705	WINTER	NONE	P
15-Jan-15	3	1156	3	NW LANTAU	3	464	ON	HKLR	830673	805331	WINTER	NONE	S
27-Jan-15	1	1409	2	NW LANTAU	3	163	ON	HKLR	825753	806454	WINTER	NONE	S
27-Jan-15	2	1442	3	NW LANTAU	3	410	ON	HKLR	830429	805475	WINTER	NONE	P
29-Jan-15	1	1104	4	NW LANTAU	3	63	ON	HKLR	824825	805464	WINTER	NONE	P
29-Jan-15	2	1128	6	NW LANTAU	2	143	ON	HKLR	826287	805456	WINTER	NONE	P
29-Jan-15	3	1150	7	NW LANTAU	2	343	ON	HKLR	827483	805469	WINTER	NONE	P
29-Jan-15	4	1208	5	NW LANTAU	2	143	ON	HKLR	829122	805472	WINTER	NONE	P
13-Feb-15	1	1344	1	NW LANTAU	2	103	ON	HKLR	821649	810495	WINTER	NONE	P
04-Mar-15	1	1009	1	NW LANTAU	2	ND	OFF	HKLR	815213	805485	SPRING	NONE	
11-Mar-15	1	1347	1	NW LANTAU	2	ND	OFF	HKLR	829495	806976	SPRING	NONE	
11-Mar-15	2	1519	7	NW LANTAU	2	258	ON	HKLR	818956	805421	SPRING	NONE	P
26-Mar-15	1	1201	3	NW LANTAU	2	21	ON	HKLR	820290	808597	SPRING	NONE	S
08-Apr-15	1	1309	3	NW LANTAU	3	142	ON	HKLR	823791	807532	SPRING	NONE	P
10-Apr-15	1	1103	2	NW LANTAU	2	ND	OFF	HKLR	828359	804688	SPRING	NONE	
22-Apr-15	1	1432	8	NW LANTAU	2	354	ON	HKLR	830139	806113	SPRING	NONE	S
02-Jun-15	1	1110	10	NW LANTAU	3	88	ON	HKLR	827673	804687	SUMMER	NONE	P
26-Jun-15	1	1210	4	NW LANTAU	4	357	ON	HKLR	826650	806456	SUMMER	NONE	P
26-Jun-15	2	1610	1	NE LANTAU	2	0	ON	HKLR	822224	818562	SUMMER	NONE	P
02-Jul-15	1	1051	2	NW LANTAU	3	158	ON	HKLR	823542	804688	SUMMER	NONE	P

Appendix II. (cont'd)

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

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
22-Jul-15	1	1055	3	NW LANTAU	3	153	ON	HKLR	827217	805458	SUMMER	NONE	P
22-Jul-15	2	1140	1	NW LANTAU	3	147	ON	HKLR	827280	807549	SUMMER	NONE	P
19-Aug-15	1	1019	1	NW LANTAU	2	45	ON	HKLR	814805	804681	SUMMER	NONE	P
19-Aug-15	2	1031	4	NW LANTAU	2	502	ON	HKLR	816101	804673	SUMMER	NONE	P
19-Aug-15	3	1036	1	NW LANTAU	2	285	ON	HKLR	817097	804675	SUMMER	NONE	P
19-Aug-15	4	1125	5	NW LANTAU	2	733	ON	HKLR	827218	805036	SUMMER	NONE	P
19-Aug-15	5	1221	5	NW LANTAU	2	98	ON	HKLR	827182	806436	SUMMER	NONE	P
28-Aug-15	1	1417	5	NW LANTAU	3	344	ON	HKLR	826693	807538	SUMMER	NONE	P
02-Sep-15	1	1045	8	NW LANTAU	3	629	ON	HKLR	823950	805482	AUTUMN	NONE	P
02-Sep-15	2	1122	12	NW LANTAU	2	240	ON	HKLR	826365	805436	AUTUMN	NONE	P
02-Sep-15	3	1143	12	NW LANTAU	2	75	ON	HKLR	826741	805344	AUTUMN	NONE	P
11-Sep-15	1	1155	6	NW LANTAU	2	349	ON	HKLR	828788	806460	AUTUMN	NONE	P
17-Sep-15	1	1411	7	NW LANTAU	3	134	ON	HKLR	828867	805462	AUTUMN	PURSE-SEINE	P
29-Sep-15	1	1445	5	NW LANTAU	2	430	ON	HKLR	827625	806489	AUTUMN	NONE	P
29-Sep-15	2	1512	4	NW LANTAU	2	281	ON	HKLR	828090	806500	AUTUMN	NONE	P
06-Oct-15	1	1113	2	NW LANTAU	2	72	ON	HKLR	827029	805334	AUTUMN	NONE	P
13-Oct-15	1	1025	2	NW LANTAU	3	195	ON	HKLR	817031	804665	AUTUMN	NONE	P
13-Oct-15	2	1036	3	NW LANTAU	3	102	ON	HKLR	817020	804675	AUTUMN	NONE	P
13-Oct-15	3	1123	10	NW LANTAU	2	745	ON	HKLR	825923	804673	AUTUMN	NONE	P
19-Oct-15	1	1407	2	NW LANTAU	3	14	ON	HKLR	826473	806476	AUTUMN	NONE	P
26-Oct-15	1	1326	6	NW LANTAU	3	73	ON	HKLR	823681	807511	AUTUMN	NONE	P
26-Oct-15	2	1444	2	NW LANTAU	2	107	ON	HKLR	827007	805303	AUTUMN	NONE	S

Appendix III. Individual dolphins identified during HKLR03 monitoring surveys in November 2014-October 2015

ID#	DATE	STG#	AREA
CH34	18/11/14	2	NW LANTAU
	15/01/15	1	NW LANTAU
	15/01/15	2	NW LANTAU
	29/01/15	4	NW LANTAU
	11/03/15	1	NW LANTAU
	02/06/15	1	NW LANTAU
	28/08/15	1	NW LANTAU
	29/09/15	1	NW LANTAU
	19/10/15	1	NW LANTAU
CH84	02/09/15	3	NW LANTAU
NL33	13/10/15	1	NW LANTAU
	26/10/15	1	NW LANTAU
NL37	02/06/15	1	NW LANTAU
NL46	04/11/14	1	NW LANTAU
	19/08/15	4	NW LANTAU
	02/09/15	2	NW LANTAU
	17/09/15	1	NW LANTAU
NL48	04/11/14	1	NW LANTAU
	18/11/14	2	NW LANTAU
	23/12/14	1	NW LANTAU
	15/01/15	3	NW LANTAU
	02/06/15	1	NW LANTAU
	02/09/15	1	NW LANTAU
	11/09/15	1	NW LANTAU
	17/09/15	1	NW LANTAU
NL49	11/03/15	2	NW LANTAU
NL80	02/09/15	2	NW LANTAU
NL98	15/01/15	2	NW LANTAU
NL103	29/01/15	2	NW LANTAU
NL104	04/11/14	1	NW LANTAU
	08/01/15	2	NW LANTAU
	22/04/15	1	NW LANTAU
	02/06/15	1	NW LANTAU
	19/08/15	4	NW LANTAU
	28/08/15	1	NW LANTAU
	13/10/15	3	NW LANTAU
NL123	08/01/15	2	NW LANTAU
	11/03/15	2	NW LANTAU
	17/09/15	1	NW LANTAU

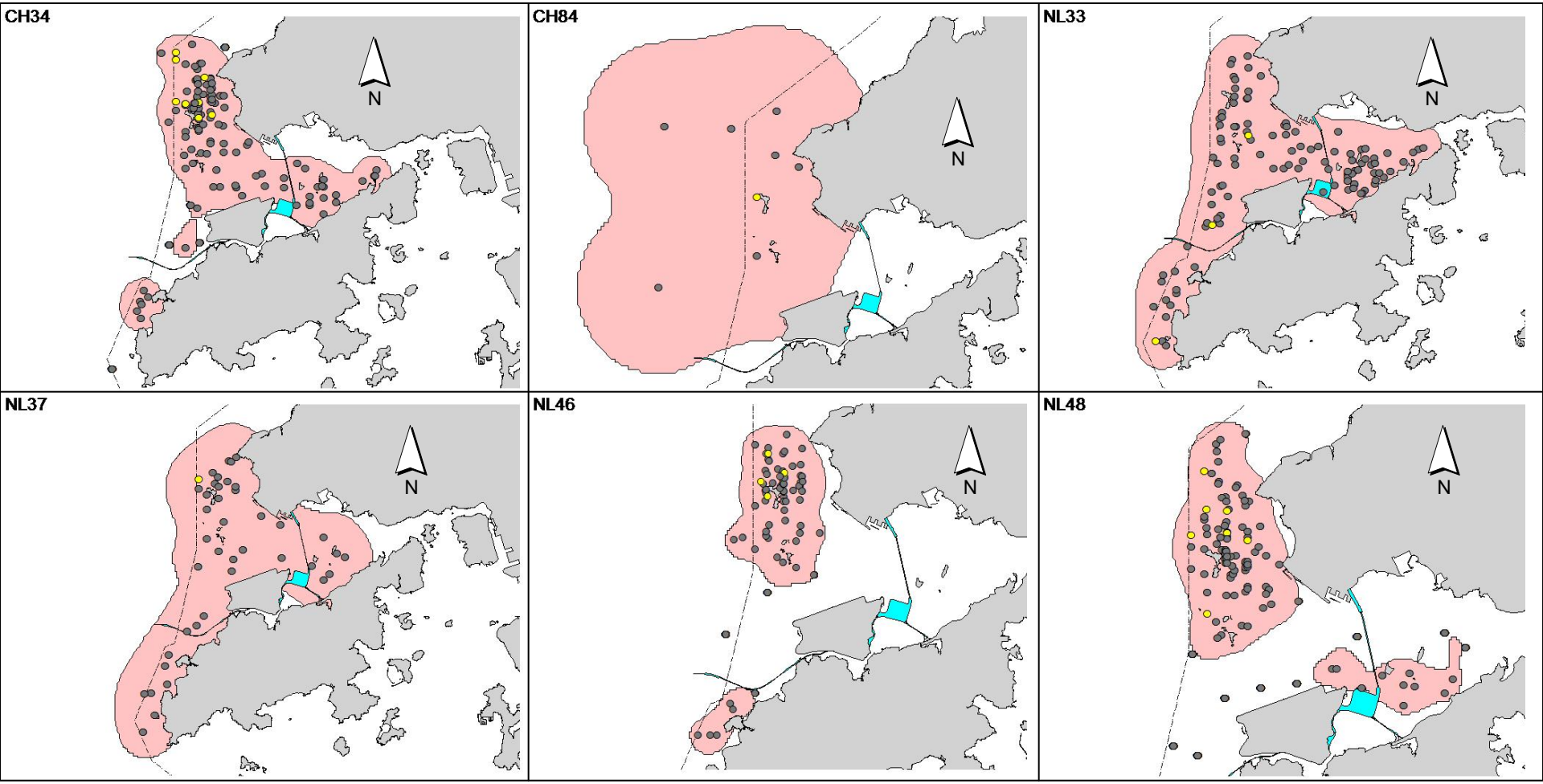
ID#	DATE	STG#	AREA
NL136	02/12/14	1	NW LANTAU
	11/03/15	2	NW LANTAU
	08/04/15	1	NW LANTAU
	02/06/15	1	NW LANTAU
	28/08/15	1	NW LANTAU
	29/09/15	1	NW LANTAU
NL145	08/01/15	2	NW LANTAU
	29/01/15	2	NW LANTAU
NL150	02/09/15	2	NW LANTAU
NL153	22/04/15	1	NW LANTAU
	19/08/15	5	NW LANTAU
NL165	11/03/15	2	NW LANTAU
	02/09/15	1	NW LANTAU
NL182	18/11/14	2	NW LANTAU
	15/01/15	1	NW LANTAU
	15/01/15	2	NW LANTAU
	02/06/15	1	NW LANTAU
	17/09/15	1	NW LANTAU
NL202	12/11/14	1	NW LANTAU
	18/11/14	1	NW LANTAU
	18/11/14	2	NW LANTAU
	08/01/15	2	NW LANTAU
	22/04/15	1	NW LANTAU
	02/06/15	1	NW LANTAU
	26/06/15	1	NW LANTAU
	19/08/15	5	NW LANTAU
	02/09/15	2	NW LANTAU
	17/09/15	1	NW LANTAU
	29/09/15	2	NW LANTAU
	13/10/15	3	NW LANTAU
	26/10/15	2	NW LANTAU
NL203	02/09/15	3	NW LANTAU
NL210	12/11/14	1	NW LANTAU
	29/01/15	2	NW LANTAU
	02/09/15	2	NW LANTAU
	13/10/15	3	NW LANTAU
NL213	26/06/15	1	NW LANTAU
NL214	09/12/14	1	NW LANTAU
	28/08/15	1	NW LANTAU
	13/10/15	3	NW LANTAU

Appendix III. (cont'd)

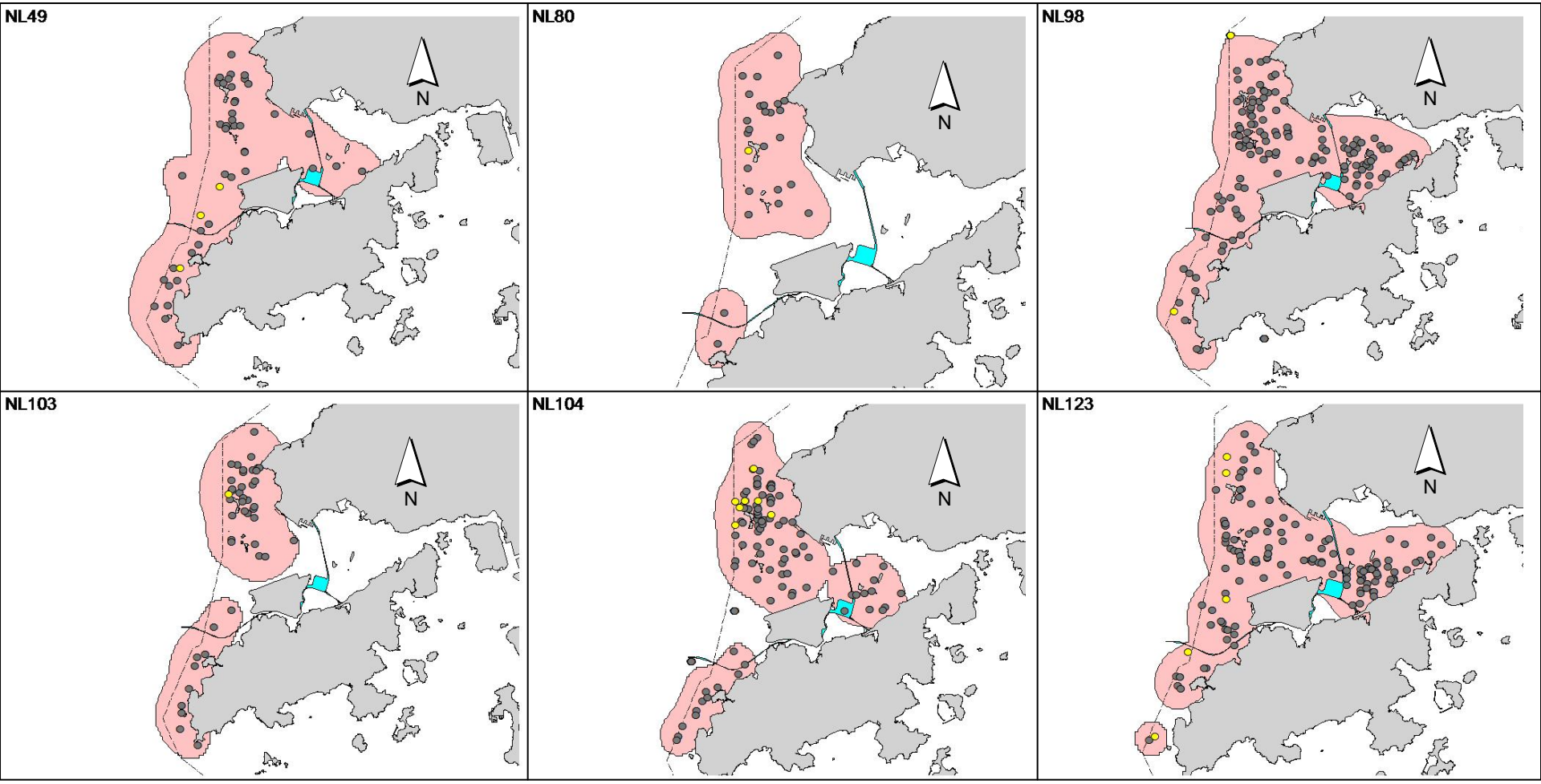
ID#	DATE	STG#	AREA
NL220	09/12/14	1	NW LANTAU
	28/08/15	1	NW LANTAU
	19/10/15	1	NW LANTAU
	26/10/15	1	NW LANTAU
NL233	22/07/15	1	NW LANTAU
	02/09/15	2	NW LANTAU
NL236	22/04/15	1	NW LANTAU
NL256	04/11/14	1	NW LANTAU
NL259	04/11/14	1	NW LANTAU
	15/01/15	3	NW LANTAU
NL261	08/01/15	2	NW LANTAU
	26/03/15	1	NW LANTAU
	02/09/15	1	NW LANTAU
	26/10/15	1	NW LANTAU
NL272	12/11/14	1	NW LANTAU
	26/03/15	1	NW LANTAU
	26/10/15	1	NW LANTAU
NL284	15/01/15	2	NW LANTAU
	29/01/15	2	NW LANTAU
	11/03/15	2	NW LANTAU
	26/03/15	1	NW LANTAU
	13/10/15	3	NW LANTAU
	26/10/15	1	NW LANTAU
NL285	08/01/15	2	NW LANTAU
	11/03/15	2	NW LANTAU
	02/09/15	1	NW LANTAU
	11/09/15	1	NW LANTAU
NL286	04/11/14	1	NW LANTAU
	18/11/14	1	NW LANTAU
	18/11/14	2	NW LANTAU
	08/01/15	2	NW LANTAU
	22/04/15	1	NW LANTAU
	02/06/15	1	NW LANTAU
	26/06/15	1	NW LANTAU
	19/08/15	5	NW LANTAU
	02/09/15	2	NW LANTAU
	17/09/15	1	NW LANTAU
	06/10/15	1	NW LANTAU
	13/10/15	3	NW LANTAU
	26/10/15	2	NW LANTAU
NL287	29/01/15	1	NW LANTAU

ID#	DATE	STG#	AREA
NL293	19/08/15	1	NW LANTAU
NL297	02/09/15	3	NW LANTAU
NL302	02/09/15	3	NW LANTAU
	11/09/15	1	NW LANTAU
NL306	29/01/15	1	NW LANTAU
	13/02/15	1	NW LANTAU
NL307	09/12/14	1	NW LANTAU
	29/01/15	1	NW LANTAU
	22/04/15	1	NW LANTAU
NL308	02/09/15	2	NW LANTAU
NL310	02/07/15	1	NW LANTAU
	19/08/15	4	NW LANTAU
NL319	26/06/15	1	NW LANTAU
	29/09/15	2	NW LANTAU
SL47	13/10/15	2	NW LANTAU
WL05	04/11/14	1	NW LANTAU
	04/11/14	3	NW LANTAU
	12/11/14	1	NW LANTAU
	02/06/15	1	NW LANTAU
	02/09/15	1	NW LANTAU
	29/09/15	2	NW LANTAU
WL17	27/01/15	1	NW LANTAU
	19/08/15	4	NW LANTAU
	02/09/15	2	NW LANTAU
	17/09/15	1	NW LANTAU
WL79	13/10/15	3	NW LANTAU
WL97	12/11/14	1	NW LANTAU
WL124	19/08/15	3	NW LANTAU
WL167	02/07/15	1	NW LANTAU
WL178	04/03/15	1	NW LANTAU
WL188	29/01/15	2	NW LANTAU
WL231	29/01/15	2	NW LANTAU
WL241	13/10/15	2	NW LANTAU
WL243	13/10/15	2	NW LANTAU

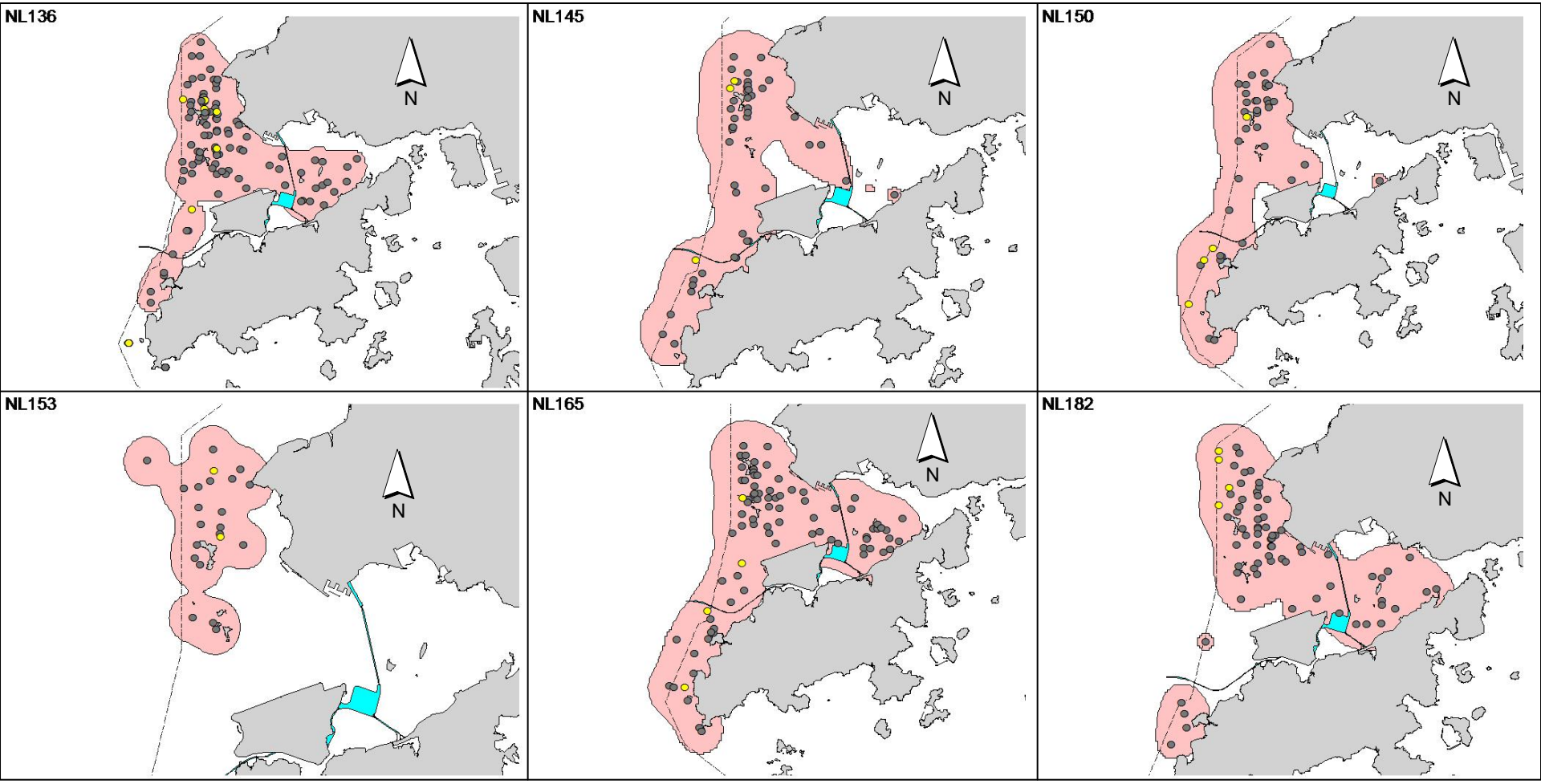
Appendix IV. Ranging patterns (95% kernel ranges) of 54 individual dolphins that were sighted during the first year of TMCLKL construction works, utilizing the HKLR03 and HKLR09 monitoring data
(note: yellow dots indicates sightings made in November 2014 to October 2015)



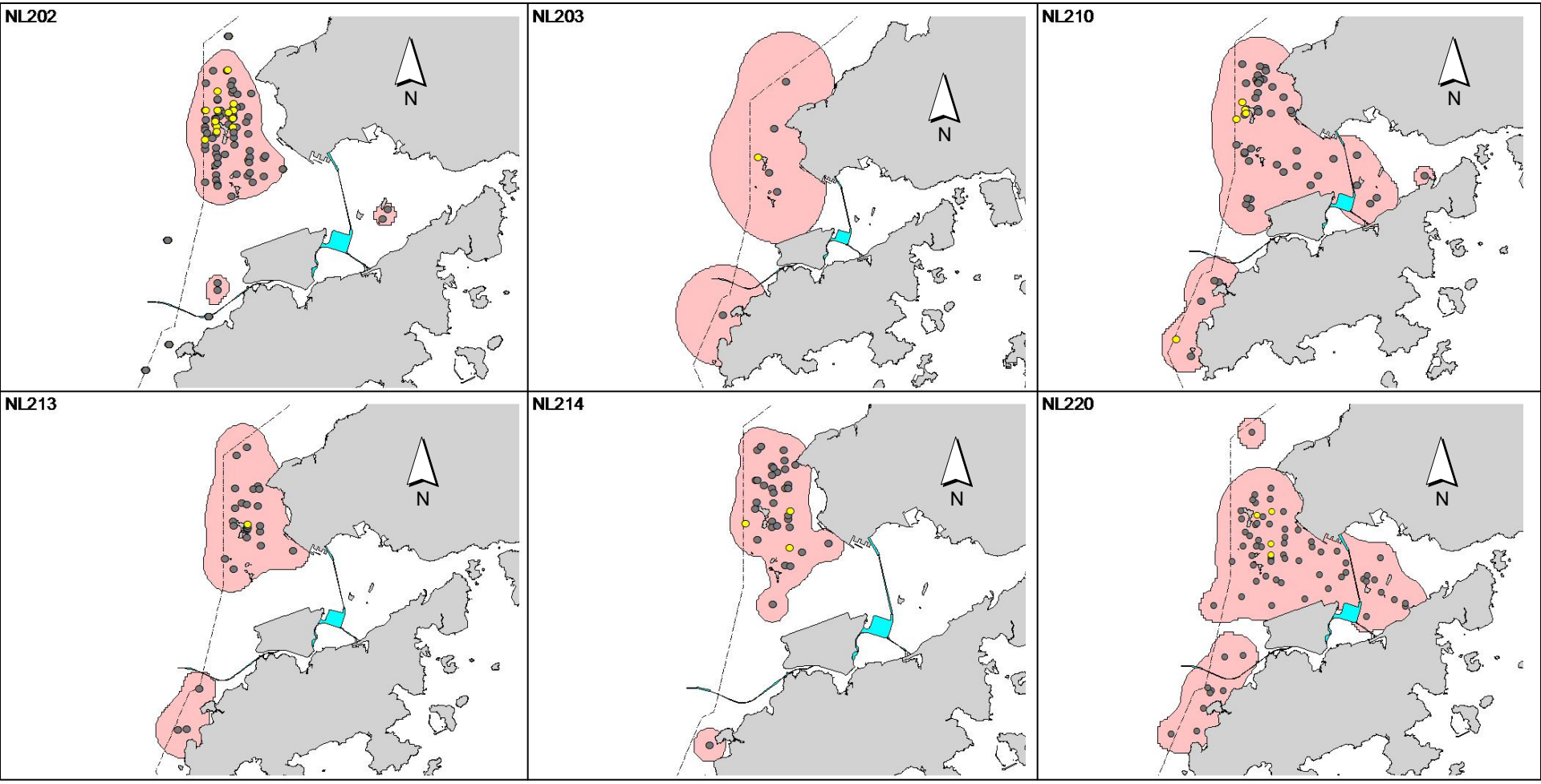
Appendix IV. (cont'd)



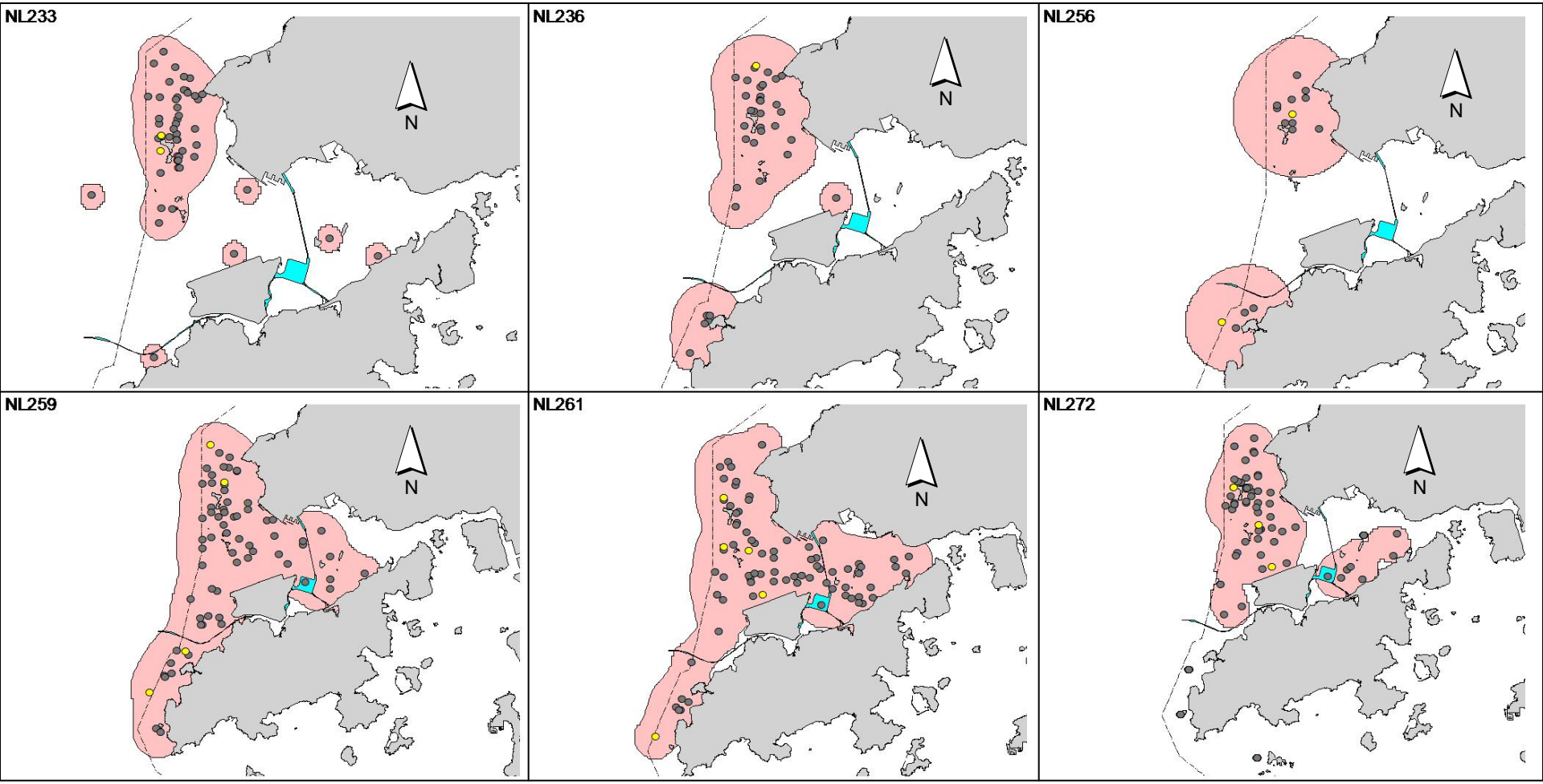
Appendix IV. (cont'd)



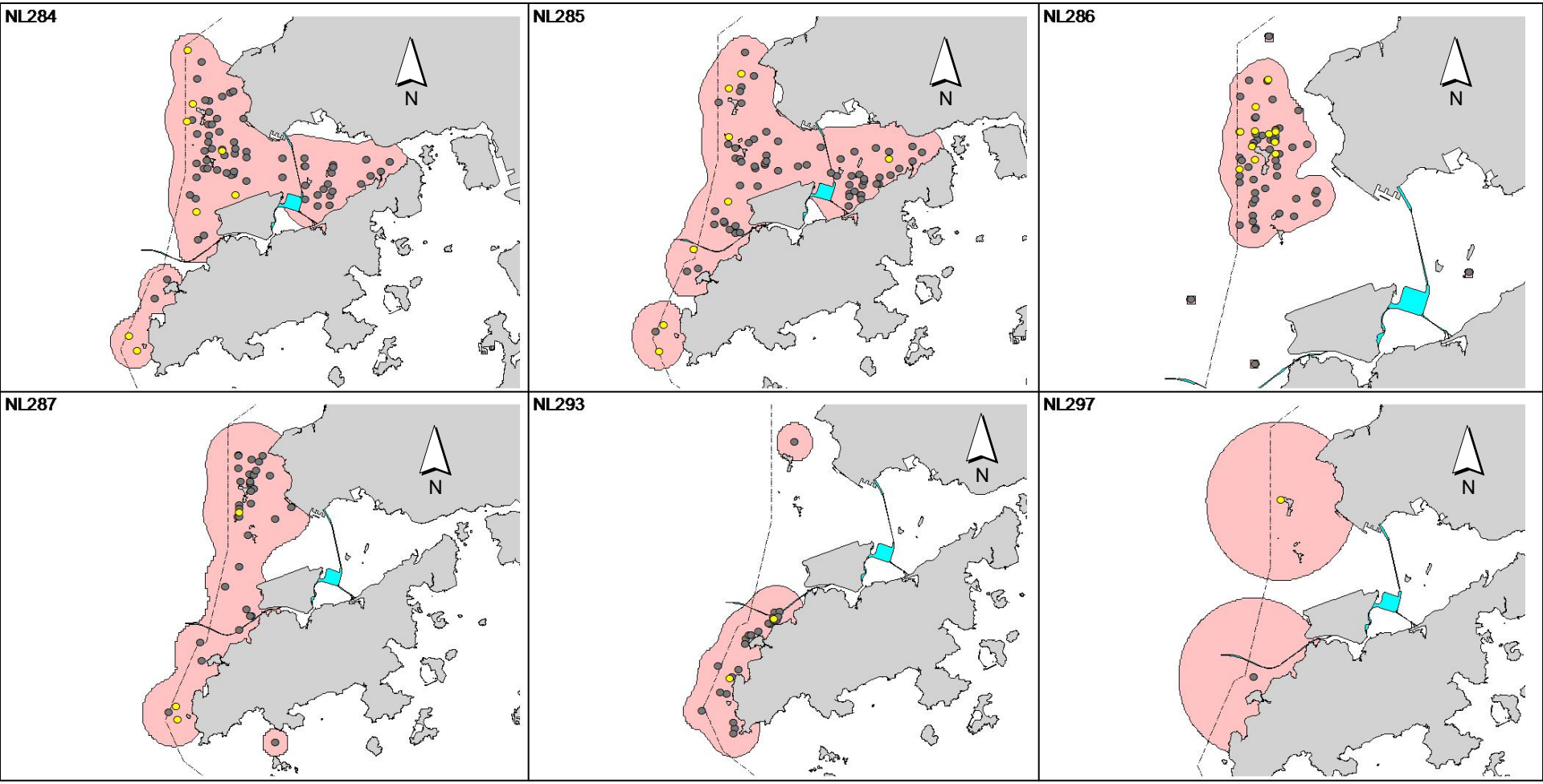
Appendix IV. (cont'd)



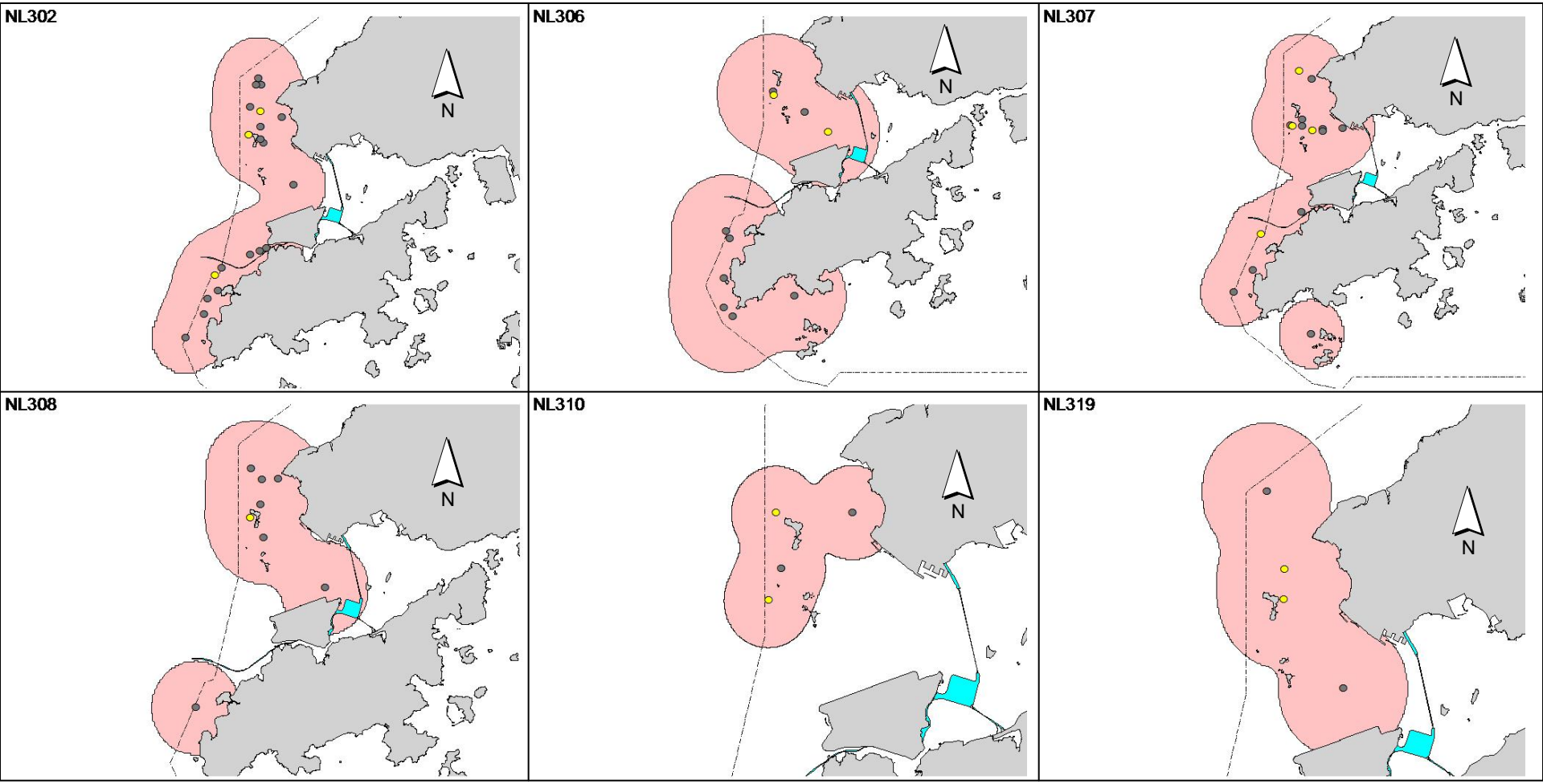
Appendix IV. (cont'd)



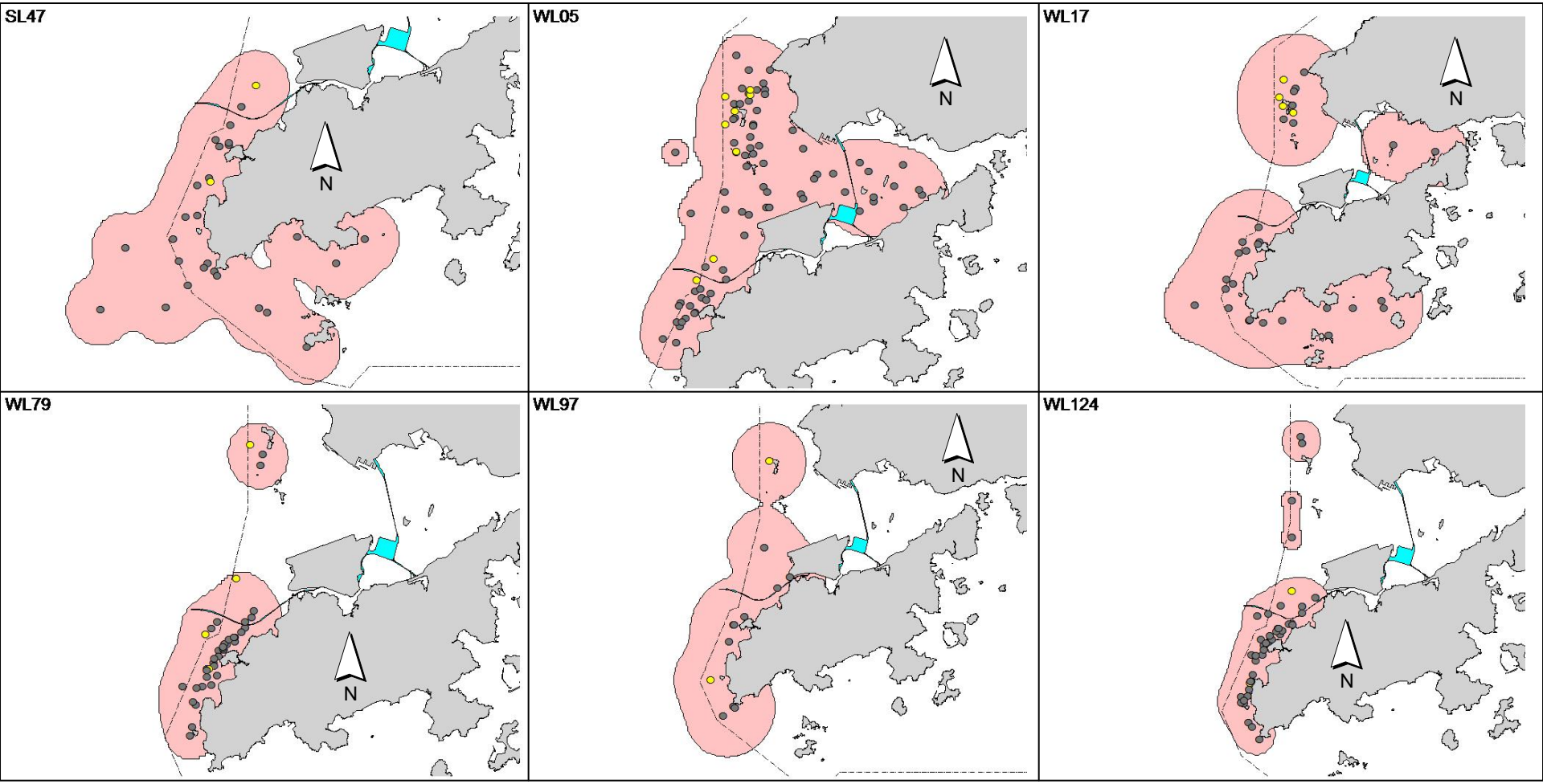
Appendix IV. (cont'd)



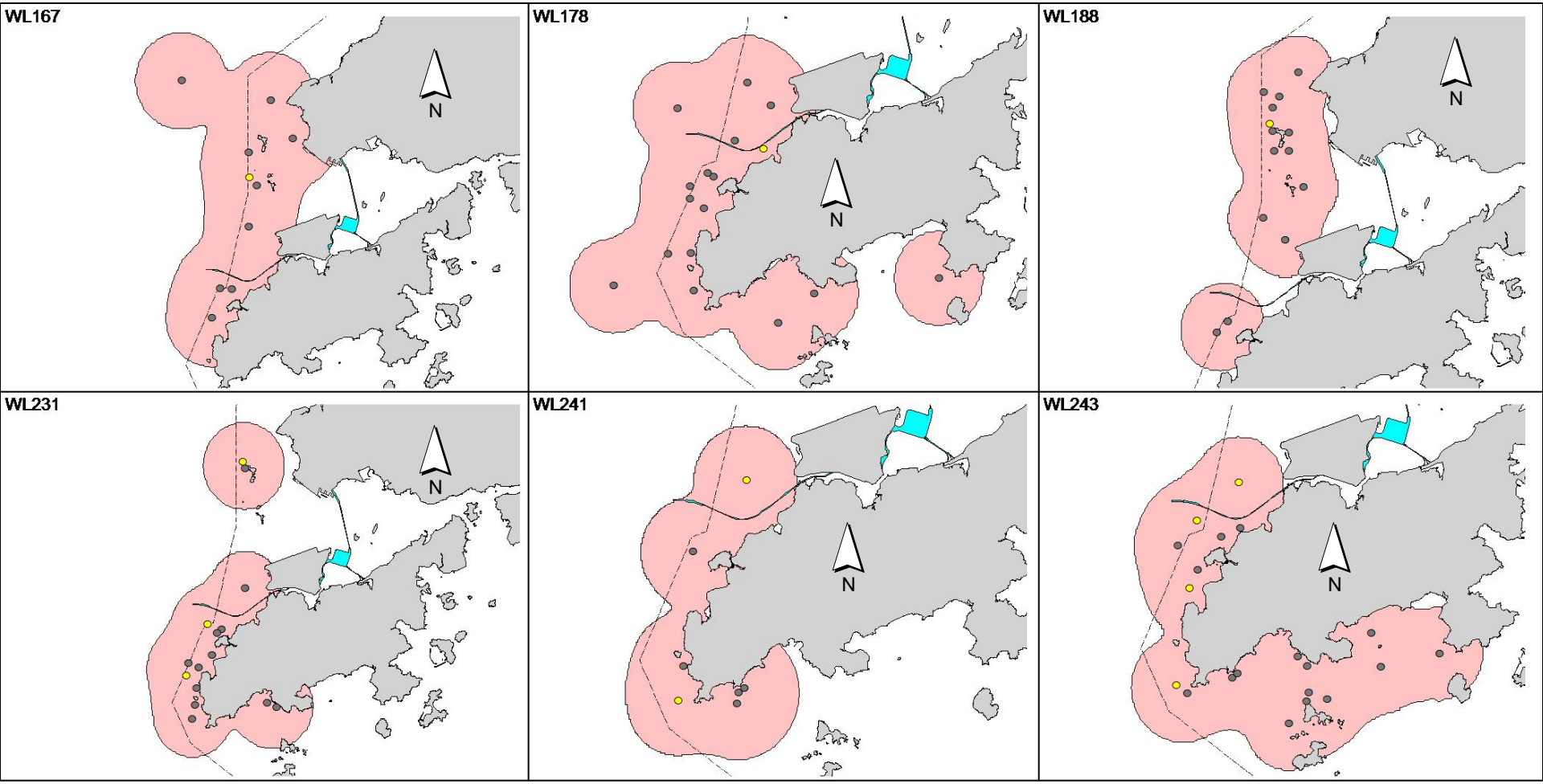
Appendix IV. (cont'd)

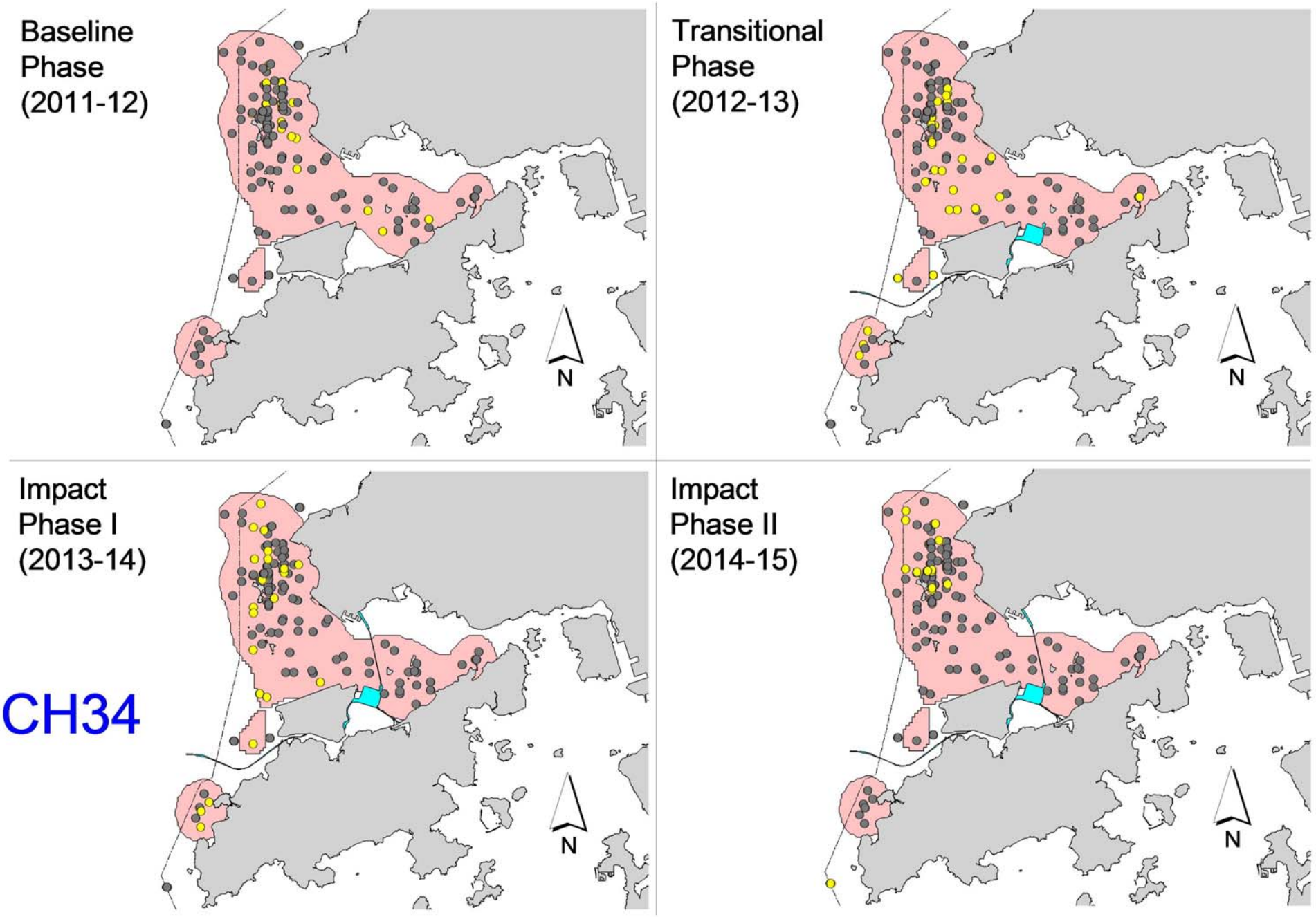


Appendix IV. (cont'd)

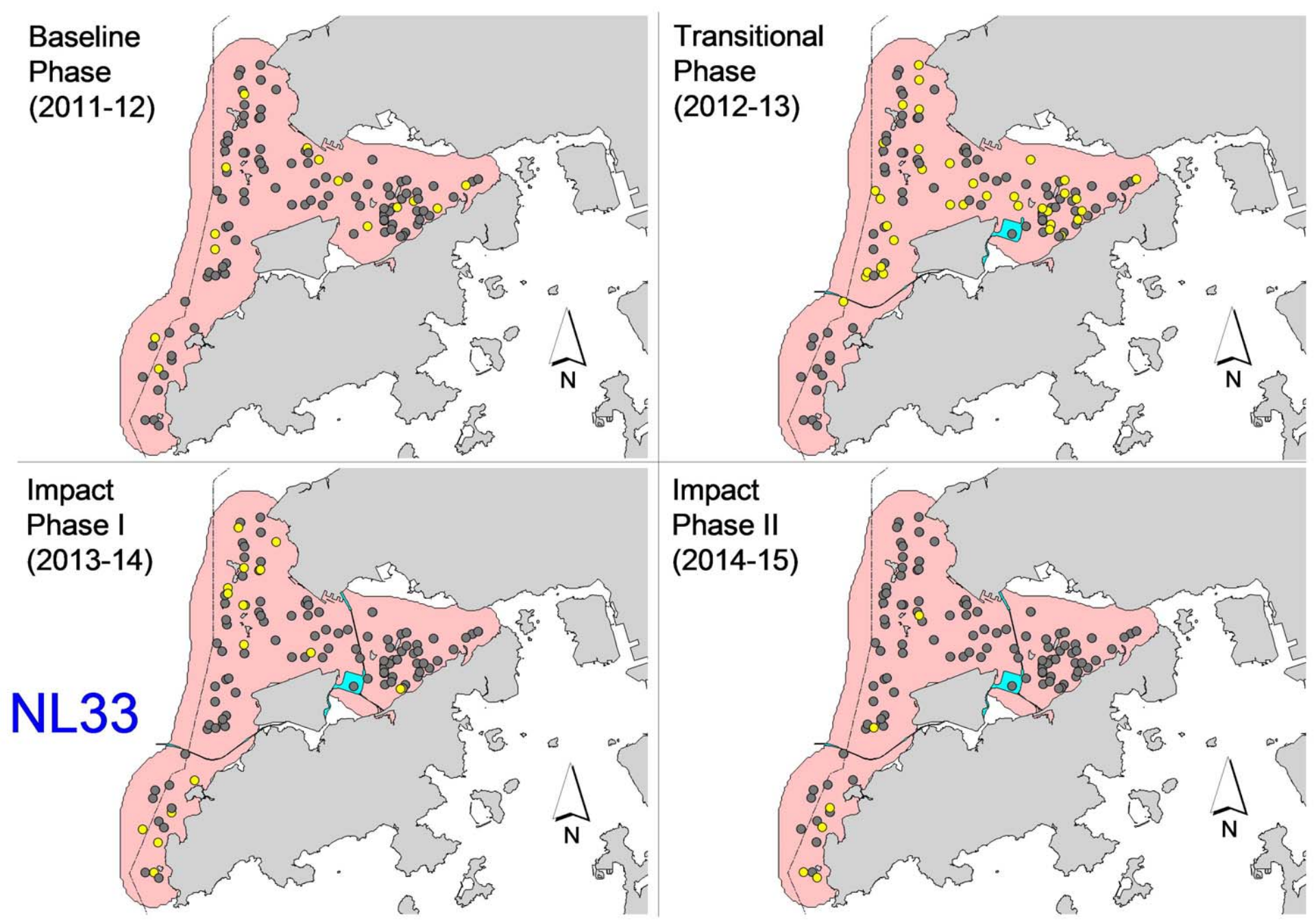


Appendix IV. (cont'd)

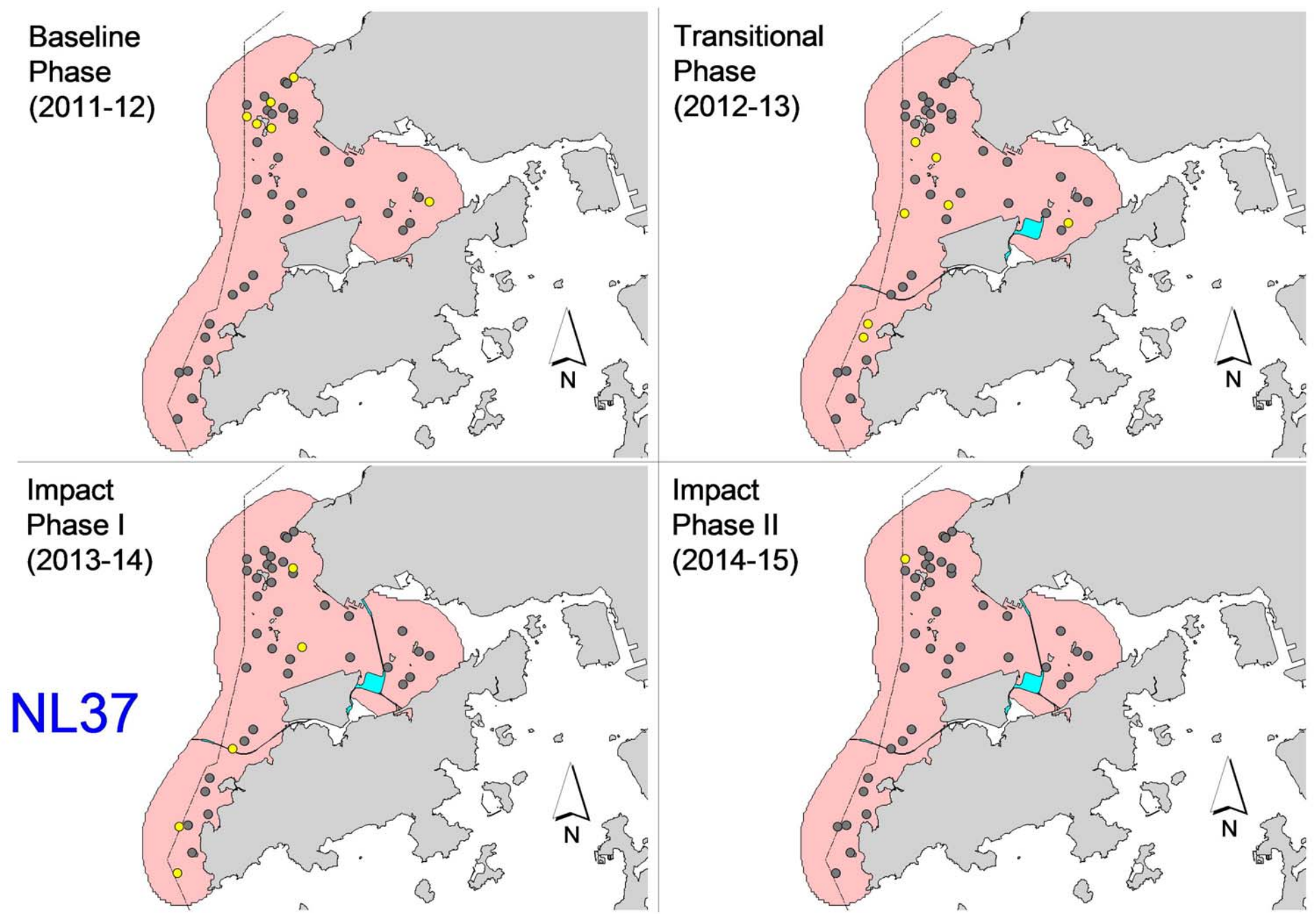




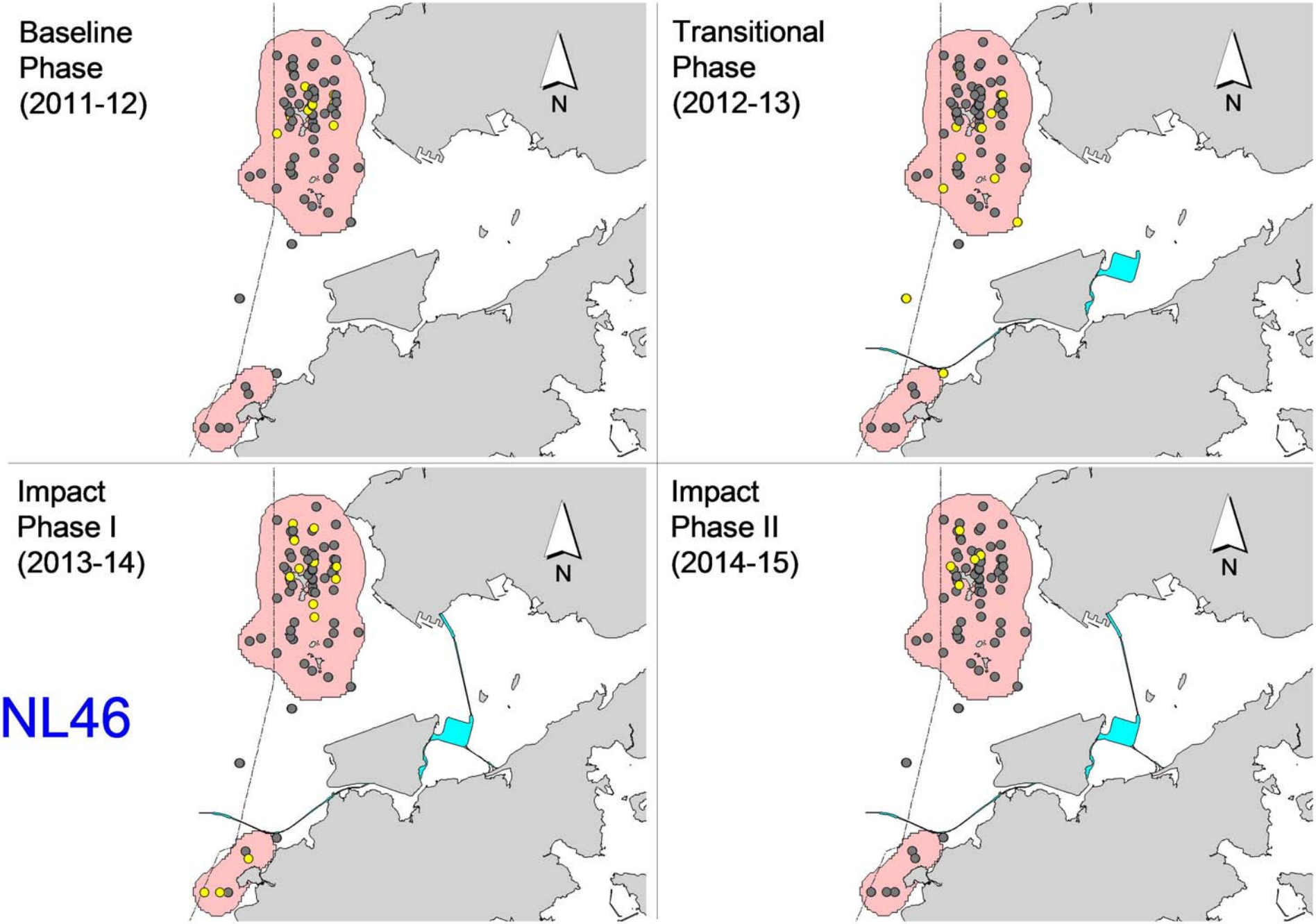
Appendix V. Temporal changes in range use patterns of 28 individual dolphins during baseline, transitional & impact phases of TMCLKL construction (note: yellow dots indicates sightings made in corresponding period)



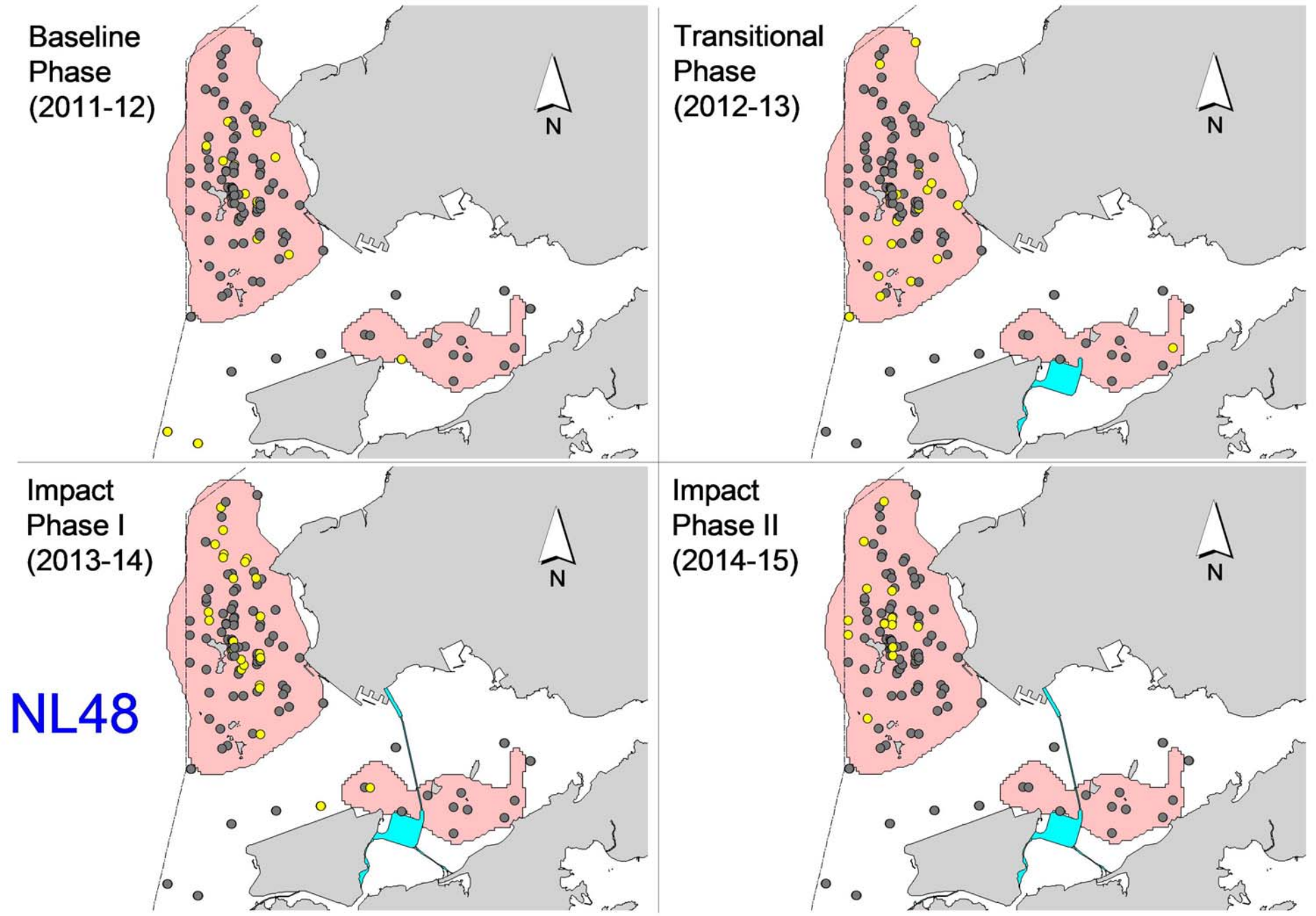
Appendix V. (cont'd)



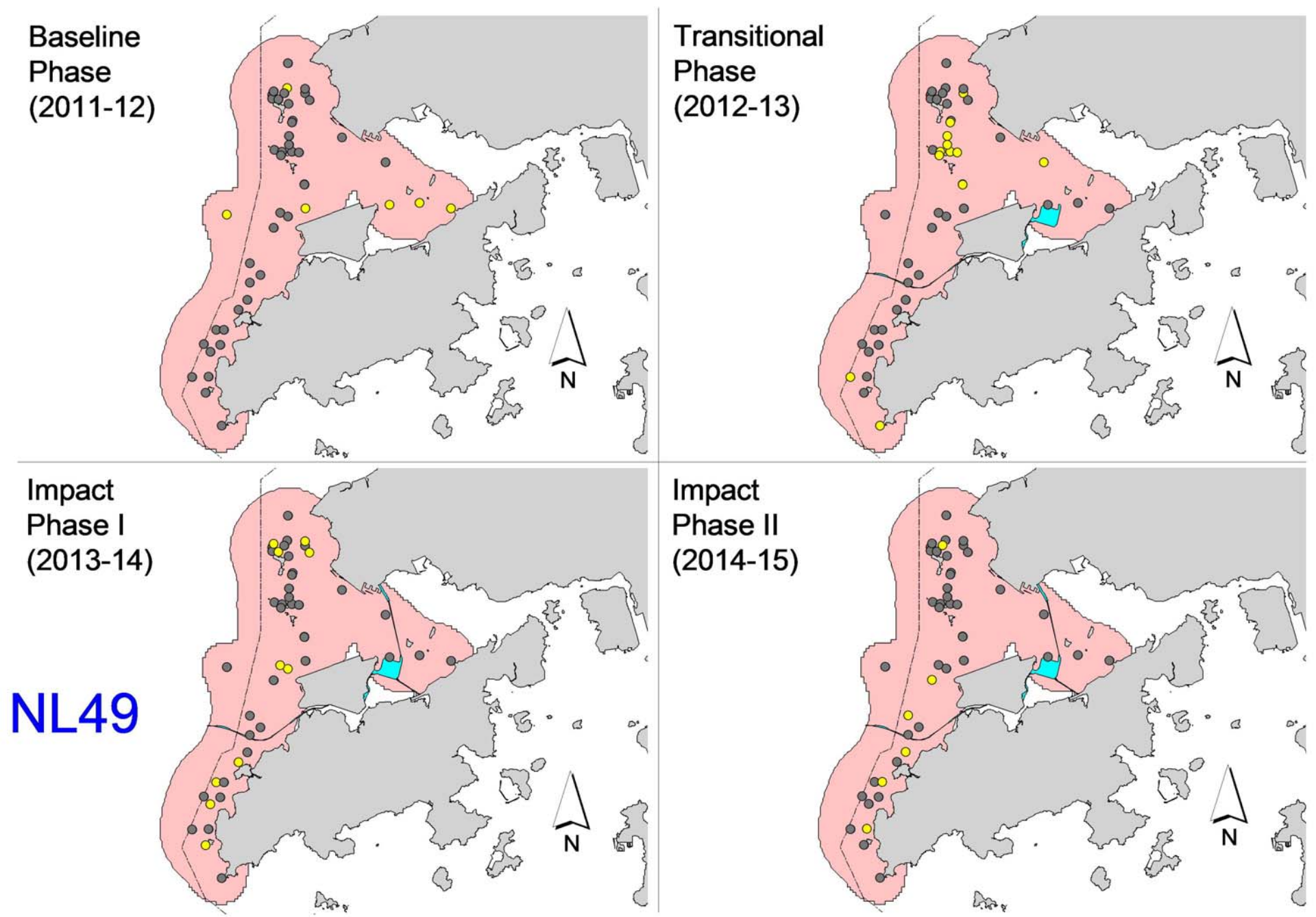
Appendix V. (cont'd)



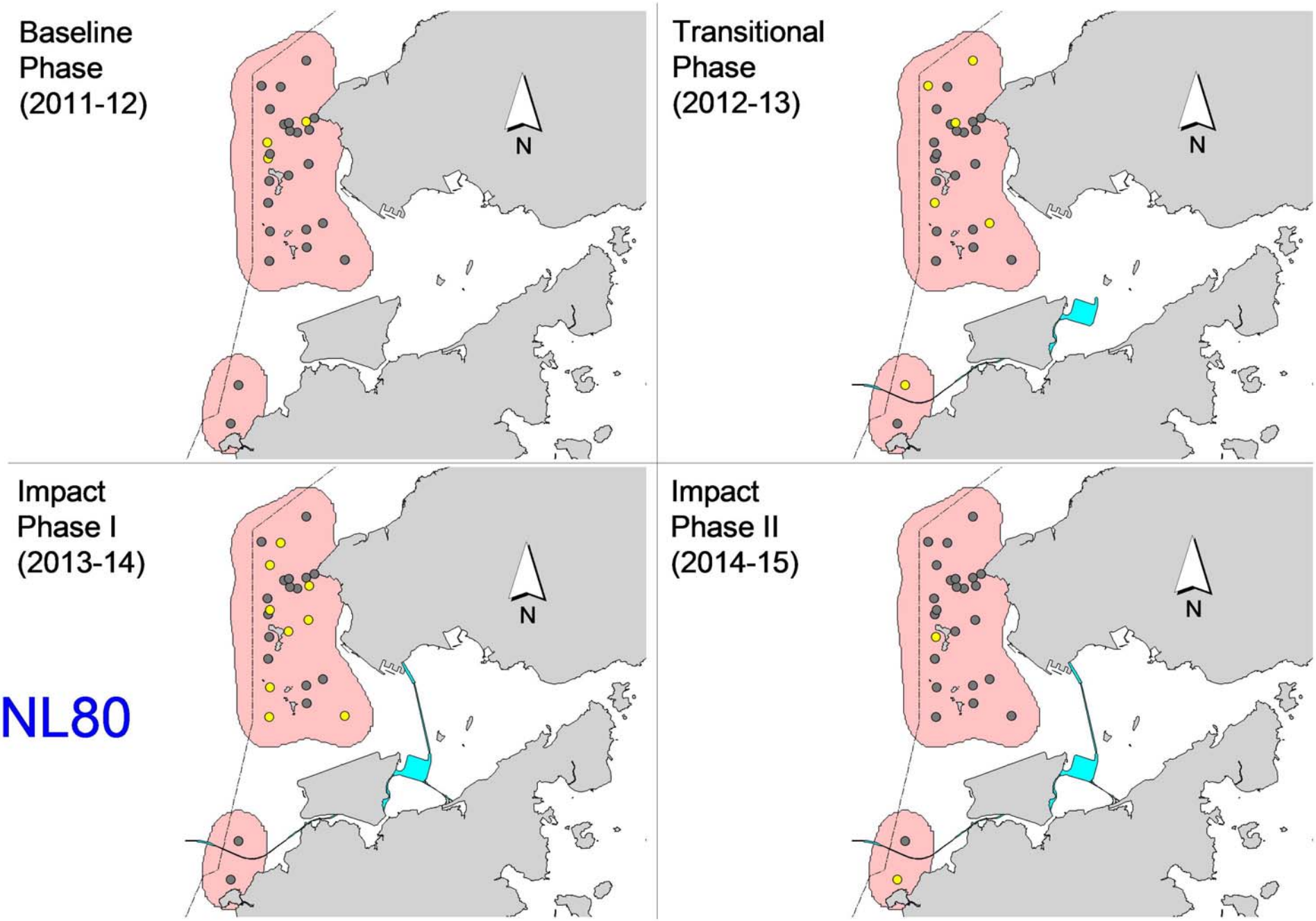
Appendix V. (cont'd)



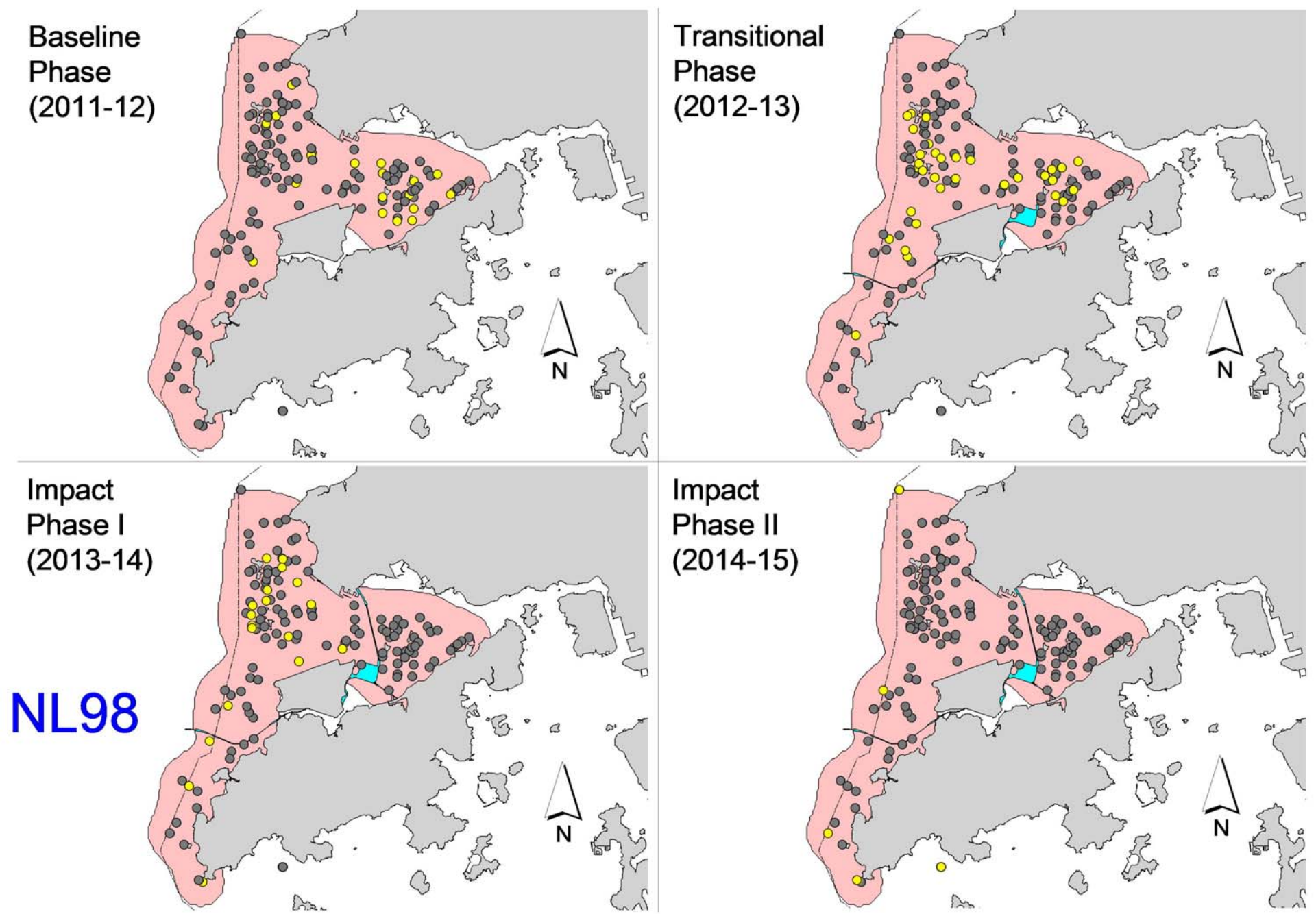
Appendix V. (cont'd)



Appendix V. (cont'd)



Appendix V. (cont'd)



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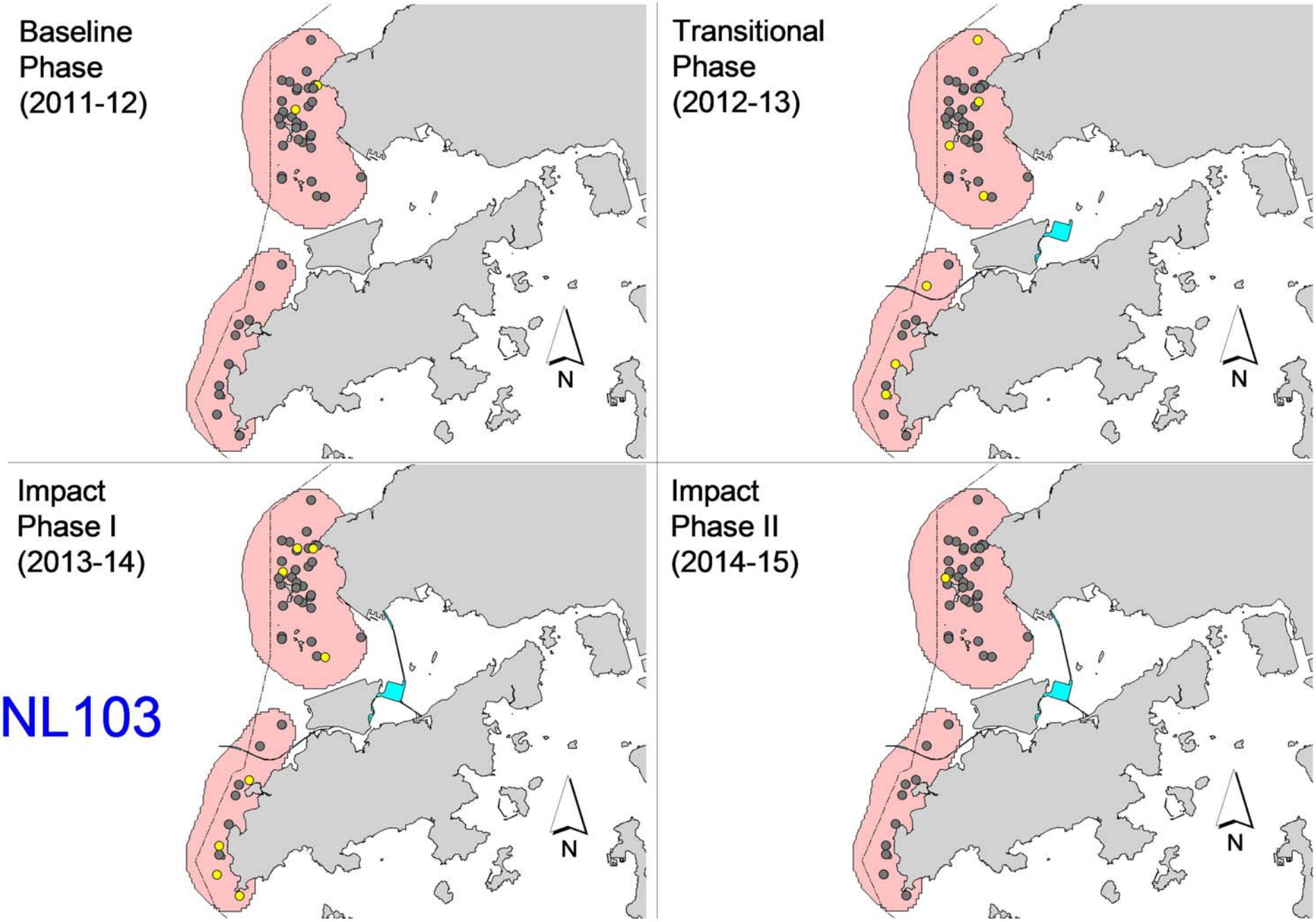
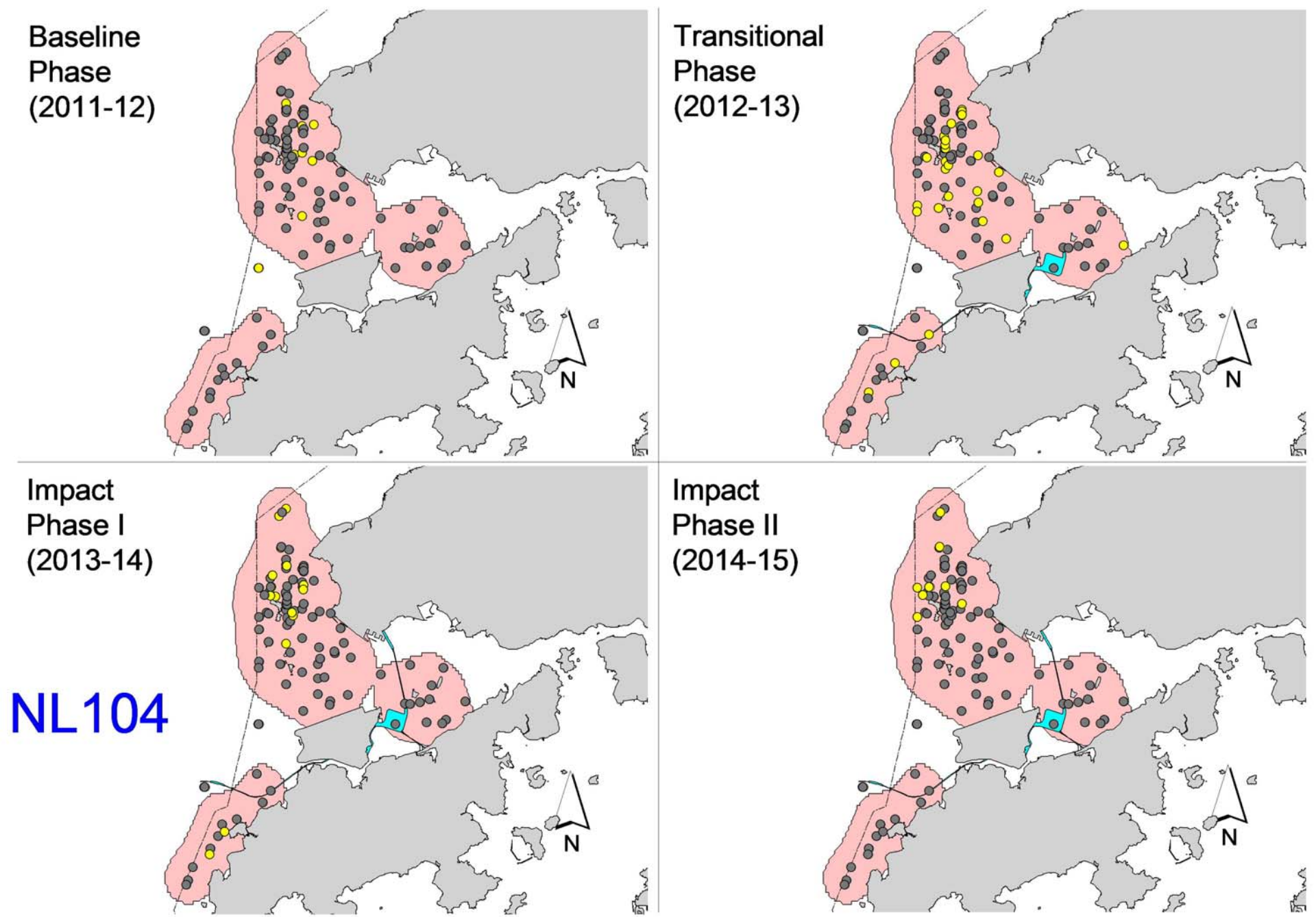


Appendix V. (cont'd)



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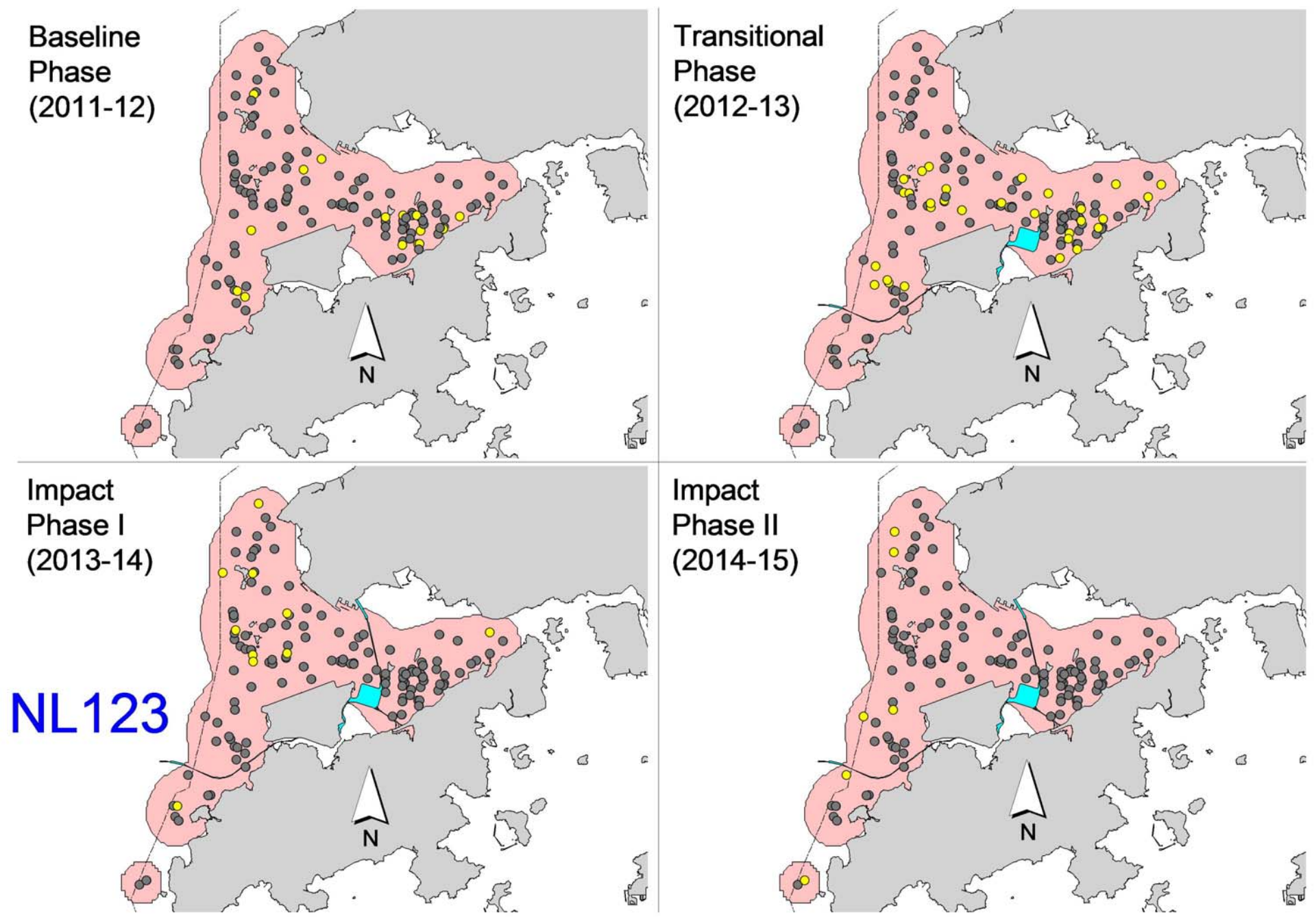

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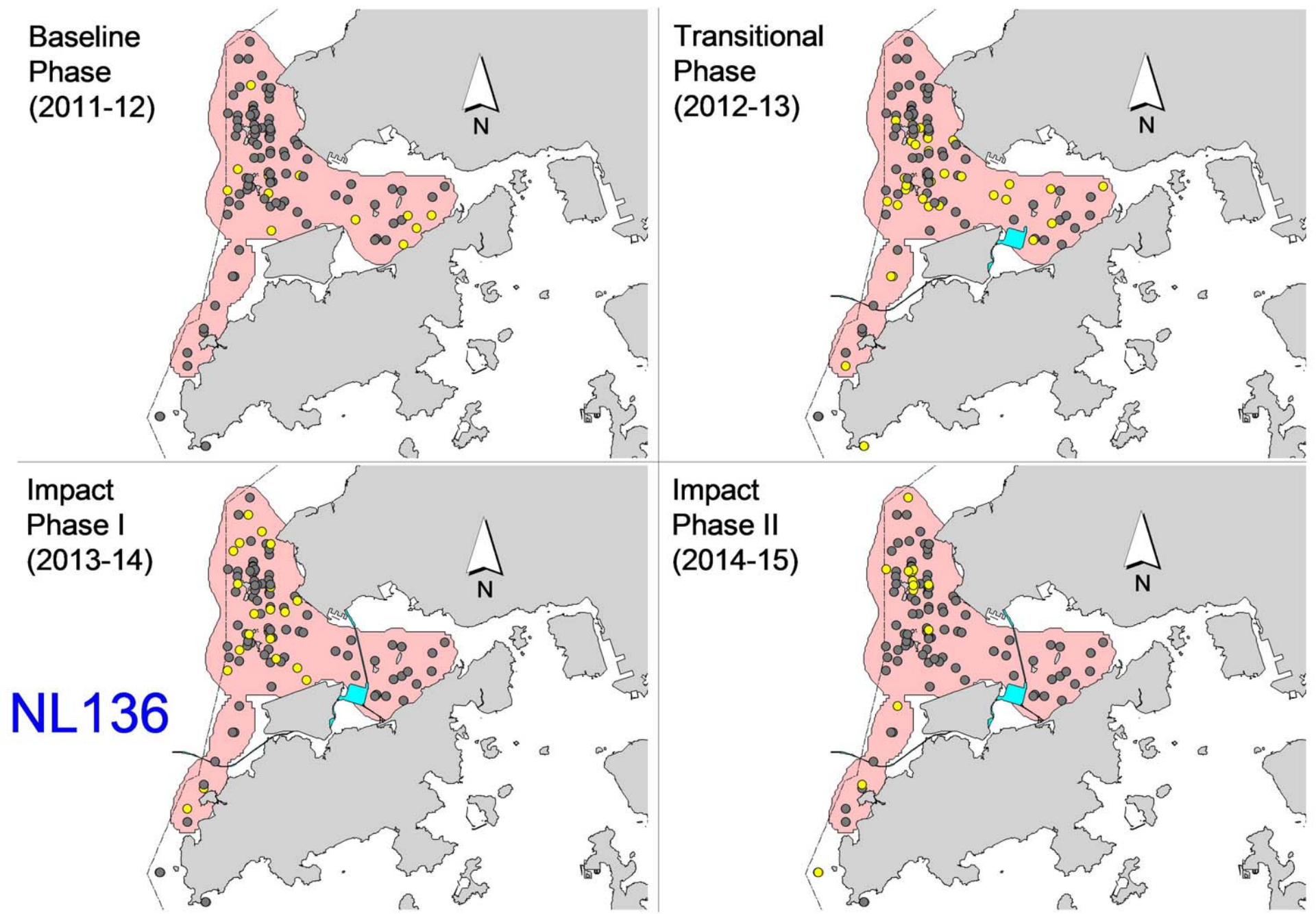
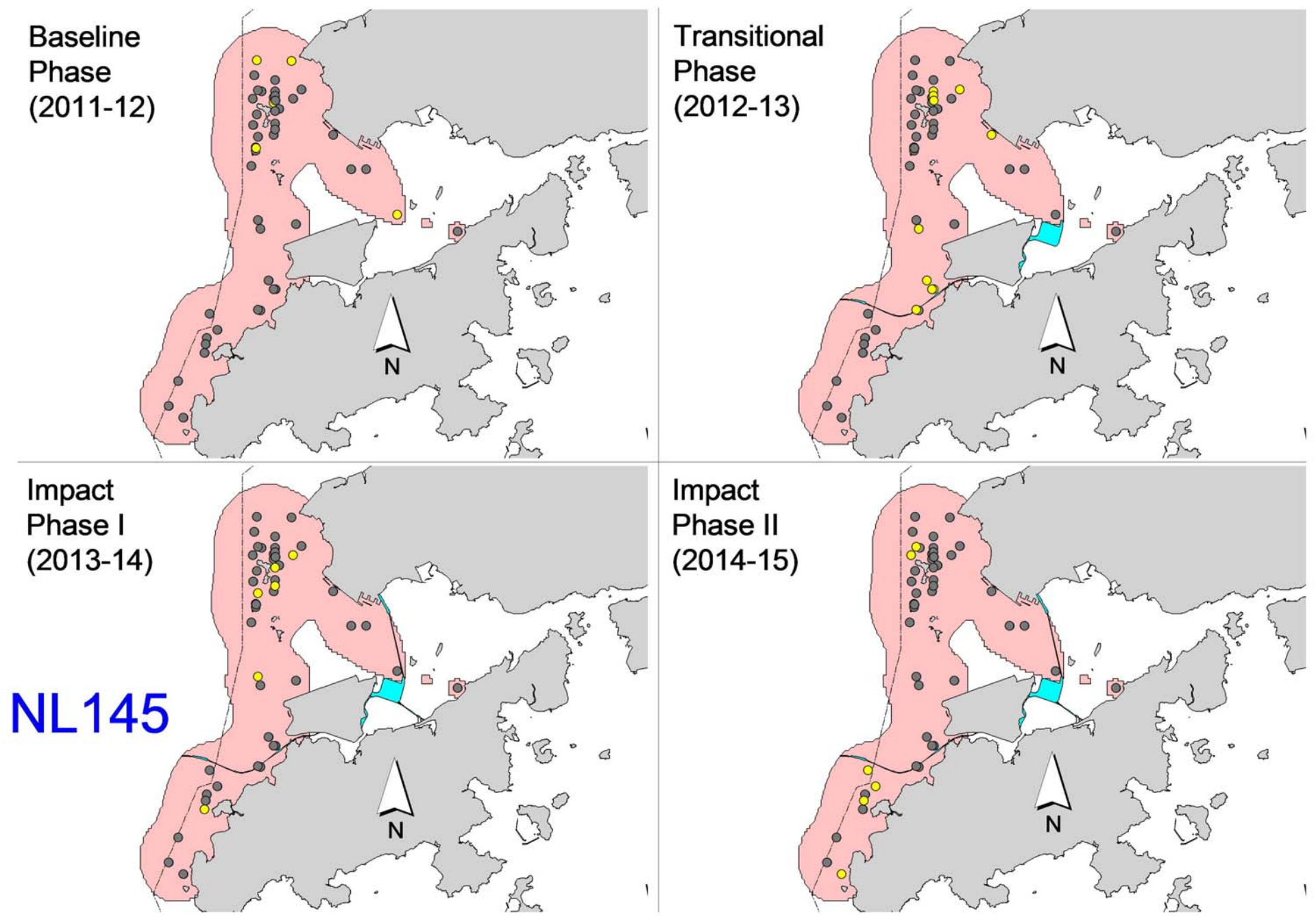
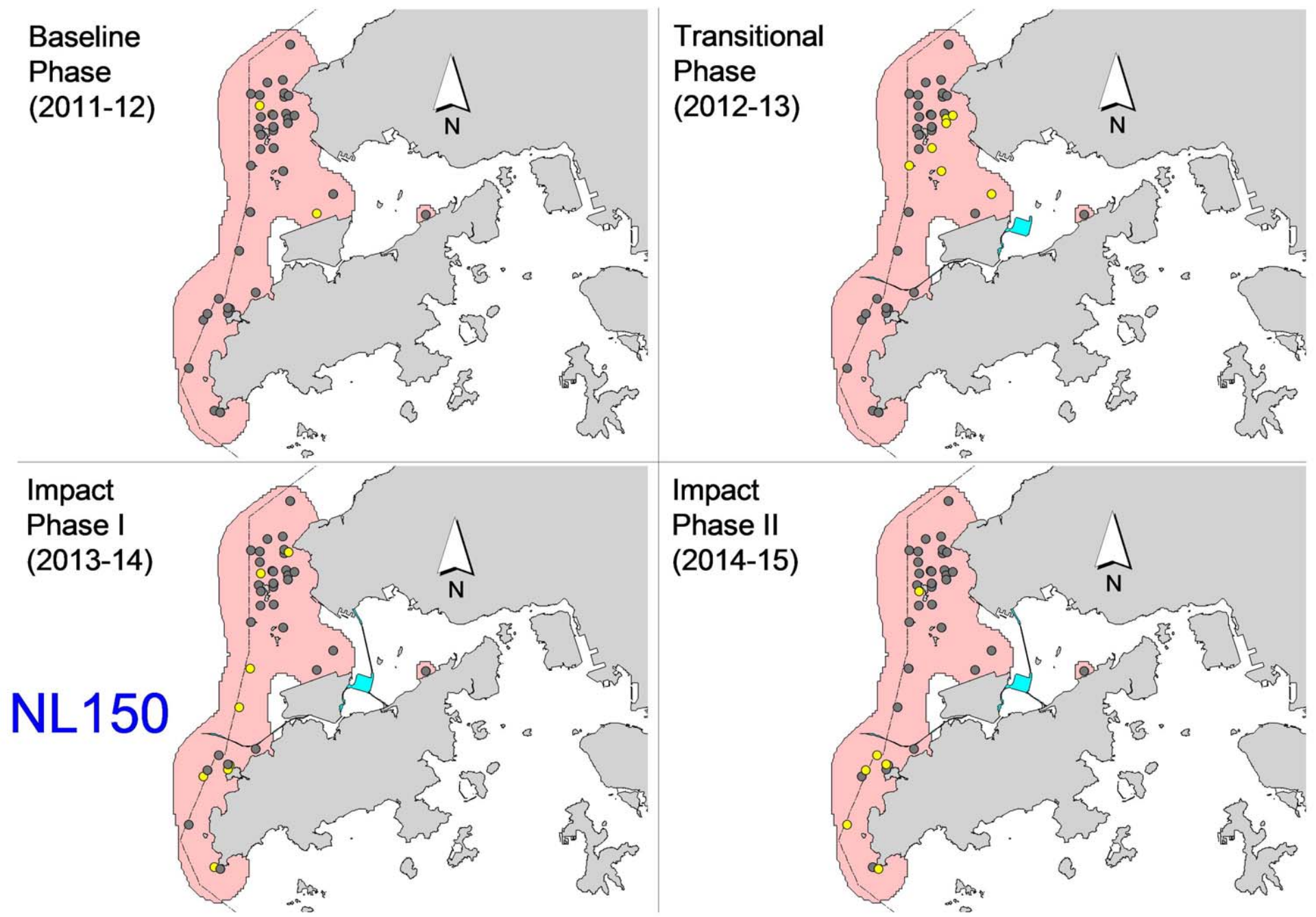


Appendix V. (cont'd)



Appendix V. (cont'd)



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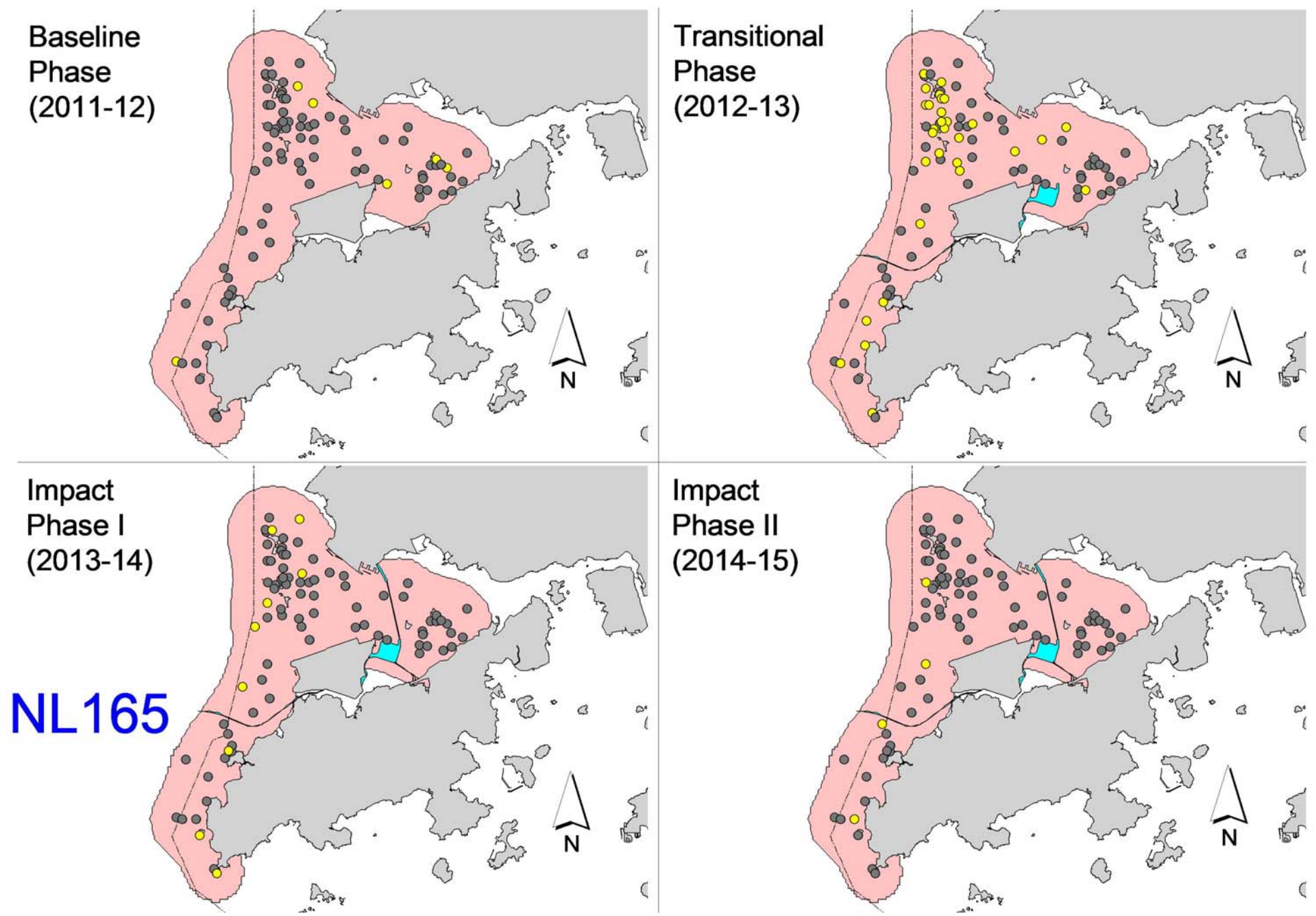

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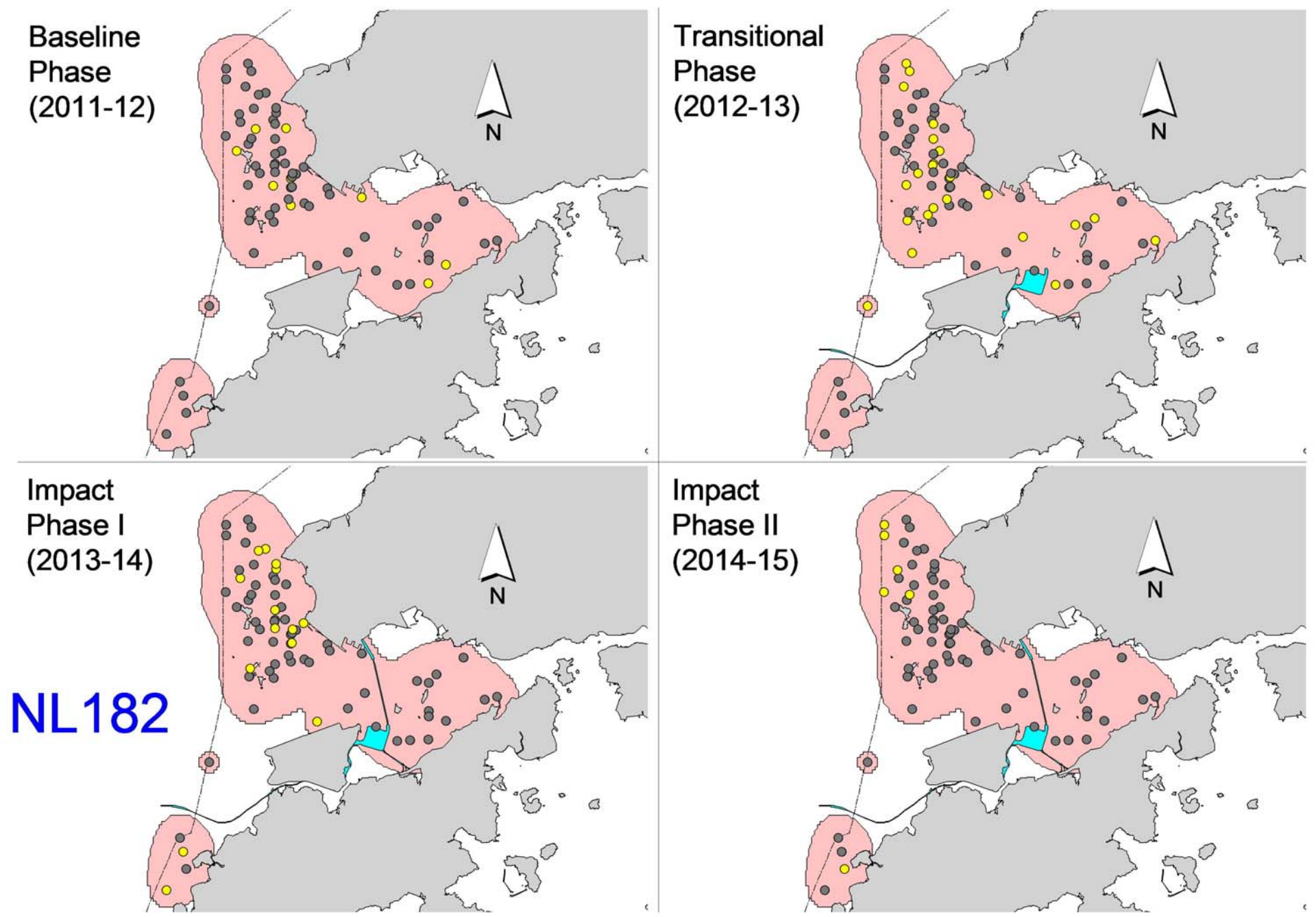

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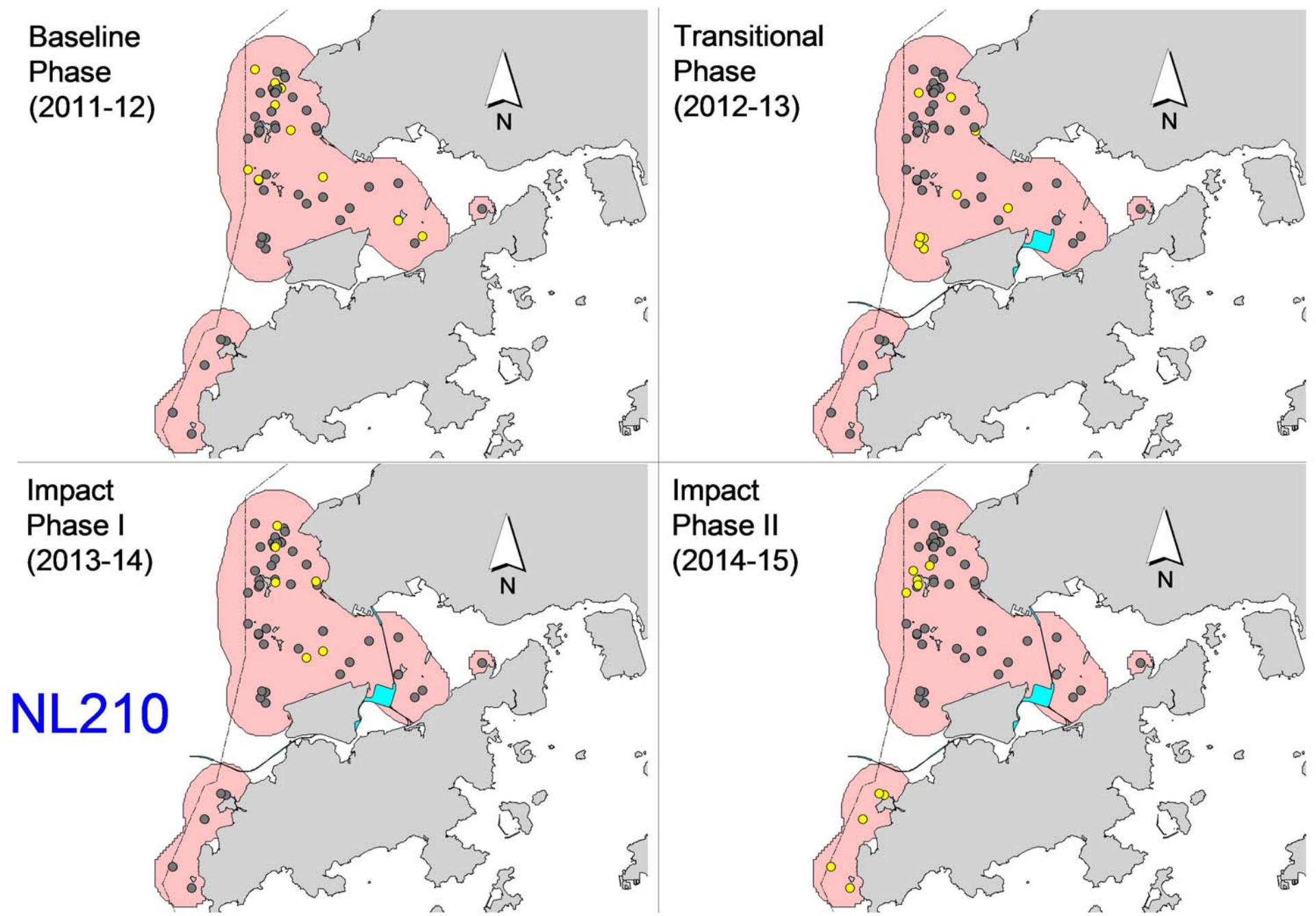

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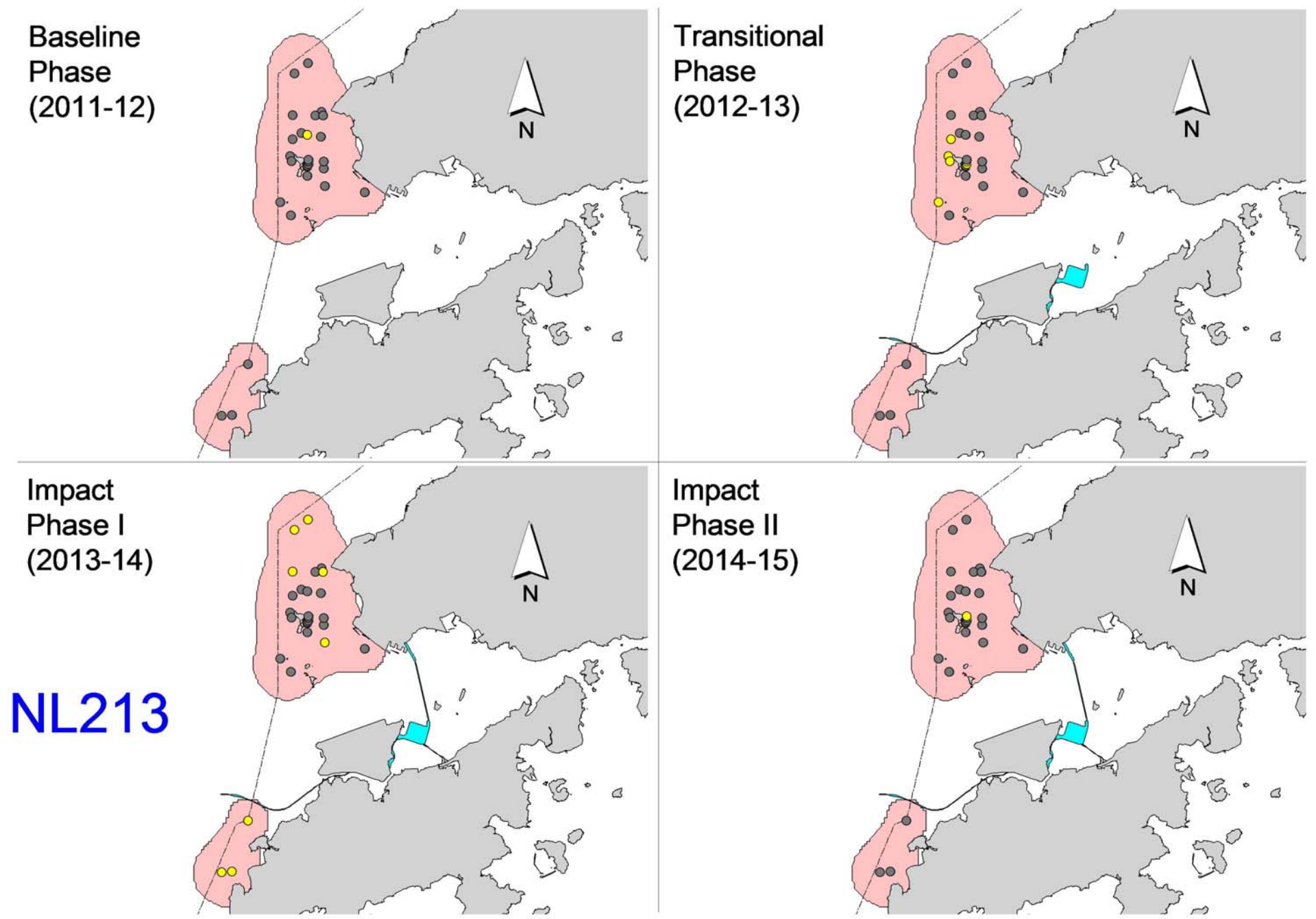

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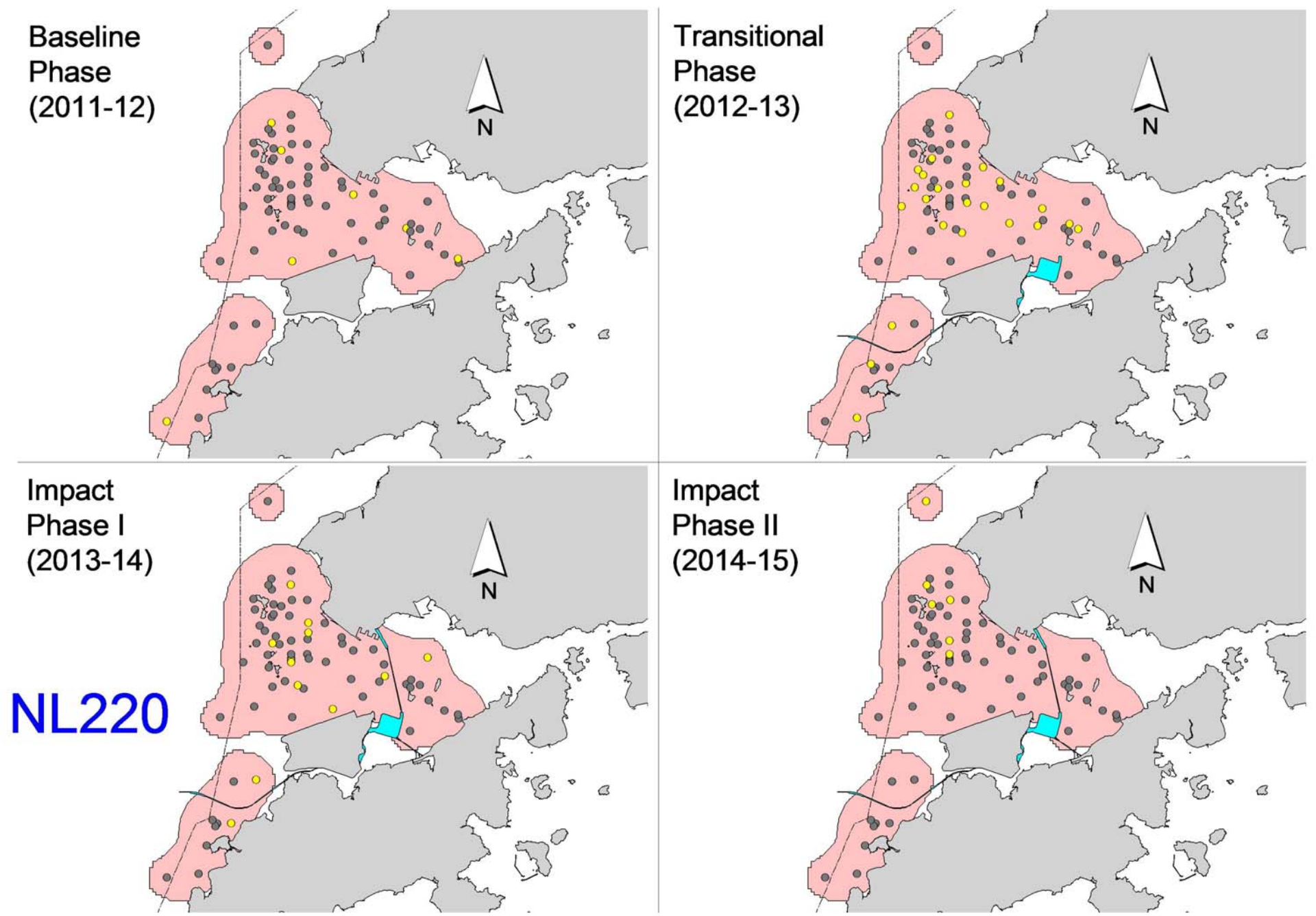

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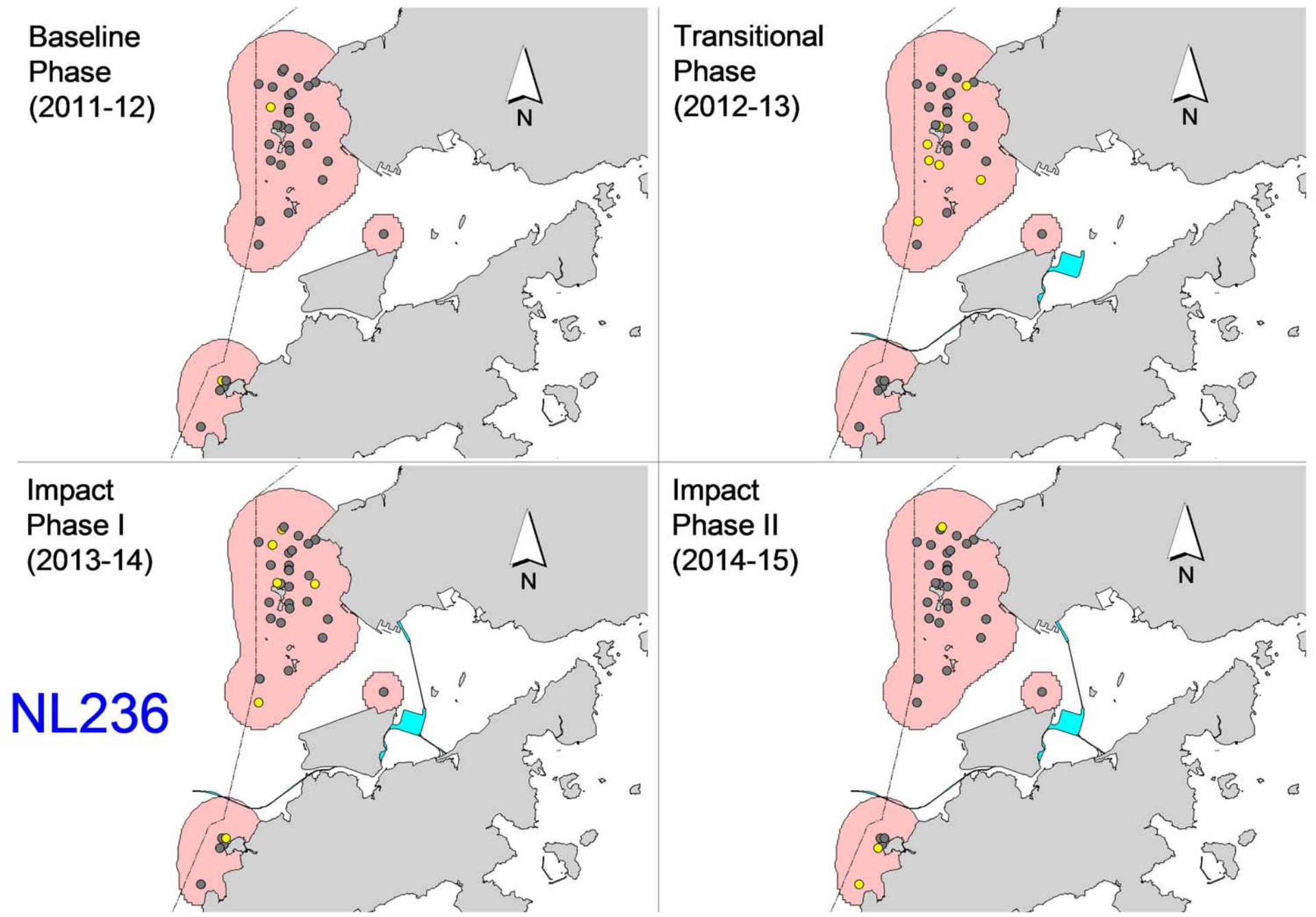

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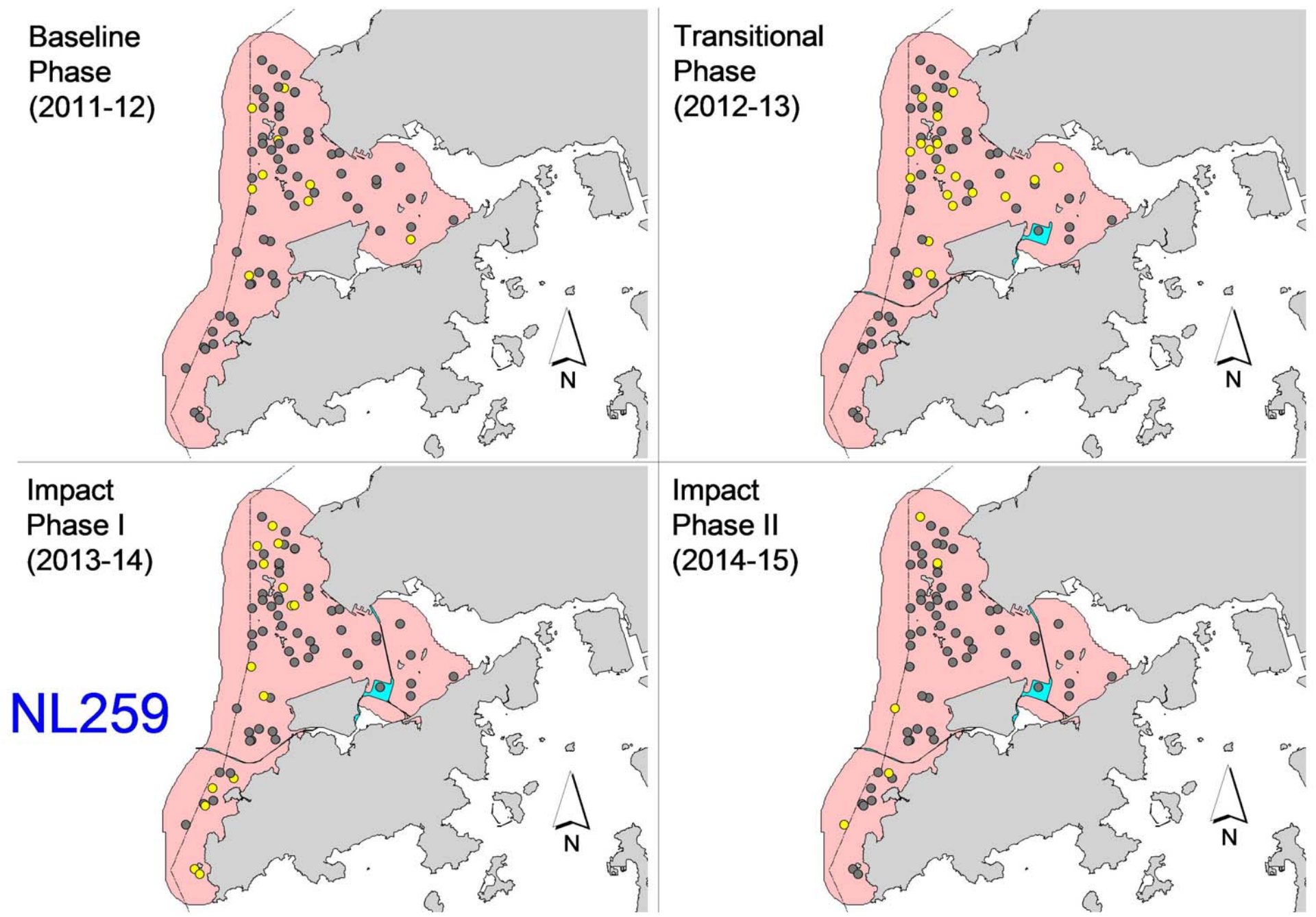

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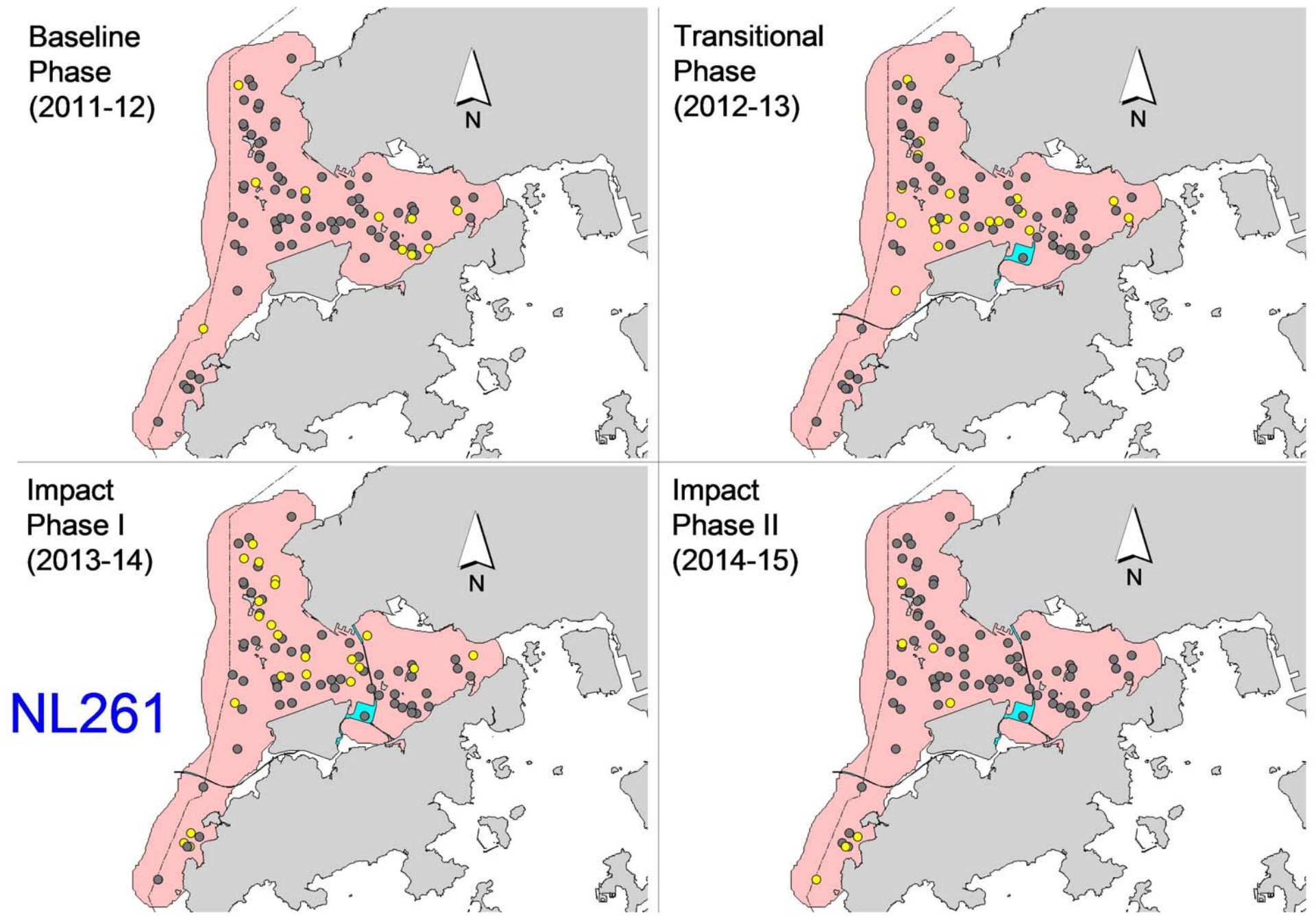

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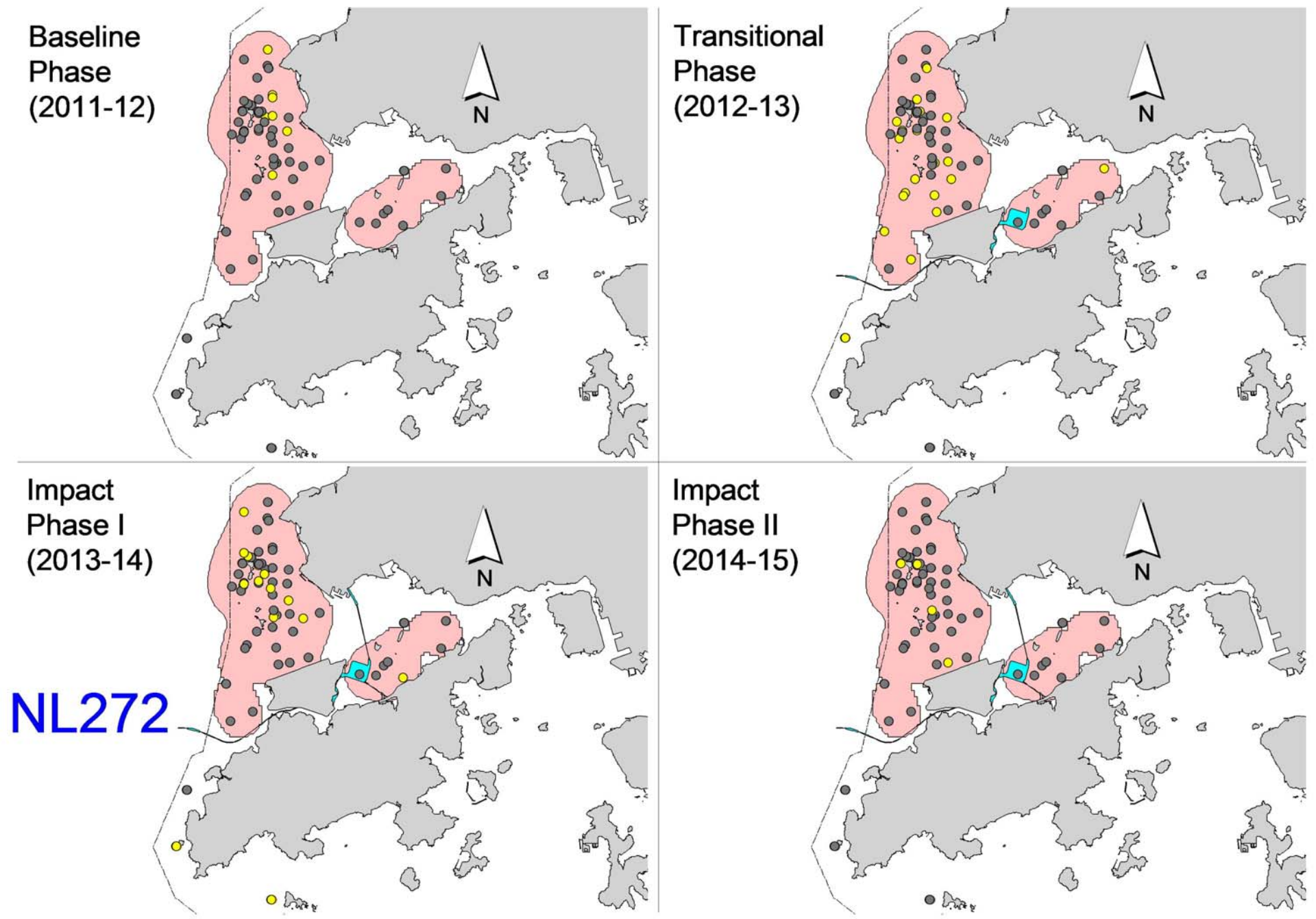

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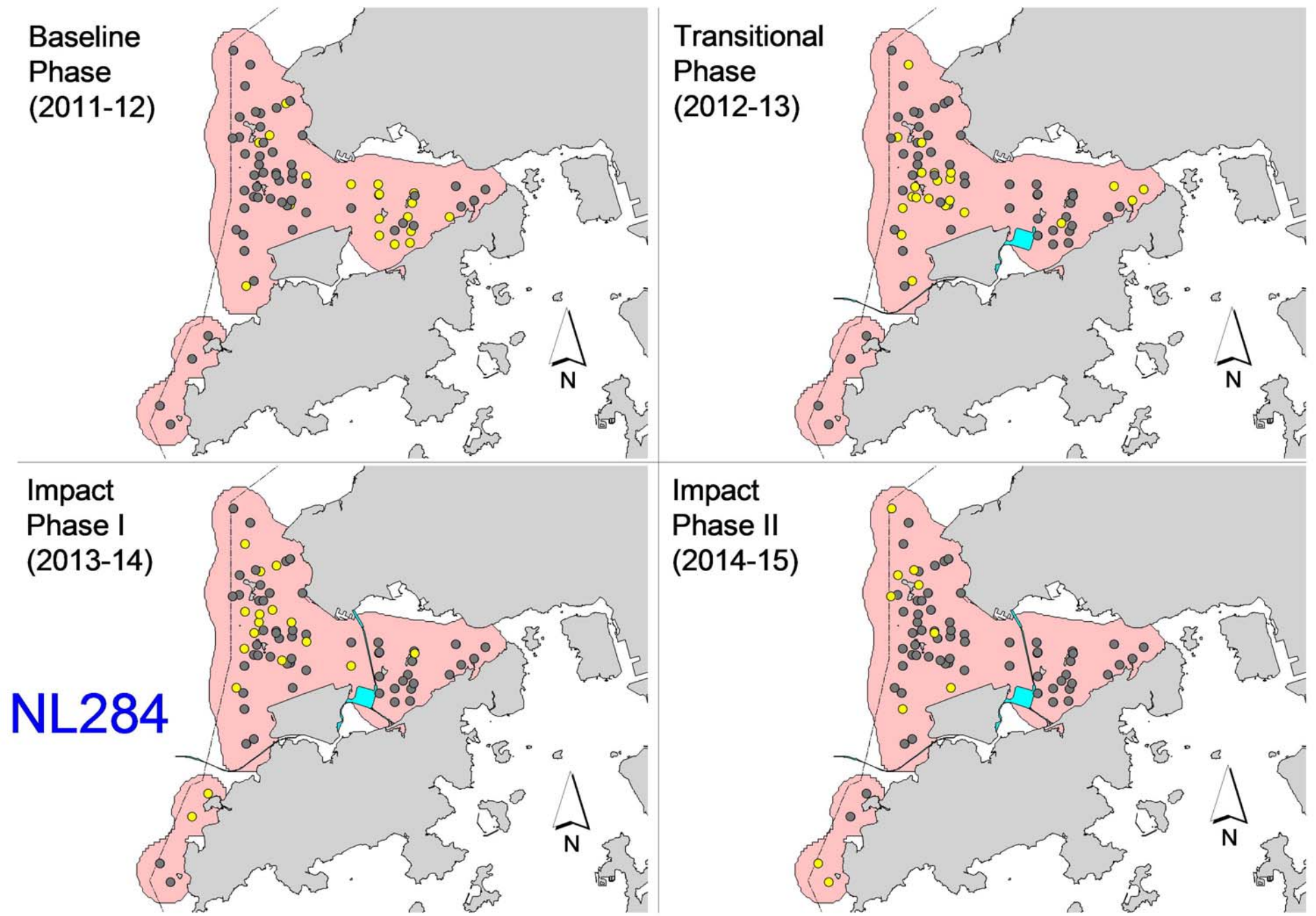

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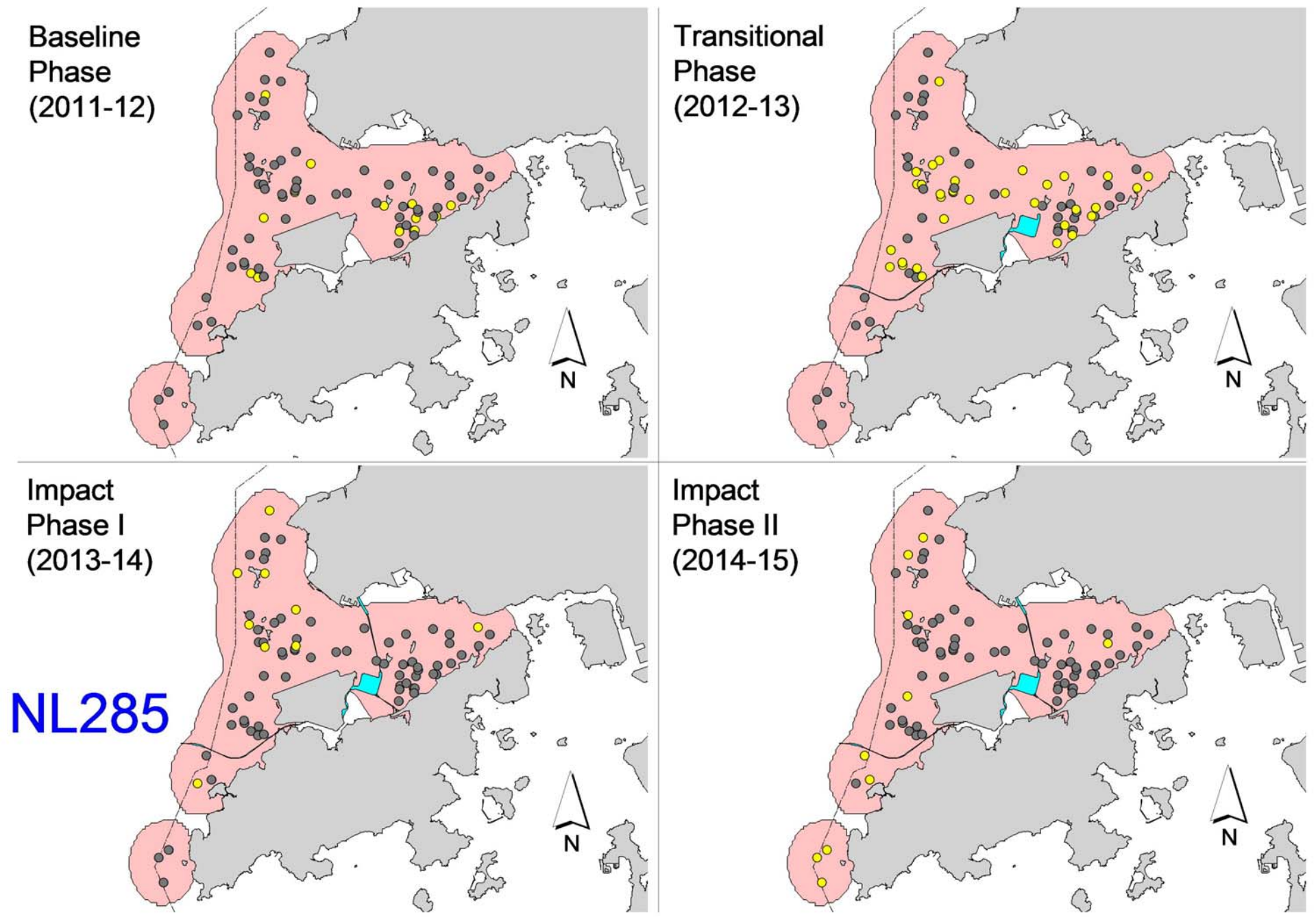
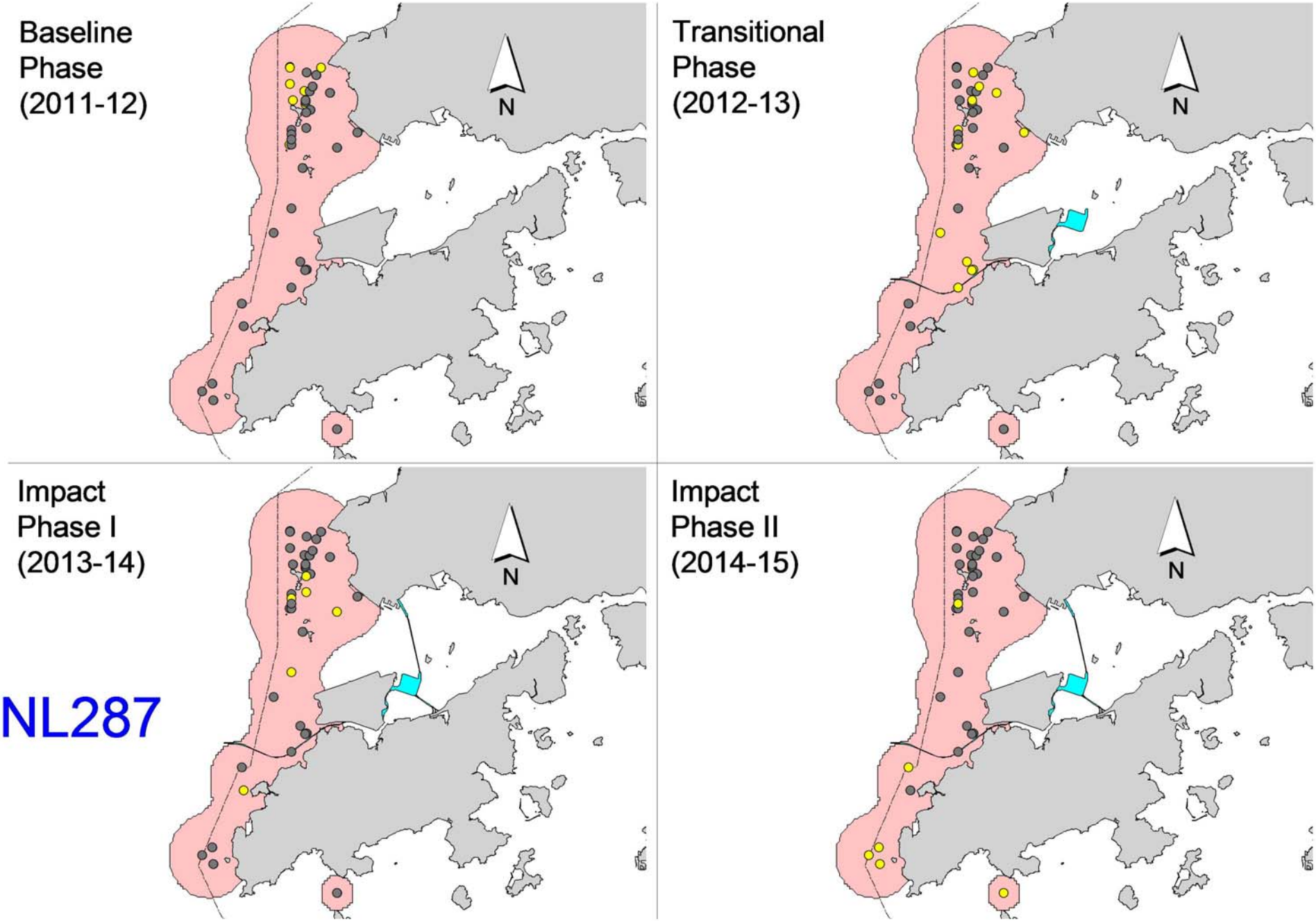


Appendix V. (cont'd)



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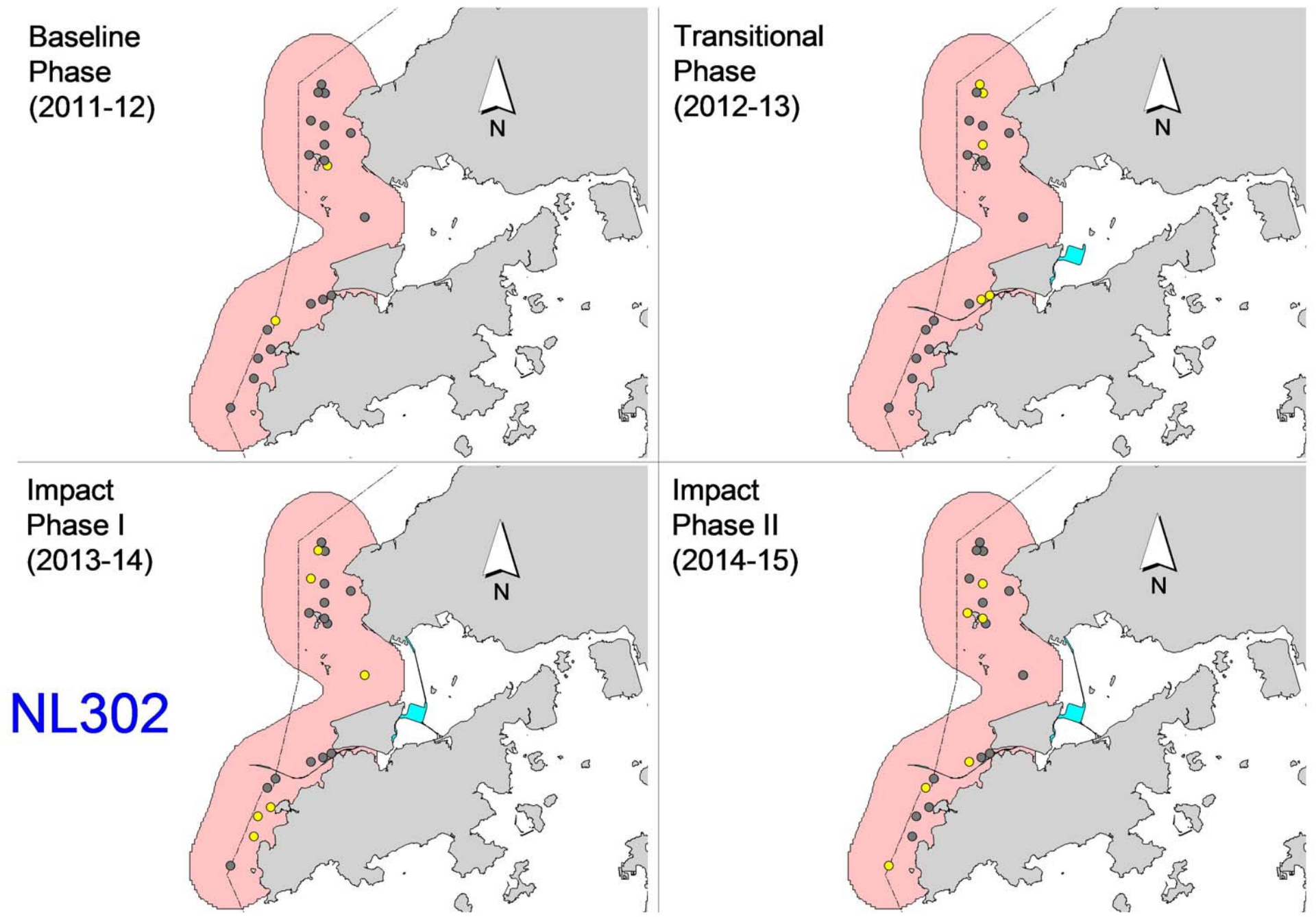

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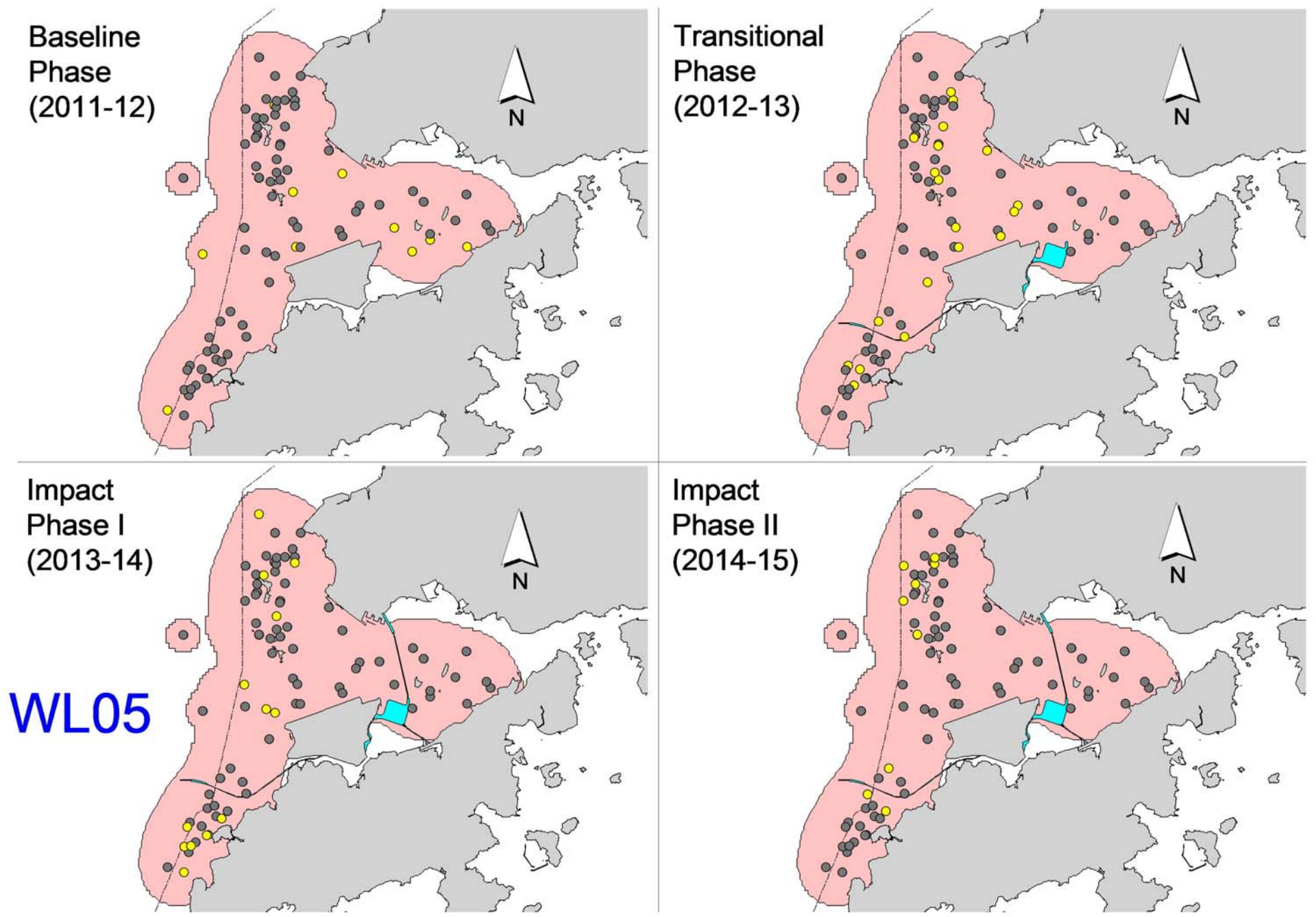

Appendix V. (cont'd)

Appendix H

Event Action Plan

AppendixH1 Event/ Action Plan for Air Quality

	ACTION			
EVENT	**ET [(1)]**	**IEC [(1)]**	**SOR[(1)]**	**Contractor**
Action Level				
1. Exceedance for one sample	1. Identify the source. 2. Inform the IEC and the SOR. 3. Repeat measurement to confirm finding. 4. Increase monitoring frequency to daily.	1. Check monitoring data submitted by the ET. 2. Check Contractor's working method.	1. Notify Contractor.	1. Rectify any unacceptable practice 2. Amend working methods if appropriate
2. Exceedance for two or more consecutive samples	1. Identify the source. 2. Inform the IEC and the SOR. 3. Repeat measurements to confirm findings. 4. Increase monitoring frequency to daily. 5. Discuss with the IEC and the Contractor on remedial actions required. 6. If exceedance continues, arrange meeting with the IEC and the SOR. 7. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET. 2. Check the Contractor's working method. 3. Discuss with the ET and the Contractor on possible remedial measures. 4. Advise the SOR on the effectiveness of the proposed remedial measures. 5. Supervisor implementation of remedial measures.	1. Confirm receipt of notification of failure in writing. 2. Notify the Contractor. 3. Ensure remedial measures properly implemented.	1. Submit proposals for remedial actions to IEC within 3 working days of notification 2. Implement the agreed proposals 3. Amend proposal if appropriate

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

and keep the IEC, the DEP and the SOR informed of the results. 8. If the exceedance stops, cease additional monitoring.	

Appendix H2 Event/ Action Plan for Construction Noise

	ACTION			
EVENT	**ET**	**IEC**	**SOR**	**Contractor**
Action Level	1. Notify the IEC and the Contractor. 2. Carry out investigation. 3. Report the results of investigation to the IEC and the Contractor. 4. Discuss with the Contractor and formulate remedial measures. 5. Increase monitoring frequency to check mitigation effectiveness.	1. Review the analysed results submitted by the ET. 2. Review the proposed remedial measures by the Contractor and advise the SOR accordingly. 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing. 2. Notify the Contractor. 3. Require the Contractor to propose remedial measures for the analysed noise problem. 4. Ensure remedial measures are properly implemented.	1. Submit noise mitigation proposals to IEC 2. Implement noise mitigation proposals
Limit Level	1. Notify the IEC, the SOR, the DEP and the Contractor. 2. Identify the source. 3. Repeat measurement to confirm findings. 4. Increase monitoring frequency. 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented. 6. Inform the IEC, the SOR and the DEP the causes & actions taken for the exceedances. 7. Assess effectiveness of the Contractor's remedial actions and keep the IEC, the DEP and the SOR informed of the results. 8. If exceedance stops, cease additional monitoring.	1. Discuss amongst the SOR, the ET and the Contractor on the potential remedial actions. 2. Review the Contractor's remedial actions whenever necessary to assure their effectiveness and advise the SOR accordingly. 3. Supervise the implementation of remedial measures.	1. Confirm receipt of notification of failure in writing. 2. Notify the Contractor. 3. Require the Contractor to propose remedial measures for the analysed noise problem. 4. Ensure remedial measures are properly implemented. 5. If exceedance continues, consider what activity of the work is responsible and instruct the Contractor to stop that activity of work until the exceedance is abated.	1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to IEC within 3 working days of notification 3. Implement the agreed proposals 4. Resubmit proposals if problem still not under control 5. Stop the relevant activity of works as determined by the SOR until the exceedance is abated.

Appendix H3 Event/ Action Plan for Water Quality

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

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

Appendix H4 Implementation of Event-Action Plan for Dolphin Monitoring

Event	ET Leader	IEC	SOR	Contractor
Action Level	1. Repeat statistical data analysis to confirm findings; 2. Review all available and relevant data, including raw data and statistical analysis results of other parameters covered in the EM&A, to ascertain if differences are as a result of natural variation or previously observed seasonal differences; 3. Identify source(s) of impact; 4. Inform the IEC, SOR and Contractor; 5. Check monitoring data. 6. Review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary.	1. Check monitoring data submitted by ET and Contractor; 2. Discuss monitoring results and findings with the ET and the Contractor.	1. Discuss monitoring with the IEC and any other measures proposed by the ET; 2. If SOR is satisfied with the proposal of any other measures, SOR to signify the agreement in writing on the measures to be implemented.	1. Inform the SOR and confirm notification of the non-compliance in writing; 2. Discuss with the ET and the IEC and propose measures to the IEC and the SOR; 3. Implement the agreed measures.

Event	ET Leader	IEC	SOR	Contractor
Limit Level	1. Repeat statistical data analysis to confirm findings; 2. Review all available and relevant data, including raw data and statistical analysis results of other parameters covered in the EM&A, to ascertain if differences are as a result of natural variation or previously observed seasonal differences; 3. Identify source(s) of impact; 4. Inform the IEC, ER/SOR and Contractor of findings; 5. Check monitoring data; 6. Repeat review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary; 7. If ET proves that the source of impact is caused by any of the construction activity by the works contract, ET to arrange a meeting to discuss with IEC, 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.	1. Check monitoring data submitted by ET and Contractor; 2. Discuss monitoring results and findings with the ET and the Contractor; 3. Attend the meeting to discuss with ET, ER/SOR and Contractor the necessity of additional dolphin monitoring and any other potential mitigation measures; 4. Review proposals for additional monitoring and any other mitigation measures submitted by ET and Contractor and advise ER/SOR of the results and findings accordingly; 5. Supervise / Audit the implementation of additional monitoring and/or any other mitigation measures and advise ER/SOR the results and findings accordingly.	1. Attend the meeting to discuss with ET, IEC and Contractor the necessity of additional dolphin monitoring and any other potential mitigation measures; 2. If 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; 3. Supervise the implementation of additional monitoring and/or any other mitigation measures.	1. Inform the ER/SOR and confirm notification of the non- compliance in writing; 2. Attend the meeting to discuss with ET, IEC and ER/SOR the necessity of additional dolphin monitoring and any other potential mitigation measures; 3. Jointly submit with ET to IEC a proposal of additional dolphin monitoring and/or any other mitigation measures when necessary; 4. Implement the agreed additional dolphin monitoring and/or any other mitigation measures.

Appendix H5 Event and Action Plan on Dolphin Acoustic Behaviour

EVENT	ACTION			
	ET Leader	**IEC**	**SO**	**Contractor**
Action Level With the numerical values presented in *Table 5.7* of *Baseline Monitoring Report*, 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 *Table 5.8* of *Baseline Monitoring Report*), 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	1. Repeat statistical data analysis to confirm findings; 2. Review all available and relevant data to ascertain if differences are as a result of natural variation or seasonal differences; 3. Identify source(s) of impact; 4. Inform the IEC, SO and Contractor; 5. Check monitoring data; 6. Carry out audit to ensure all dolphin protective measures are implemented fully and additional measures be proposed if necessary	1. Check monitoring data submitted by ET and Contractor; 2. Discuss monitoring with the ET and the Contractor;	1. Discuss with the IEC the repeat monitoring and any other measures proposed by the ET; 2. Make agreement on measures to be implemented.	1. Inform the SO and confirm notification of the non- compliance in writing; 2. Discuss with the ET and the IEC and propose measures to the IEC and the SO; 3. Implement the agreed measures.

EVENT	ACTION			
	ET Leader	**IEC**	**SO**	**Contractor**
Limit Level With the numerical values presented in Table 5.7 of *Baseline Monitoring Report*, 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 of *Baseline Monitoring Report*), 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	1. Repeat statistical data analysis to confirm findings; 2. Review all available and relevant data to ascertain if differences are as a result of natural variation or seasonal differences; 3. Identify source(s) of impact; 4. Inform the IEC, SO and Contractor; 5. Check monitoring data; 6. Carry out audit to ensure all dolphin protective measures are implemented fully and additional measures be proposed if necessary 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.	1. Check monitoring data submitted by ET and Contractor; 2. Discuss monitoring with the ET and the Contractor; 3. Review proposals for additional monitoring and any other measures submitted by the Contractor and advise ER accordingly.	1. Discuss with the IEC the repeat monitoring and any other measures proposed by the ET; 2. Make agreement on measures to be implemented.	1. Inform the SO and confirm notification of the non- compliance in writing; 2. Discuss with the ET and the IEC and propose measures to the IEC and the SO; 3. Implement the agreed measures.

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

Appendix I

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^3)	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000Kg)	('000Kg)	('000Kg)	('000Kg)	('000Kg)	('000Kg)
Jan	0.033	0.011	0.003	-	0.030	-	-	-	-	-	22.380	-	10.240	-	-
Feb	4.716	0.010	0.031	-	0.010	4.674	-	-	-	-	10.670	-	0.780	-	-
Mar	2.559	0.009	0.240	-	0.221	2.098	-	-	-	0.275	12.390	-	46.050	-	-
Apr	1.051	0.000	0.020	-	0.118	0.914	-	-	-	-	87.650	-	15.760	-	-
May	2.008	-	0.010	-	1.546	0.451	0.386	0.267	0.055	-	98.030	-	8.460	0.126	-
Jun	5.318	0.021	0.030	2.473	0.357	2.457	0.338	-	-	-	77.290	-	25.340	0.140	-
SUB-TOTAL	**15.685**	**0.051**	**0.334**	**2.473**	**2.283**	**10.595**	**0.724**	**0.267**	**0.055**	**0.275**	**308.410**	**-**	**106.630**	**0.266**	**-**
Jul	6.303	0.129	0.020	-	4.654	1.629	0.847	0.252	0.051	-	87.810	-	27.370	0.126	-
Aug	4.824	0.018	0.265	1.829	2.441	0.288	0.391	0.131	0.033	1.022	98.220	-	21.680	0.126	0.475
Sep	8.037	0.142	0.175	-	7.722	0.140	0.400	0.073	0.060	-	238.01	-	34.190	0.161	-
Oct	15.033	0.083	0.943	-	13.860	0.230	0.441	0.118	0.104	-	268.18	-	-	0.105	-
Nov	16.266	0.268	3.356	-	12.474	0.436	-	0.150	0.084	-	114.37	-	-	0.133	-
Dec	19.007	0.202	2.898	0.122	15.987	-	0.337	0.165	0.110	-	130.97	-	-	0.147	-
TOTAL	**85.154**	**0.894**	**7.990**	**4.424**	**59.422**	**13.318**	**3.140**	**1.156**	**0.497**	**1.297**	**1,245.970**	**-**	**189.870**	**1.064**	**0.475**

Notes :

1 - The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.

2 - Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material.

3 - Broken concrete for recycling into aggregates.

4 - Assumed 5 kg per damaged water-filled barrier.

5 - Disposed as Public Fills includes Hard Rock and Large Broken Concrete.

Contract No. : HY/2012/07

Tuen Mun Chek Lap Kok Link – Southern Connection Viaduct Section

Monthly Summary Waste Flow Table for 2015 (Year)

Month\Material	Actual Quantities of Inert C&D Materials Generation						Actual Quantities of C&D wastes Generation						Actual Quantities of Recyclables Generation			
	Total Quantity Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Reused in other Projects	Disposed as Public Fills	Imported Fill	Marine Sediment, Cat. L	Marine Sediment, Cat. Mp	Marine Sediment, Cat. Mf	Marine Sediment, Cat. H	Chemical Waste	General Refuse	Metals	Felled trees	Paper/ cardboard packaging	Plastics
Unit	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000m^3)	('000Kg)	('000Kg)	('000Kg)	('000Kg)	('000Kg)	('000Kg)
Jan	13.578	0.081	0.990	-	12.474	0.115	0.178	0.229	0.258	-	-	132.170	-	61.380	0.091	-
Feb	6.233	0.148	0.461	-	5.759	0.014	0.801	0.110	0.223	-	0.400	141.020	-	73.690	0.112	-
Mar	10.149	0.220	0.473	-	9.600	0.077	0.618	0.073	0.149	-	-	120.940	-	9.140	0.203	-
Apr	9.986	0.410	2.261	-	7.694	0.032	-	-	-	-	-	133.630	-	2.740	0.105	-
May	8.753	0.177	0.662	-	8.091	-	0.550	-	-	-	-	107.920	-	13.070	0.042	-
Jun	8.517	0.132	1.351	-	7.166	-	0.324	0.118	0.169	-	0.017	89.930	-	2.000	0.119	-
SUB-TOTAL	**57.217**	**1.168**	**6.197**	**-**	**50.782**	**0.238**	**2.471**	**0.530**	**0.799**	**-**	**0.417**	**725.610**	**-**	**162.020**	**0.672**	**-**
Jul	3.391	0.137	0.992	-	2.322	0.078	-	-	-	-	1.400	111.570	-	-	0.105	-
Aug	1.370	0.203	0.105	-	1.265	-	-	-	-	-	1.200	87.760	-	-	0.133	-
Sep	4.148	0.160	0.623	-	3.525	-	-	-	-	-	0.600	66.680	-	-	0.105	-
Oct	2.250	0.313	0.615	-	1.635	-	-	-	-	-	-	102.080	-	-	0.084	-
Nov	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Dec	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
TOTAL	**68.375**	**1.982**	**8.531**	**-**	**59.528**	**0.316**	**2.471**	**0.530**	**0.799**	**-**	**3.617**	**1,093.700**	**-**	**162.020**	**1.099**	**-**

Notes :

1 - The waste flow table shall also include C&D materials that are specified in the Contract to be imported for use at the Site.

2 - Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material.

3 - Broken concrete for recycling into aggregates.

4 - Assumed 5 kg per damaged water-filled barrier.

5 - Disposed as Public Fills includes Hard Rock and Large Broken Concrete.

Appendix J

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

Appendix J1 Cumulative Statistics on Exceedances

		Total No. recorded in this reporting period	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	1	2
	Limit	0	0
Impact Dolphin Monitoring	Action	2	7
	Limit	3	3

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

Reporting Period	Cumulative Statistics		
	Complaints	Notifications of Summons	Successful Prosecutions
This Reporting Period (Nov 2014 – Oct 2015)	2	0	0
Total No. received since project commencement	4	0	0