



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

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

27 February 2017

Environmental Resources Management
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Ref.: HYDZHMBEEM00_0_5117L.17

2 March 2017

AECOM
Supervising Officer Representative's Office
No.8 Mong Fat Street, Tuen Mun,
New Territories, Hong Kong

By Fax (2293 6300) and By Post

Attention: Messrs. Andy Westmoreland / Roger Man

Dear Sirs,

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

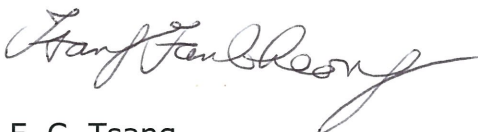
**Contract No. HY/2012/08 TM-CLKL Northern Connection Sub-sea
Tunnel Section
Eleventh Quarterly EM&A Report (June 2016 – August 2016)**

Reference is made to the Eleventh Quarterly Environmental Monitoring and Audit (EM&A) Report (June 2016 - August 2016) (ET's ref.: "0212330_11th Quarterly EM&A_20170117.doc" dated 27 February 2017) certified by the ET Leader and provided to us via e-mail on 2 March 2017.

Please be informed that we have no adverse comments on the captioned quarterly EM&A report.

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

Yours sincerely,



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

c.c. HyD – Mr. Stephen Chan (By Fax: 3188 6614)
HyD – Mr. Vico Cheung (By Fax: 3188 6614)
AECOM – Mr. Conrad Ng (By Fax: 3922 9797)
ERM – Mr. Jovy Tam (By Fax: 2723 5660)
Dragages – Bouygues JV - Mr. C. F. Kwong (By Fax: 2293 7499)

Internal: DY, YH, ENPO Site

Q:\Projects\HYDZHMBEEM00\02_Proj_Mgt\02_Corr\HYDZHMBEEM00_0_5117L.17.docx

Contract No. HY/2012/08

Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section

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

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|--|--|--|---------|----------|----------|
| Client: DBJV | | Project No: 0212330 | | | |
| Summary: This document presents the Eleventh Quarterly EM&A Report for Tuen Mun – Chek Lap Kok Link Northern Connection Sub-sea Tunnel Section. | | Date: 27 February 2017 | | | |
| | | Approved by:  | | | |
| | | Mr Craig Reid Partner | | | |
| | | Certified by:  | | | |
| | | Mr Jovy Tam ET Leader | | | |
| | | | | | |
| | 11 th Quarterly EM&A Report | VAR | JT | CAR | 27/02/17 |
| Revision | Description | By | Checked | Approved | Date |
| <p>This report has been prepared by Environmental Resources Management the trading name of 'ERM Hong-Kong, Limited', with all reasonable skill, care and diligence within the terms of the Contract with the client, incorporating our General Terms and Conditions of Business and taking account of the resources devoted to it by agreement with the client.</p> <p>We disclaim any responsibility to the client and others in respect of any matters outside the scope of the above.</p> | | <p>Distribution</p> <p><input type="checkbox"/> Internal</p> <p><input checked="" type="checkbox"/> Public</p> <p><input type="checkbox"/> Confidential</p> | | | |
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TABLE OF CONTENTS

| | | |
|------------|---|-----------|
| | <i>EXECUTIVE SUMMARY</i> | <i>I</i> |
| <i>1</i> | <i>INTRODUCTION</i> | <i>1</i> |
| <i>1.1</i> | <i>BACKGROUND</i> | <i>1</i> |
| <i>1.2</i> | <i>SCOPE OF REPORT</i> | <i>2</i> |
| <i>1.3</i> | <i>ORGANIZATION STRUCTURE</i> | <i>2</i> |
| <i>1.4</i> | <i>SUMMARY OF CONSTRUCTION WORKS</i> | <i>3</i> |
| <i>2</i> | <i>EM&A RESULTS</i> | <i>5</i> |
| <i>2.1</i> | <i>AIR QUALITY</i> | <i>5</i> |
| <i>2.2</i> | <i>WATER QUALITY MONITORING</i> | <i>7</i> |
| <i>2.3</i> | <i>DOLPHIN MONITORING</i> | <i>7</i> |
| <i>2.4</i> | <i>EM&A SITE INSPECTION</i> | <i>12</i> |
| <i>2.5</i> | <i>WASTE MANAGEMENT STATUS</i> | <i>14</i> |
| <i>2.6</i> | <i>ENVIRONMENTAL LICENSES AND PERMITS</i> | <i>15</i> |
| <i>2.7</i> | <i>IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES</i> | <i>17</i> |
| <i>2.8</i> | <i>SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT</i> | <i>17</i> |
| <i>2.9</i> | <i>SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS</i> | <i>17</i> |
| <i>3</i> | <i>FUTURE KEY ISSUES</i> | <i>19</i> |
| <i>3.1</i> | <i>CONSTRUCTION ACTIVITIES FOR THE COMING QUARTER</i> | <i>19</i> |
| <i>3.2</i> | <i>KEY ISSUES FOR THE COMING QUARTER</i> | <i>19</i> |
| <i>3.3</i> | <i>MONITORING SCHEDULE FOR THE COMING QUARTER</i> | <i>19</i> |
| <i>4</i> | <i>CONCLUSIONS</i> | <i>21</i> |

| | |
|-------------------|---|
| <i>APPENDIX A</i> | <i>PROJECT ORGANIZATION</i> |
| <i>APPENDIX B</i> | <i>CONSTRUCTION PROGRAMME</i> |
| <i>APPENDIX C</i> | <i>ENVIRONMENTAL MITIGATION AND ENHANCEMENT MEASURE IMPLEMENTATION SCHEDULES (EMIS)</i> |
| <i>APPENDIX D</i> | <i>ACTION AND LIMIT LEVELS</i> |
| <i>APPENDIX E</i> | <i>MONITORING SCHEDULE</i> |
| <i>APPENDIX F</i> | <i>AIR QUALITY MONITORING RESULTS</i> |
| <i>APPENDIX G</i> | <i>IMPACT DOLPHIN MONITORING</i> |
| <i>APPENDIX H</i> | <i>EVENT AND ACTION PLAN</i> |
| <i>APPENDIX I</i> | <i>CUMULATIVE STATISTICS ON EXCEEDANCE AND COMPLAINT</i> |
| <i>APPENDIX J</i> | <i>WASTE FLOW TABLE</i> |

EXECUTIVE SUMMARY

Under *Contract No. HY/2012/08*, Dragages – Bouygues Joint Venture (DBJV) is commissioned by the Highways Department (HyD) to undertake the design and construction of the Northern Connection Sub-sea Tunnel Section of the Tuen Mun – Chek Lap Kok Link Project (TM-CLK Link Project) while AECOM Asia Company Limited was appointed by HyD as the Supervising Officer. For implementation of the environmental monitoring and audit (EM&A) programme under the Contract, ERM-Hong Kong, Limited (ERM) has been appointed as the Environmental Team (ET) in accordance with *Environmental Permit No. EP-354/2009/A*. Ramboll Environ Hong Kong Ltd. was employed by HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO). Subsequent applications for variation of environmental permits (VEP), *EP-354/2009/B*, *EP-354/2009/C* and *EP-354/2009/D*, were granted on 28 January 2014, 10 December 2014 and 13 March 2015, respectively.

The construction phase of the Project commenced on 1 November 2013 and will tentatively be completed by the end of 2018. The impact monitoring of the EM&A programme, including air quality, water quality, marine ecological monitoring and environmental site inspections, were commenced on 1 November 2013.

This is the Eleventh Quarterly EM&A report presenting the EM&A works carried out during the period from 1 June 2016 to 31 August 2016 for the *Contract No. HY/2012/08 Northern Connection Sub-sea Tunnel Section* (the “Project”) in accordance with the Updated EM&A Manual of the TM-CLK Link Project. As informed by the Contractor, the major activities in the reporting quarter included:

Land-based Works

- Box Culvert Extension at Works Area – Portion N-A;
- Shaft Structure and Backfilling – Portion N-C;
- Construction of Cross Passage Tympanum – TBM tunnel;
- Excavation of Sub-sea Tunnel – TBM tunnel;
- Thrust Frame Removal – TBM tunnel;
- Cross Passage Lining Installation – TBM Tunnel;
- Corbel Construction – TBM Tunnel;
- Sub-sea Tunnel Gallery Installation – TBM tunnel;
- Slab Construction of Tunnel Protection Enhancement – TBM tunnel;
- Deep Band Drain Installation – Portion S-A;
- Dewatering Deep well Installation – Portion S-A; and
- Jet Grouting, CSM Ground Treatment and Diaphragm Wall Construction – Portion S-A

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

| | |
|-------------------------------------|-------------|
| 24-hour TSP Monitoring | 31 sessions |
| 1-hour TSP Monitoring | 31 sessions |
| Impact Dolphin Monitoring | 6 sessions |
| Joint Environmental Site Inspection | 14 sessions |

Implementation of Marine Mammal Exclusion Zone

There was no dredging, reclamation or marine sheet piling works in open waters during this reporting period. Thus, Passive Acoustic Monitoring (PAM) and the day-time monitoring of Dolphin Exclusion Zone (DEZ) by dolphin observers were not in effect during the reporting period.

Summary of Breaches of Action/Limit Levels

Breaches of Action and Limit Levels for Air Quality

No exceedances were recorded from the air quality monitoring in this reporting period.

Dolphin Monitoring

Whilst one (1) Limit Level exceedance was observed for the quarterly dolphin monitoring data between June and August 2016, no unacceptable impact from the construction activities of the TM-CLKL Northern Connection Sub-sea Tunnel Section on Chinese White Dolphins was noticeable from general observations during the dolphin monitoring in this reporting quarter.

Environmental Complaints, Non-compliance & Summons

No non-compliance with EIA recommendations, EP conditions and other requirements associated with the construction of this Contract was recorded in this reporting period.

Two environmental complaints regarding muddy water discharge near the Pier at 33 Ho Yeung Street, Tuen Mun at Northern Landfall and marine litter disposal near Tuen Mun Ferry Pier were received from EPD on 6 July 2016 and from ENPO on 16 July 2016 respectively. Upon investigation, the complaints were considered not related to this Project.

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

Reporting Change

There was no reporting change required in the reporting period.

Upcoming Works for the Next Reporting Period

Works to be undertaken in the coming quarterly period include the following:

Land-based works

- Box Culvert Extension at Works Area – Portion N-A;
- Preparation of Phase 2 Reclamation – Portion N-A;
- Shaft Structure and Backfilling – Portion N-C;
- Construction of Cross Passage Tympanum – TBM tunnel;
- Cross Passage Lining Installation – TBM Tunnel;
- Corbel Construction – TBM Tunnel;
- Excavation of Sub-sea Tunnel – TBM tunnel;
- Sub-sea Tunnel Gallery Installation – TBM tunnel;
- Deep Band Drain Installation – Portion S-A;
- Dewatering Deep well Installation – Portion S-A; and
- Jet Grouting, CSM Ground Treatment and Diaphragm Wall Construction – Portion S-A

Future Key Issues

As informed by the Contractor, Phase I Reclamation works for the Northern Landfall was substantially completed in December 2014, a proposal letter was sent to EPD on 21 May 2015 to seek approval for the temporary suspension of Water Quality Monitoring. Subsequently, a letter from EPD on 5 June 2015 stated that they have no strong objection to the temporary suspension of the water quality monitoring. Water Quality Monitoring was suspended from 6 June 2015 effectively and will resume when Phase II Reclamation commences in the fourth quarter of 2016 tentatively.

Potential environmental impacts arising from the above upcoming construction activities in the coming quarterly period are expected to be mainly associated with dust, marine ecology and waste management issues.

1.1

BACKGROUND

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

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

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

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



| | | | |
|-------------|-------------|---------|---------|
| Designed By | PKV | | |
| Drawn By | DAI | | |
| Approved By | SPo | | |
| Date | 11SEP2013 | PKV | |
| Rev. | Description | Date | Checked |
| A | FIRST ISSUE | 11SEP13 | PKV |

Main Contractor

Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

Client

HIGHWAYS DEPARTMENT

Contractor's Designer

Arup Ove Arup & Partners Hong Kong Limited

Project

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

Drawing Title

Figure 1.1

| | |
|--------------|---------------------------------|
| Drawing no. | TMCLKL8-DBJ-GEN-DWG-00174 |
| Scale | 1:25000 © A3 |
| CADD Ref. | TMCLKL8-DBJ-GEN-DWG-00174-DFT-A |
| Issue Status | DFT (DRAFT) |
| Revision | A |

The construction phase of the Contract commenced on 1 November 2013 and will tentatively be completed by 2018. The impact monitoring phase of the EM&A programme, including air quality, water quality, marine ecological monitoring and environmental site inspections, were commenced on 1 November 2013.

1.2 SCOPE OF REPORT

This is the Eleventh Quarterly EM&A Report under the *Contract No. HY/2012/08 Tuen Mun – Chek Lap Kok Link – Northern Connection Sub-sea Tunnel Section*. This report presents a summary of the environmental monitoring and audit works from 1 June 2016 to 31 August 2016.

1.3 ORGANIZATION STRUCTURE

The organization structure of the Contract is shown in *Appendix A*. The key personnel contact names and contact details are summarized in *Table 1.1* below.

Table 1.1 *Contact Information of Key Personnel*

| Party | Position | Name | Telephone | Fax |
|---|---------------------------|---------------------|-----------|-----------|
| Highways Department | Engr 16/HZMB | Kenneth Lee | 2762 4996 | 3188 6614 |
| SOR (AECOM Asia Company Limited) | Chief Resident Engineer | Edwin Ching | 2293 6388 | 2293 6300 |
| | | Andrew Westmoreland | 2293 6360 | 2293 6300 |
| ENPO / IEC (Ramboll Environ Hong Kong Ltd.) | ENPO Leader | Y.H. Hui | 3465 2850 | 3465 2899 |
| | IEC | Dr. F.C. Tsang | 3465 2851 | 3465 2899 |
| Contractor (Dragages – Bouygues Joint Venture) | Environmental Manager | C.F. Kwong | 2293 7322 | 2293 7499 |
| | Environmental Officer | Bryan Lee | 2293 7323 | 2293 7499 |
| | Environmental Officer | David Ho | 6628 8684 | 2293 7499 |
| | 24-hour complaint hotline | Rachel Lam | 2293 7330 | |
| ET (ERM-HK) | ET Leader | Jovy Tam | 2271 3113 | 2723 5660 |

1.4 SUMMARY OF CONSTRUCTION WORKS

The construction phase of this Contract was commenced on 1 November 2013. The construction programme is shown in *Appendix B*.

As per DBJV's information, details of major construction works carried out in this reporting period are summarized in *Table 1.2*.

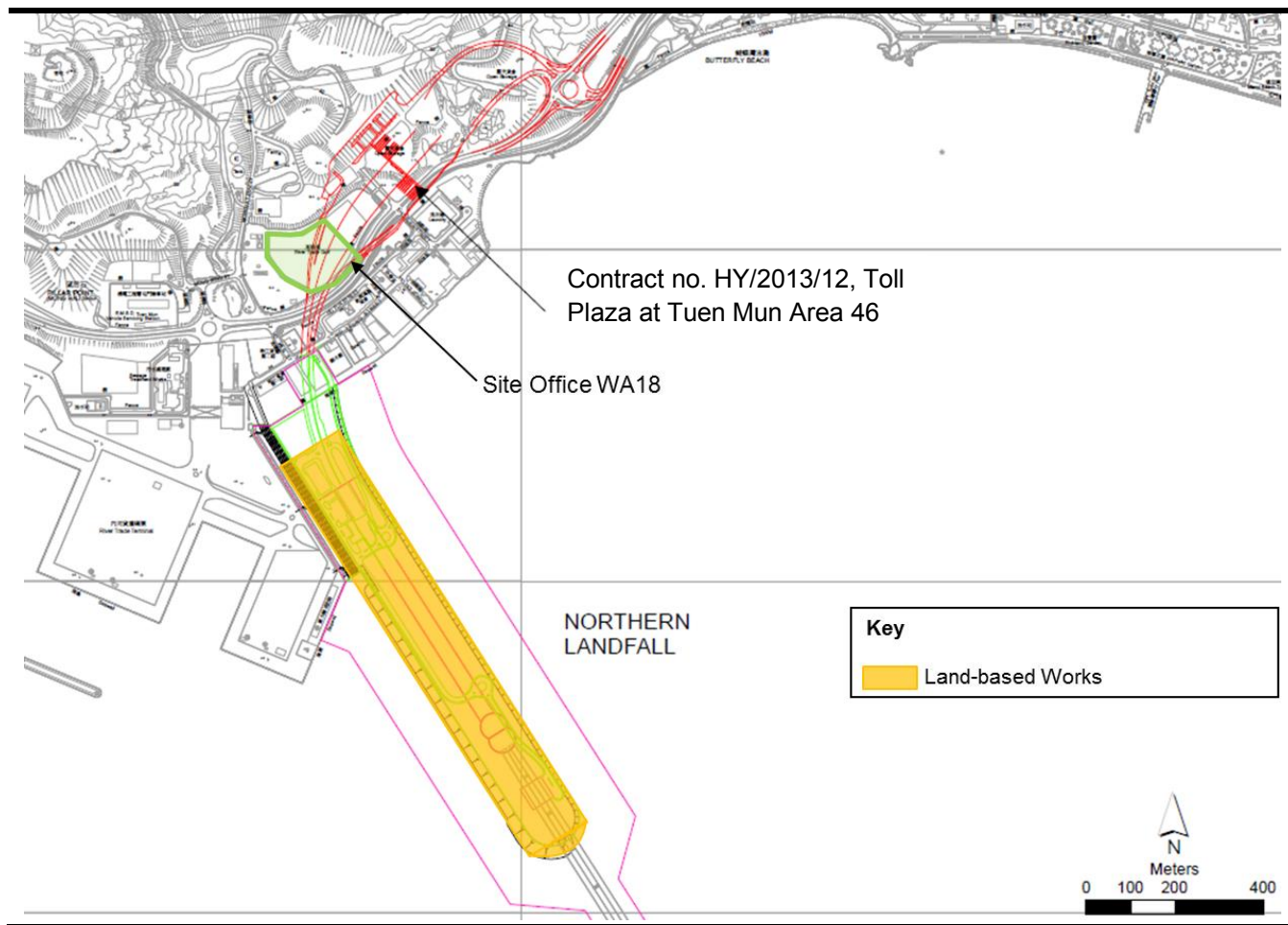
The general layout plan of the site showing the detailed works areas is shown in *Figure 1.2*. The Environmental Sensitive Receivers in the vicinity of the Project are shown in *Figure 1.3*.

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

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

| Construction Activities Undertaken |
|---|
| <i>Land-based Works</i> |
| Portion N-A |
| <ul style="list-style-type: none">• Box Culvert Extension |
| Portion N-C |
| <ul style="list-style-type: none">• Shaft Structure and Backfilling |
| TBM tunnel |
| <ul style="list-style-type: none">• Construction of Cross Passage Tympanum• Cross Passage Lining Installation• Corbel Construction• Excavation of Sub-sea Tunnel• Thrust Frame Removal• Sub-sea Tunnel Gallery Installation• Slab Construction of Tunnel Protection Enhancement |
| Portion S-A |
| <ul style="list-style-type: none">• Deep Band Drain Installation• Dewatering Deep well Installation• Jet Grouting, CSM Ground Treatment and Diaphragm Wall Construction |

Figure 1.2 Locations of Construction Activities – June 2016 to August 2016



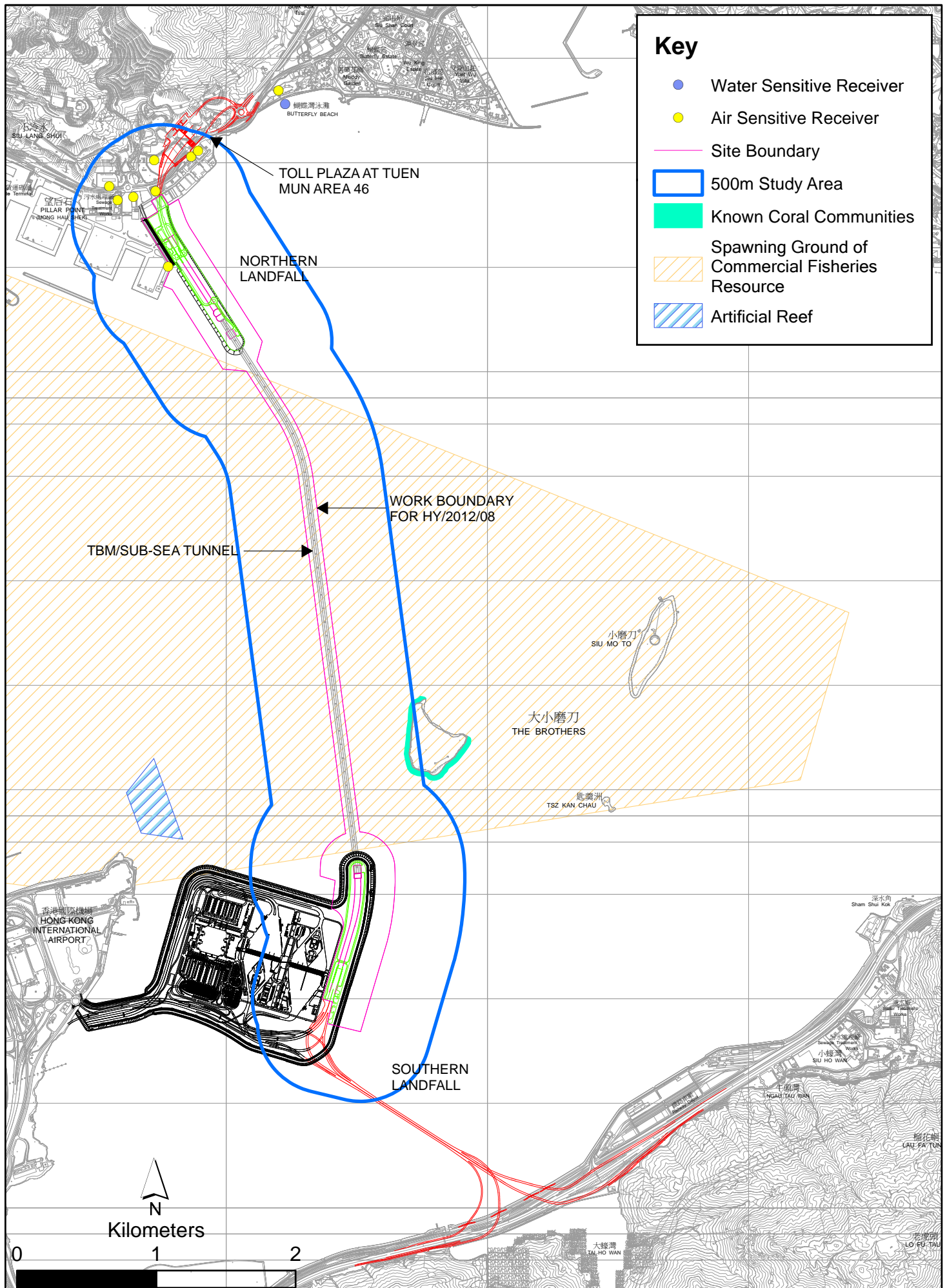


Figure 1.3 Environmental Sensitive Receivers in the vicinity of Contract No. HY/2012/08 Tuen Mun - Chek Lap Kok Link - Northern Connection Sub-Sea Tunnel Section

File: T:\GIS\CONTRACT\0212330\I\mxd\0212330_EMnA_Env_Sensitive_Receiver.mxd
Date: 15/4/2014

The EM&A programme required environmental monitoring for air quality, water quality and marine ecology as well as environmental site inspections for air quality, noise, water quality, waste management, marine ecology and landscape and visual impacts. The EM&A requirements and related findings for each component are summarized in the following sections

2.1 AIR QUALITY

As per the requirements under *Condition 2.4* of *EP-354/2009/D*, the Enhanced TSP Monitoring Plan has been prepared under *Contract No. HY/2012/08*. Details of the monitoring plan are presented in the *Enhanced TSP Monitoring Plan* ⁽¹⁾.

2.1.1 Monitoring Requirements and Equipment

In accordance with the Updated EM&A Manual and the *Enhanced TSP Monitoring Plan*, impact 1-hour TSP monitoring was conducted three (3) times in every six (6) days and impact 24-hour TSP monitoring was carried out once in every six (6) days when the highest dust impact was expected. 1-hr and 24-hr TSP monitoring frequency was increased to three times per day every three days and daily every three days respectively as excavation works for launching shaft commenced on 24 October 2014.

High volume samplers (HVSs) were used to carry out the 1-hour and 24-hour TSP monitoring in the reporting quarter at the five (5) air quality monitoring stations in accordance with the requirements stipulated in the Updated EM&A Manual (*Figure 2.1; Table 2.1*). Wind anemometer was installed at the rooftop of ASR5 for logging wind speed and wind direction. Details of the equipment deployed are provided in *Table 2.2*.

(1) ERM (2013) Enhanced TSP Monitoring Plan. Submitted on 28 October 2013 and subsequently approved by EPD on 1 November 2013.

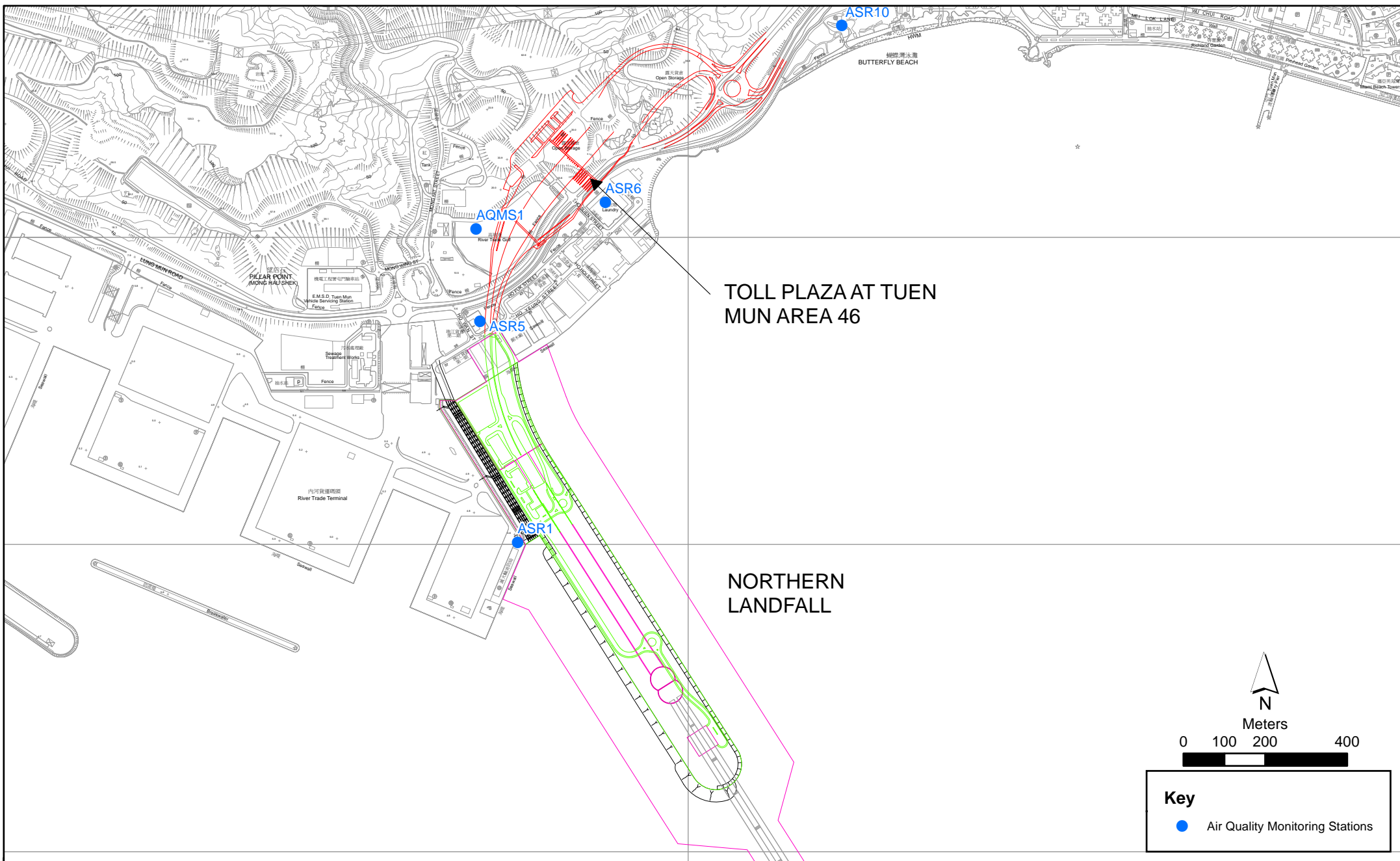


Figure 2.1

Air Quality Monitoring Stations for the Enhanced TSP Monitoring

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

| Monitoring Station | Location | Description | Parameters & Frequency | Monitoring Dates |
|--------------------|---------------------------|-------------------|--|--|
| ASR1 | Tuen Mun Fireboat Station | Office | TSP monitoring | 1, 4, 7, 10, 13, 16, 19, 22, 25 and 28 |
| ASR5 | Pillar Point Fire Station | Office | <ul style="list-style-type: none"> 1-hour Total Suspended Particulates (1-hour TSP, $\mu\text{g}/\text{m}^3$), 3 times in every 6 days | June 2016; 1, 4, 7, 10, 13, 16, 19, 22, 25, 28 and 31 July 2016; and |
| AQMS1 | Previous River Trade Golf | Bare ground | <ul style="list-style-type: none"> 24-hour Total Suspended Particulates (24-hour TSP, $\mu\text{g}/\text{m}^3$), daily for 24-hour in every 6 days | 3, 6, 9, 12, 15, 18, 21, 24, 27 and 30 August 2016 |
| ASR6 | Butterfly Beach Laundry | Office | Enhanced TSP monitoring (commenced on 24 October 2014) | |
| ASR10 | Butterfly Beach Park | Recreational uses | <ul style="list-style-type: none"> 1-hour Total Suspended Particulates (1-hour TSP, $\mu\text{g}/\text{m}^3$), 3 times in every 3 days 24-hour Total Suspended Particulates (24-hour TSP, $\mu\text{g}/\text{m}^3$), daily for 24-hour in every 3 days | |

Table 2.2 Air Quality Monitoring Equipment

| Equipment | Brand and Model |
|--|--|
| High Volume Sampler (1-hour TSP and 24-hour TSP) | Tisch Environmental Mass Flow Controlled Total Suspended Particulate (TSP) High Volume Sampler (Model No. TE-5170) |
| Wind Meter | Davis (Model: Weather Wizard III (S/N: WE90911A30) / Davis (Model: Vantage Pro 2 (S/N: AS160104014) |
| Wind Anemometer for calibration | Lutron (Model No. AM-4201) |

2.1.2 Action & Limit Levels

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

2.1.3 Monitoring Schedule for the Reporting Quarter

The schedules for air quality monitoring in the reporting quarter are provided in *Appendix E*.

2.1.4 Results and Observations

Impact air quality monitoring was conducted at all designated monitoring stations in the reporting period under favourable weather conditions. The major dust sources in the reporting period include construction activities under the Contract as well as nearby traffic emissions.

The monitoring results for 1-hour TSP and 24-hour TSP are summarized in *Tables 2.3 and 2.4*, respectively. Monitoring results are presented graphically in *Appendix F* and detailed impact air quality monitoring data were reported in the *Thirty-two to Thirty-four Monthly EM&A Report*.

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

| Month/Year | Station | Average ($\mu\text{g}/\text{m}^3$) | Range ($\mu\text{g}/\text{m}^3$) | Action Level ($\mu\text{g}/\text{m}^3$) | Limit Level ($\mu\text{g}/\text{m}^3$) |
|--------------|---------|--------------------------------------|------------------------------------|---|--|
| June 2016 to | ASR 1 | 77 | 44 - 170 | 331 | 500 |
| August 2016 | ASR 5 | 100 | 47 - 199 | 340 | 500 |
| | AQMS1 | 65 | 45 - 128 | 335 | 500 |
| | ASR6 | 89 | 44 - 162 | 338 | 500 |
| | ASR10 | 68 | 33 - 128 | 337 | 500 |

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

| Month/Year | Station | Average ($\mu\text{g}/\text{m}^3$) | Range ($\mu\text{g}/\text{m}^3$) | Action Level ($\mu\text{g}/\text{m}^3$) | Limit Level ($\mu\text{g}/\text{m}^3$) |
|--------------|---------|--------------------------------------|------------------------------------|---|--|
| June 2016 to | ASR 1 | 56 | 44 - 88 | 213 | 260 |
| August 2016 | ASR 5 | 59 | 43 - 84 | 238 | 260 |
| | AQMS1 | 47 | 39 - 65 | 213 | 260 |
| | ASR6 | 54 | 39 - 76 | 238 | 260 |
| | ASR10 | 52 | 43 - 73 | 214 | 260 |

No Action or Limit Level exceedances for 1-hr TSP were recorded. No Action or Limit Level exceedances for 24-hr TSP were recorded. Summary of Exceedances for Air Quality Impact Monitoring in this Reporting Quarter is detailed in *Table 2.13*.

2.2 WATER QUALITY MONITORING

As informed by the Contractor, Phase I Reclamation works for the Northern Landfall was substantially completed in December 2014, a proposal letter was sent to EPD on 21 May 2015 to seek approval for the temporary suspension of Water Quality Monitoring. Subsequently, a letter from EPD on 5 June 2015 stated that they have no strong objection to the temporary suspension of the water quality monitoring. Water Quality Monitoring was suspended from 6 June 2015 effectively and will resume when Phase II Reclamation commences in the fourth quarter of 2016 tentatively.

2.3 DOLPHIN MONITORING

2.3.1 Monitoring Requirements

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

Crossing Facilities on the monthly basis is adopted to avoid duplicates of survey effort.

2.3.2 *Monitoring Equipment*

Table 2.5 summarizes the equipment used for the impact dolphin monitoring.

Table 2.5 *Dolphin Monitoring Equipment*

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

2.3.3 *Monitoring Parameter, Frequencies & Duration*

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

2.3.4 *Monitoring Location*

The impact dolphin monitoring was carried out in the NEL and NWL along the line transect as depicted in *Figure 2.2*. The co-ordinates of all transect lines are shown in *Table 2.6* below.

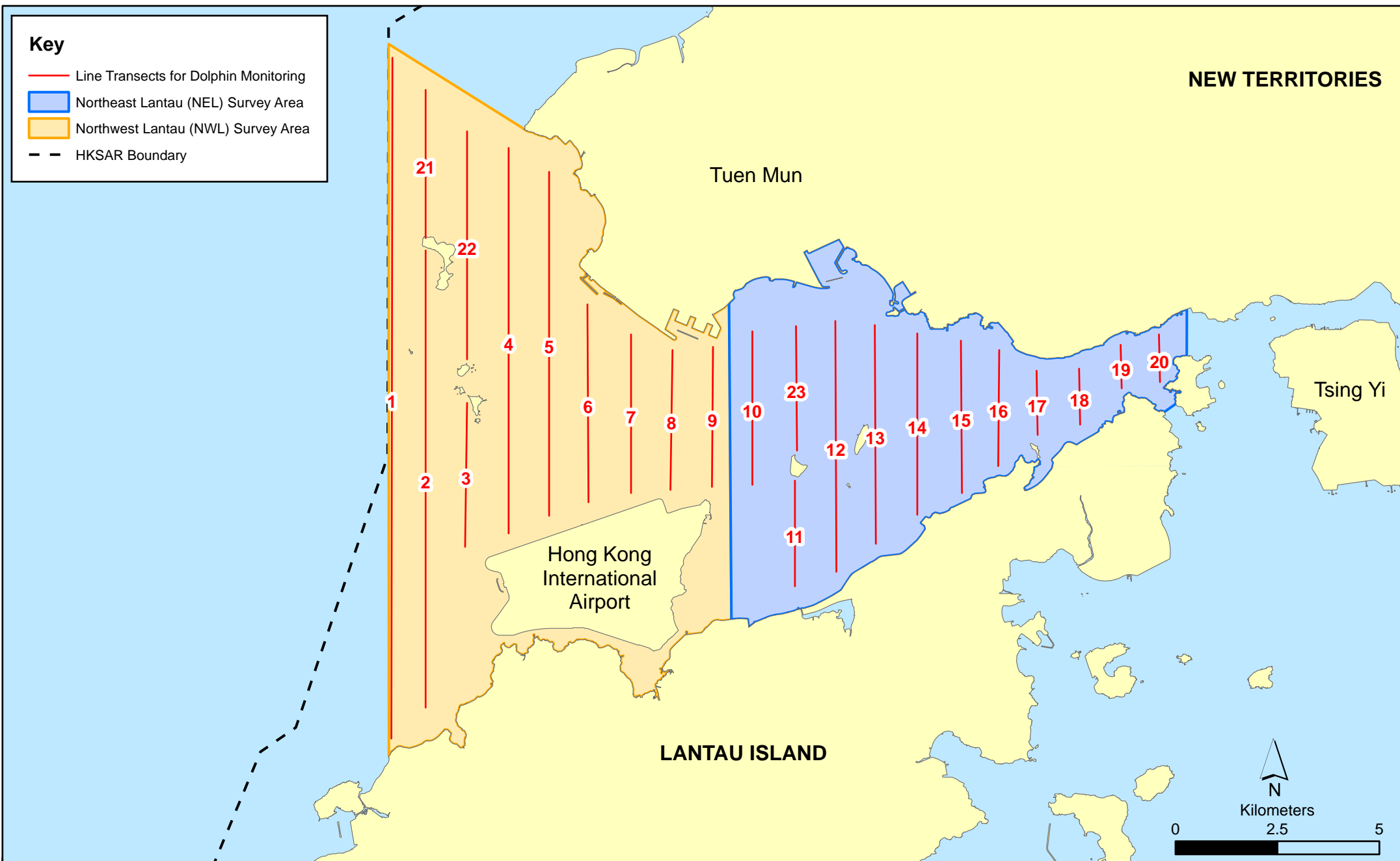


Figure 2.2

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

Table 2.6 Impact Dolphin Monitoring Line Transect Co-ordinates

| Line No. | | Easting | Northing | Line No. | | Easting | Northing |
|----------|-------------|---------|----------|----------|-------------|---------|----------|
| 1 | Start Point | 804671 | 815456 | 13 | Start Point | 816506 | 819480 |
| 1 | End Point | 804671 | 831404 | 13 | End Point | 816506 | 824859 |
| 2 | Start Point | 805475 | 815913 | 14 | Start Point | 817537 | 820220 |
| 2 | End Point | 805477 | 826654 | 14 | End Point | 817537 | 824613 |
| 3 | Start Point | 806464 | 819435 | 15 | Start Point | 818568 | 820735 |
| 3 | End Point | 806464 | 822911 | 15 | End Point | 818568 | 824433 |
| 4 | Start Point | 807518 | 819771 | 16 | Start Point | 819532 | 821420 |
| 4 | End Point | 807518 | 829230 | 16 | End Point | 819532 | 824209 |
| 5 | Start Point | 808504 | 820220 | 17 | Start Point | 820451 | 822125 |
| 5 | End Point | 808504 | 828602 | 17 | End Point | 820451 | 823671 |
| 6 | Start Point | 809490 | 820466 | 18 | Start Point | 821504 | 822371 |
| 6 | End Point | 809490 | 825352 | 18 | End Point | 821504 | 823761 |
| 7 | Start Point | 810499 | 820880 | 19 | Start Point | 822513 | 823268 |
| 7 | End Point | 810499 | 824613 | 19 | End Point | 822513 | 824321 |
| 8 | Start Point | 811508 | 821123 | 20 | Start Point | 823477 | 823402 |
| 8 | End Point | 811508 | 824254 | 20 | End Point | 823477 | 824613 |
| 9 | Start Point | 812516 | 821303 | 21 | Start Point | 805476 | 827081 |
| 9 | End Point | 812516 | 824254 | 21 | End Point | 805476 | 830562 |
| 10 | Start Point | 813525 | 820872 | 22 | Start Point | 806464 | 824033 |
| 10 | End Point | 813525 | 824657 | 22 | End Point | 806464 | 829598 |
| 11 | Start Point | 814556 | 818853 | 23 | Start Point | 814559 | 821739 |
| 11 | End Point | 814556 | 820992 | 23 | End Point | 814559 | 824768 |
| 12 | Start Point | 815542 | 818807 | | | | |
| 12 | End Point | 815542 | 824882 | | | | |

2.3.5 Action & Limit Levels

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

2.3.6 *Monitoring Schedule for the Reporting Period*

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

2.3.7 *Results & Observations*

A total of 897.06 km of survey effort was conducted, with 92.5% of the total survey effort being conducted under favourable weather conditions (ie Beaufort Sea State 3 or below with good visibility) in this reporting quarter. Amongst the two areas, 341.80 km and 555.26 km of survey effort were conducted from NEL and NWL survey areas, respectively. The total survey effort conducted on primary and secondary lines were 648.70 km and 248.36 km, respectively. The survey efforts are summarized in *Appendix G*.

A total of 10 groups of 34 Chinese White Dolphins sightings were recorded during the six sets of surveys in this reporting quarter. Seven of the ten dolphin sightings were made during on-effort search, and all seven on-effort dolphin sightings were made on primary lines. During this reporting quarter, all except one dolphin groups were sighted in NWL, while an off-effort of a lone dolphin was sighted in NEL.

Encounter rates of Chinese White Dolphins are deduced from the survey effort and on-effort sighting data made under favourable conditions (Beaufort 3 or below with good visibility) in the reporting quarter with the results and comparison with baseline results present in *Tables 2.7* and *2.8*.

Table 2.7 *Individual Survey Event Encounter Rates*

| | | Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort) | Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort) |
|-----|---|--|--|
| | | Primary Lines Only | Primary Lines Only |
| NEL | Set 1: Jun 1 st /6 th | 0.00 | 0.00 |
| | Set 2: Jun 13 th /17 th | 0.00 | 0.00 |
| | Set 3: Jul 5 th /12 th | 0.00 | 0.00 |
| | Set 4: Jul 18 th /27 th | 0.00 | 0.00 |
| | Set 5: Aug 5 th /9 th | 0.00 | 0.00 |
| | Set 6: Aug 17 th /23 rd | 0.00 | 0.00 |
| NWL | Set 1: Jun 1 st /6 th | 0.00 | 0.00 |
| | Set 2: Jun 13 th /17 th | 0.00 | 0.00 |
| | Set 3: Jul 5 th /12 th | 4.60 | 9.20 |
| | Set 4: Jul 18 th /27 th | 0.00 | 0.00 |
| | Set 5: Aug 5 th /9 th | 4.24 | 28.28 |
| | Set 6: Aug 17 th /23 rd | 1.48 | 7.40 |

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

Table 2.8 *Quarterly Average Encounter Rates*

| | Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort) | | Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort) | |
|-------------------------|---|------------------------------|--|------------------------------|
| | June 2016 - August 2016 | September - November 2011 | June 2016 - August 2016 | September - November 2011 |
| Northeast Lantau | 0.0 | 6.00 ± 5.05 | 0.0 | 22.19 ± 26.81 |
| Northwest Lantau | 1.72 ± 2.17 | 9.85 ± 5.85 | 7.48 ± 10.98 | 44.66 ± 29.85 |

Note: Encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions.

Group size of Chinese White Dolphins ranged from 1 - 11 individuals per group in North Lantau region during June to August 2016. The average dolphin group sizes from these three months were compared with the ones deduced from the baseline period in September to November 2011, as shown in *Table 2.9*.

Table 2.9 *Average Dolphin Group Size*

| | Average Dolphin Group Size | |
|-------------------------|----------------------------|---------------------------|
| | June - August 2016 | September - November 2011 |
| Overall | 3.40 ± 3.34 (n = 10) | 3.72 ± 3.13 (n = 66) |
| Northeast Lantau | 1.00 (n = 1) | 3.18 ± 2.16 (n = 17) |
| Northwest Lantau | 3.67 ± 3.43 (n = 9) | 3.92 ± 3.40 (n = 49) |

Whilst one limit level exceedance was observed for the quarterly dolphin monitoring data between June and August 2016, no unacceptable impact from the construction activities of this Contract was recorded from the general observations.

Although the dolphins infrequently occurred along the alignment of TM-CLKL Northern Connection Sub-Sea Tunnel Section in the past and during the baseline monitoring period, it is apparent that dolphin usage has been significantly reduced in NEL.

It is critical to monitor the dolphin usage in North Lantau region in the upcoming quarters to determine whether the dolphins are continuously affected by the various construction activities in relation to the HZMB-related works, and whether suitable mitigation measure can be applied to revert the situation.

2.3.8 *Implementation of Marine Mammal Exclusion Zone*

There was no dredging, reclamation or marine sheet piling works in open waters during this reporting period. Thus, Passive Acoustic Monitoring (PAM) and the day-time monitoring of Dolphin Exclusion Zone (DEZ) by dolphin observers were not in effect during the reporting period.

2.4 *EM&A SITE INSPECTION*

Site inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures under the Contract. Fourteen (14) site inspections were carried out in the reporting quarter on 1, 8, 15, 22 and 29 June 2016; 6, 13, 20 and 27 July 2016; 3, 10, 17, 24 and 31 August 2016.

Key observations during the site inspections in this reporting period are summarized in *Table 2.10*.

Table 2.10 *Specific Observations and Recommendations during the Weekly Site Inspection in this Reporting Period*

| Inspection Date | Environmental Observations | Recommendations/ Remarks |
|------------------------|--|--|
| 1 June 2016 | Works Area - Portion N-C <ul style="list-style-type: none"> Stagnant water should be removed from the tank. | Works Area - Portion N-C <ul style="list-style-type: none"> The Contractor was reminded to remove the stagnant water from the tank. |
| 8 June 2016 | Works Area -TBM tunnel <ul style="list-style-type: none"> Drip tray should be provided to the chemical containers. Works Area - Portion S-A <ul style="list-style-type: none"> Drip tray should be provided to the oil drums. Works Area - Portion S-B <ul style="list-style-type: none"> Oil drums should be removed from the machine. | Works Area -TBM tunnel <ul style="list-style-type: none"> The Contractor was reminded to provide drip tray to the chemical containers. Works Area - Portion S-A <ul style="list-style-type: none"> The Contractor was reminded to provide drip tray to the oil drums. Works Area - Portion S-B <ul style="list-style-type: none"> The Contractor was reminded to remove the oil drums from the machine. |
| 15 June 2016 | Works Area - Portion N-C <ul style="list-style-type: none"> Drip tray should be provided to the chemical drum. Works Area - Portion S-A <ul style="list-style-type: none"> Chemical labels should be provided to the oil drums. | Works Area - Portion N-C <ul style="list-style-type: none"> The Contractor was reminded to provide drip tray to the chemical drum. Works Area - Portion S-A <ul style="list-style-type: none"> The Contractor was reminded to provide chemical labels to the oil drums. |
| 22 June 2016 | Works Area - Portion S-B <ul style="list-style-type: none"> Water spraying should be applied more frequently during dry condition. | Works Area - Portion S-B <ul style="list-style-type: none"> The Contractor was reminded to apply water spraying more frequently during dry condition. |

| Inspection Date | Environmental Observations | Recommendations/ Remarks |
|------------------------|---|---|
| 29 June 2016 | <p>Works Area - Portion N-B</p> <ul style="list-style-type: none"> Water spraying should be applied more frequently during dry condition. <p>Works Area - Portion S-B</p> <ul style="list-style-type: none"> Wastewater should be directed to the wastewater treatment facility properly. Chemical labels should be provided to the acid containers. | <p>Works Area - Portion N-B</p> <ul style="list-style-type: none"> The Contractor was reminded to apply water spraying more frequently during dry condition. <p>Works Area - Portion S-B</p> <ul style="list-style-type: none"> The Contractor was reminded to properly direct the wastewater to the wastewater treatment facility. The Contractor was reminded to provide chemical labels to the acid containers. |
| 6 July 2016 | <p>Works Area - Portion N-C</p> <ul style="list-style-type: none"> Oil drum should be removed after used. <p>Works Area - TBM tunnel</p> <ul style="list-style-type: none"> Oil drum should be removed after used. | <p>Works Area - Portion N-C</p> <ul style="list-style-type: none"> The Contractor was reminded to remove the oil drum after used. <p>Works Area - TBM tunnel</p> <ul style="list-style-type: none"> The Contractor was reminded to remove the oil drum after used. |
| 13 July 2016 | <p>Works Area - Portion N-C</p> <ul style="list-style-type: none"> Rubbish and empty chemical drums should be removed. <p>Works Area - Portion S-B</p> <ul style="list-style-type: none"> Drip tray and chemical labels should be provided to the chemical containers. | <p>Works Area - Portion N-C</p> <ul style="list-style-type: none"> The Contractor was reminded to remove the rubbish and empty chemical drums. <p>Works Area - Portion S-B</p> <ul style="list-style-type: none"> The Contractor was reminded to provide drip tray and chemical labels to the chemical containers. |
| 20 July 2016 | <p>Works Area - Portion S-B</p> <ul style="list-style-type: none"> Stagnant water in the drip tray should be removed. | <p>Works Area - Portion N-C</p> <ul style="list-style-type: none"> The Contractor was reminded to remove the stagnant water in the drip tray. |
| 27 July 2016 | <p>Works Area - Portion N-A</p> <ul style="list-style-type: none"> Accumulated waste in the skip should be removed. <p>Works Area - Portion S-C</p> <ul style="list-style-type: none"> Drip tray and labels should be provided to the chemicals. | <p>Works Area - Portion N-A</p> <ul style="list-style-type: none"> The Contractor was reminded to remove the accumulated waste in the skip. <p>Works Area - Portion S-C</p> <ul style="list-style-type: none"> The Contractor was reminded to provide drip tray and labels to the chemicals. |
| 3 August 2016 | <p>Works Area - TBM tunnel</p> <ul style="list-style-type: none"> Drip tray and labels should be provided to the chemicals. <p>Works Area - Portion S-C</p> <ul style="list-style-type: none"> Accumulated waste in the skip should be removed. | <p>Works Area - TBM tunnel</p> <ul style="list-style-type: none"> The Contractor was reminded to provide drip tray and labels to the chemicals. <p>Works Area - Portion S-C</p> <ul style="list-style-type: none"> The Contractor was reminded to remove the accumulated waste in the skip. |
| 10 August 2016 | <p>Works Area - TBM tunnel</p> <ul style="list-style-type: none"> Drip tray and labels should be provided to the chemicals. | <p>Works Area - TBM tunnel</p> <ul style="list-style-type: none"> The Contractor was reminded to provide drip tray and labels to the chemicals. |

| Inspection Date | Environmental Observations | Recommendations/ Remarks |
|-----------------|--|--|
| 17 August 2016 | <p>Works Area - Portion N-C</p> <ul style="list-style-type: none"> Drip tray should be provided to the chemicals. <p>Works Area - Portion N-B</p> <ul style="list-style-type: none"> Rubbish should be removed in order to maintain better housekeeping. Surface runoff should be controlled to prevent direct discharge to surface or marine waters. <p>Works Area - Portion N-A</p> <ul style="list-style-type: none"> Drip tray and labels should be provided to the chemicals. <p>Works Area - Portion S-B</p> <ul style="list-style-type: none"> Stagnant water should be removed to maintain better housekeeping. | <p>Works Area - Portion N-C</p> <ul style="list-style-type: none"> The Contractor was reminded to provide drip tray to the chemicals. <p>Works Area - Portion N-B</p> <ul style="list-style-type: none"> The Contractor was reminded to remove the rubbish in order to maintain better housekeeping. The Contractor was reminded to control the surface runoff to prevent direct discharge to surface or marine waters. <p>Works Area - Portion N-A</p> <ul style="list-style-type: none"> The Contractor was reminded to provide drip tray and labels to the chemicals. <p>Works Area - Portion S-B</p> <ul style="list-style-type: none"> The Contractor was reminded to remove stagnant water to maintain better housekeeping. |
| 24 August 2016 | <p>Works Area - Portion N-B</p> <ul style="list-style-type: none"> Water spraying should be applied more frequently during dry condition. Sand and mud in the surface channel should be removed. <p>Works Area - Portion S-B</p> <ul style="list-style-type: none"> Drip tray should be provided to the chemicals. | <p>Works Area - Portion N-B</p> <ul style="list-style-type: none"> The Contractor was reminded to apply water spraying more frequently during dry condition. The Contractor was reminded to remove the sand and mud in the surface channel. <p>Works Area - Portion S-B</p> <ul style="list-style-type: none"> The Contractor was reminded to provide drip tray to the chemicals. |
| 31 August 2016 | <p>Works Area - Portion N-C</p> <ul style="list-style-type: none"> Accumulated wastes beside the waste skips should be removed. <p>Works Area - TBM tunnel</p> <ul style="list-style-type: none"> Cement bags should be covered with tarpaulin sheet. <p>Works Area - Portion S-B</p> <ul style="list-style-type: none"> Stagnant water in the drip tray should be removed. | <p>Works Area - Portion N-C</p> <ul style="list-style-type: none"> The Contractor was reminded to remove the accumulated wastes beside the waste skips. <p>Works Area - TBM tunnel</p> <ul style="list-style-type: none"> The Contractor was reminded to cover the cement bags with tarpaulin sheet. <p>Works Area - Portion S-B</p> <ul style="list-style-type: none"> The Contractor was reminded to remove the stagnant water in the drip tray. |

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

2.5 WASTE MANAGEMENT STATUS

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

Wastes generated during this reporting period include mainly construction wastes (inert and non-inert) and recyclable materials. Reference has been made to the waste flow table prepared by the Contractor (*Appendix J*). The quantities of different types of wastes are summarized in *Table 2.11*.

Table 2.11 Quantities of Different Waste Generated in the Reporting Period

| Month/Year | Inert Construction Waste ^(a) (tonnes) | Imported Fill (tonnes) | Inert Construction Waste Re-used (tonnes) | Non-inert Construction Waste ^(b) (tonnes) | Recyclable Materials ^(c) (kg) | Chemical Wastes (kg) | Marine Sediment (m ³) | |
|--------------|--|------------------------|---|--|--|----------------------|-----------------------------------|------------|
| | | | | | | | Category L | Category M |
| June 2016 | 5,597 | 0 | 0 | 214 | 200 | 0 | 0 | 0 |
| July 2016 | 10,063 | 0 | 0 | 292 | 200 | 0 | 0 | 0 |
| August 2016 | 31,621 | 0 | 0 | 323 | 0 | 0 | 0 | 0 |
| Total | 47,281 | 0 | 0 | 829 | 400 | 0 | 0 | 0 |

Notes:

- (a) Inert construction wastes include hard rock and large broken concrete, and materials disposed as public fill.
- (b) Non-inert construction wastes include general refuse disposed at landfill.
- (c) Recyclable materials include metals, paper, cardboard, plastics, timber and others.

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

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

2.6 ENVIRONMENTAL LICENSES AND PERMITS

The status of environmental licensing and permit is summarized in *Table 2.12* below.

Table 2.12 Summary of Environmental Licensing and Permit Status

| License/ Permit | License or Permit No. | Date of Issue | Date of Expiry | License/ Permit Holder | Remarks |
|-------------------------------------|-----------------------|-------------------|-------------------------|------------------------|--|
| Environmental Permit | EP-354/2009/D | 13 March 2015 | Throughout the Contract | HyD | Application for VEP on 3 March 2015 to supersede EP-354/2009/C |
| Construction Dust Notification | 363510 | 19 August 2013 | Throughout the Contract | DBJV | Northern Landfall |
| Construction Dust Notification | 403620 | 10 June 2016 | Throughout the Contract | DBJV | Southern Landfall |
| Chemical Waste Registration | 5213-422-D2516-01 | 10 September 2013 | Throughout the Contract | DBJV | Northern Landfall |
| Chemical Waste Registration | 5213-951-D2591-01 | 25 May 2016 | Throughout the Contract | DBJV | Southern Landfall |
| Construction Waste Disposal Account | 7018108 | 28 August 2013 | Throughout the Contract | DBJV | Waste disposal in Contract HY/2012/08 |
| Waste Water Discharge License | WT00017707-2013 | 18 November 2013 | 30 November 2018 | DBJV | For works in site WA18 |
| Waste Water Discharge License | WT00019248-2014 | 5 June 2014 | 30 June 2019 | DBJV | For site Portion N6 and Reclamation Area E |
| Marine Dumping Permit | EP/MD/17-036 | 7 June 2016 | 6 July 2016 | DBJV | Southern Landfall |
| Marine Dumping Permit | EP/MD/17-070 | 7 August 2016 | 6 September 2016 | DBJV | Southern Landfall |
| Construction Noise Permit | GW-RW0180-16 | 9 April 2016 | 30 September 2016 | DBJV | For Urmston Road in front of Pillar Point |
| Construction Noise Permit | GW-RW0450-16 | 27 July 2016 | 19 January 2017 | DBJV | For Urmston Road in front of Pillar Point |
| Construction Noise Permit | GW-RW0334-16 | 14 June 2016 | 13 December 2016 | DBJV | For site WA23A+B |
| Construction Noise Permit | GW-RW0143-16 | 29 March 2016 | 28 September 2016 | DBJV | For Portion N6 |
| Construction Noise Permit | GW-RS0324-16 | 18 April 2016 | 17 October 2016 | DBJV | For excavation works at Southern Landfall |
| Construction Noise Permit | GW-RS0860-16 | 25 August 2016 | 24 February 2017 | DBJV | For Southern Landfall |

Notes:
 HyD = Highways Department
 DBJV = Dragages - Bouygues Joint Venture
 VEP = Variation of Environmental Permit

2.7 IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

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

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

2.8 SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT

For air quality impact monitoring, a total of thirty-one monitoring events were undertaken in which no Action Level or Limit Level exceedances for 1-hr TSP; no Action Level exceedances or Limit Level exceedances for 24-hr TSP were recorded in this reporting quarter (*Table 2.13*).

Table 2.13 *Summary of Exceedances for Air Quality Impact Monitoring in this Reporting Quarter*

| Station | Exceedance Level | Date of Exceedances | | Number of Exceedances | |
|--|------------------|---------------------|-----------|-----------------------|-----------|
| | | 1-hr TSP | 24-hr TSP | 1-hr TSP | 24-hr TSP |
| AQMS1 | Action Level | - | - | 0 | 0 |
| | Limit Level | - | - | 0 | 0 |
| ASR1 | Action Level | - | - | 0 | 0 |
| | Limit Level | - | - | 0 | 0 |
| ASR5 | Action Level | - | - | 0 | 0 |
| | Limit Level | - | - | 0 | 0 |
| ASR6 | Action Level | - | - | 0 | 0 |
| | Limit Level | - | - | 0 | 0 |
| ASR10 | Action Level | - | - | 0 | 0 |
| | Limit Level | - | - | 0 | 0 |
| Total number of Action level Exceedances: | | | | 0 | 0 |
| Total number of Limit level Exceedances: | | | | 0 | 0 |

One (1) Limit Level exceedance was observed for the quarterly dolphin monitoring data between June and August 2016, whilst no unacceptable impact from the construction activities of the TM-CLKL Northern Connection Sub-sea Tunnel Section on Chinese White Dolphins was noticeable from general observations.

Cumulative statistics are provided in *Appendix I*.

2.9 SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

The Environmental Complaint Handling Procedure is provided in *Figure 2.3*.

Two environmental complaints regarding muddy water discharge near the Pier at 33 Ho Yeung Street, Tuen Mun at Northern Landfall and marine litter

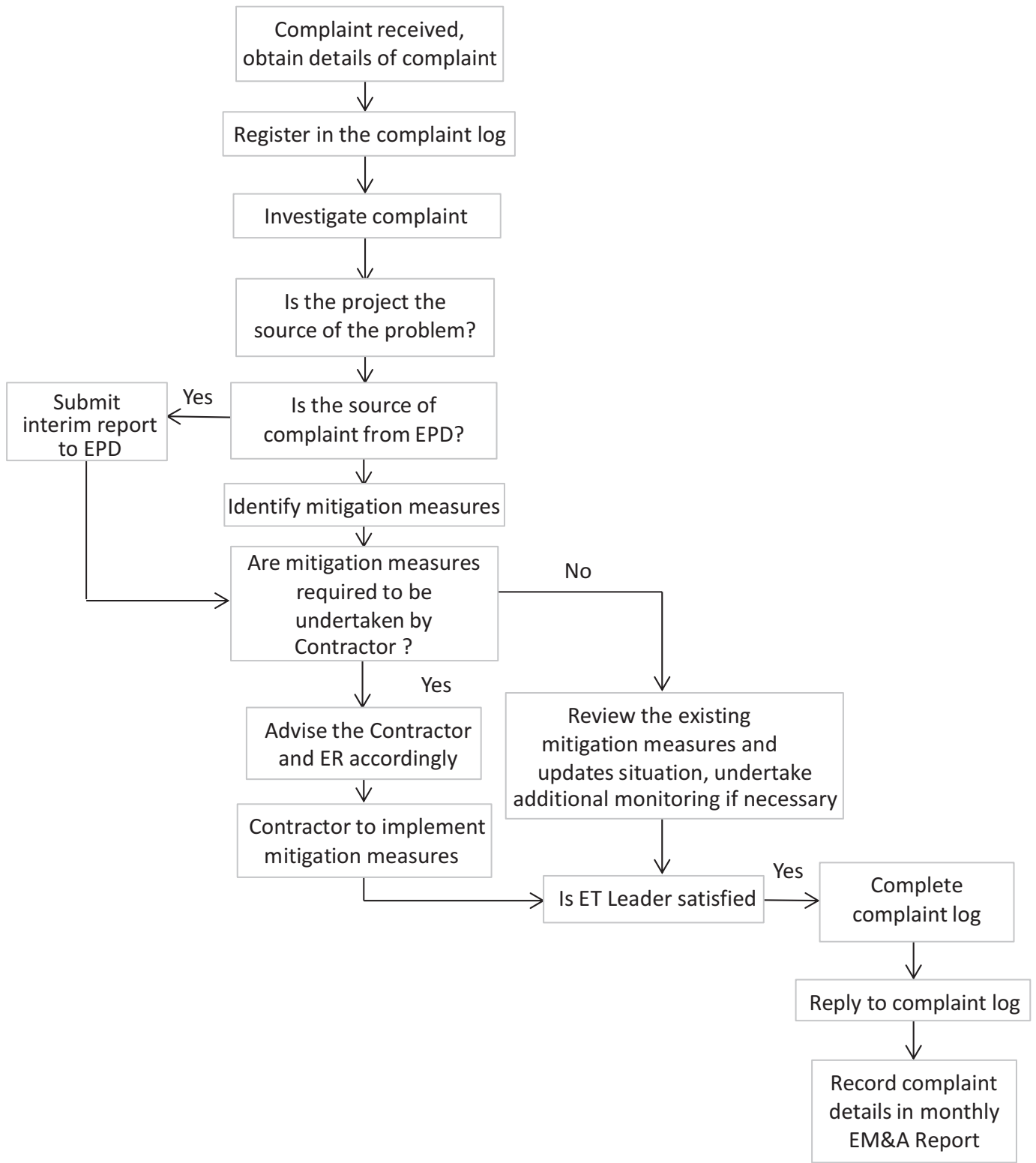


Figure 2.3

Environmental Complaint Handling Procedure

disposal near Tuen Mun Ferry Pier were received from EPD on 6 July 2016 and from ENPO on 16 July 2016 respectively. Upon investigation, the complaints were considered not related to this Project.

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

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

3 FUTURE KEY ISSUES

3.1 CONSTRUCTION ACTIVITIES FOR THE COMING QUARTER

As informed by the Contractor, the major works for the Project in the coming quarter are summarized in *Table 3.1*.

Table 3.1 Construction Works to Be Undertaken in the Coming Quarter

| Works to be undertaken |
|---|
| <i>Land-based Works</i> |
| <ul style="list-style-type: none">• Box Culvert Extension at Works Area – Portion N-A;• Preparation of Phase 2 Reclamation – Portion N-A;• Shaft Structure and Backfilling – Portion N-C;• Construction of Cross Passage Tympanum – TBM tunnel;• Cross Passage Lining Installation – TBM Tunnel;• Corbel Construction – TBM Tunnel;• Excavation of Sub-sea Tunnel – TBM tunnel;• Sub-sea Tunnel Gallery Installation – TBM tunnel;• Deep Band Drain Installation – Portion S-A;• Dewatering Deep well Installation – Portion S-A; and• Jet Grouting, CSM Ground Treatment and Diaphragm Wall Construction – Portion S-A |

3.2 KEY ISSUES FOR THE COMING QUARTER

As informed by the Contractor, Phase I Reclamation works for the Northern Landfall was substantially completed in December 2014, a proposal letter was sent to EPD on 21 May 2015 to seek approval for the temporary suspension of Water Quality Monitoring. Subsequently, a letter from EPD on 5 June 2015 stated that they have no strong objection to the temporary suspension of the water quality monitoring. Water Quality Monitoring was suspended from 6 June 2015 effectively and will resume when Phase II Reclamation commences in the fourth quarter of 2016 tentatively.

Potential environmental impacts arising from the above upcoming construction activities in the coming quarterly period are expected to be mainly associated with dust, marine ecology and waste management issues.

3.3 MONITORING SCHEDULE FOR THE COMING QUARTER

Impact monitoring for air quality and marine ecology (include dolphin monitoring) are scheduled to continue for the next reporting period.

The monitoring programme has been reviewed and was considered as adequate to cater for the nature of works in progress. Change to the monitoring programme was thus not considered to be necessary at this stage.

The monitoring programme will be evaluated as appropriate in the next reporting period.

This Eleventh Quarterly EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 June 2016 to 31 August 2016, in accordance with the Updated EM&A Manual and the requirements of *EP-354/2009/D*.

Air quality (including 1-hour TSP and 24-hour TSP) and dolphin monitoring were carried out in the reporting period. No Action or Limit Level exceedances for 1-hr TSP were recorded. No Action or Limit Level exceedances for 24-hr TSP were recorded.

A total of 10 groups of 34 Chinese White Dolphins sightings were recorded during the six sets of surveys in this reporting quarter. Seven of the ten dolphin sightings were made during on-effort search, and all seven on-effort dolphin sightings were made on primary lines. Whilst one limit level exceedance was recorded for the quarterly dolphin monitoring data between June and August 2016, no unacceptable impact from the construction activities of the TM-CLKL Northern Connection Sub-sea Tunnel Section on Chinese White Dolphins was noticeable from general observations. Although the dolphins infrequently occurred along the alignment of TM-CLKL Northern Connection Sub-Sea Tunnel Section in the past and during the baseline monitoring period, it is apparent that dolphin usage has been significantly reduced in NEL. It is critical to monitor the dolphin usage in North Lantau region in the upcoming quarters, to determine whether the dolphins are continuously affected by the various construction activities in relation to the construction works of the Contract, and whether suitable mitigation measure can be applied to improve the situation.

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

Two environmental complaints regarding muddy water discharge near the Pier at 33 Ho Yeung Street, Tuen Mun at Northern Landfall and marine litter disposal near Tuen Mun Ferry Pier were received from EPD on 6 July 2016 and from ENPO on 16 July 2016 respectively. Upon investigation, the complaints were considered not related to this Project.

No notification of summons or successful prosecution recorded in the reporting period. The monitoring programme has been reviewed and was considered as adequate to cater for the nature of works in progress. Change to the monitoring programme was thus not recommended at this stage. The monitoring programme will be evaluated as appropriate in the next reporting period. The ET will keep track on the construction works to confirm compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

Appendix A

Project Organization for Environmental Works



↔ Line of Communication

Appendix B

Construction Programme

| Activity Name | Orig Dur | DWPF Start | DWPF Finish | % Comp | 2016 | | | | | | | |
|---|----------|------------|-------------|--------|------|-----|-----|-----|-----|-----|-----|-----|
| | | | | | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec |
| TMCLK - Northern Connection Sub-Sea Tunnel Section | | | | | | | | | | | | |
| Contract Dates | | | | | | | | | | | | |
| Site Possession Date | | | | | | | | | | | | |
| Portions: X1, (N10,11,13 & 14) - Sth Landfall | 0 | 06-Aug-15 | | 0% | | | | | | | | |
| Handover Date | | | | | | | | | | | | |
| Portions: N8A, N8B(above +3), N8C | 0 | | 03-Dec-15 | 0% | | | | | | | | |
| General Submissions | | | | | | | | | | | | |
| Environmental | | | | | | | | | | | | |
| Environmental Permit Submissions | | | | | | | | | | | | |
| Supplementary WMP of C&C Tunnel at Sth.Landfall | | | | | | | | | | | | |
| Supplementary WMP of C&C Tunnel at Sth.Landfall | 0 | | 28-Jun-14 | 0% | | | | | | | | |
| Sediment Quality Report/Dumping Permit | | | | | | | | | | | | |
| Southern Landfall | | | | | | | | | | | | |
| Southern landfall - Commencement of Shaft & C&C Tunnel Dwall | 0 | 03-Oct-15 | | 0% | | | | | | | | |
| Sediment Sampling & Testing Plan (SSTP) - if required | | | | | | | | | | | | |
| Complete SSTP and Obtain EPD's approval | 24 | 17-Feb-15 | 23-Mar-15 | 50% | | | | | | | | |
| Sediment Quality Report (SQR) - if required | | | | | | | | | | | | |
| Advance Ground Investigation works for Sediment sampling | 24 | 24-Mar-15 | 24-Apr-15 | 90% | | | | | | | | |
| Sediment Sample Testing & Report preparation | 120 | 25-Apr-15 | 16-Sep-15 | 0% | | | | | | | | |
| Dumping Permit for Load Dumping (Loading Permit) - if required | | | | | | | | | | | | |
| Finalize the application document and submit to EPD - for Dwall | 24 | 20-Jan-15 | 16-Feb-15 | 0% | | | | | | | | |
| Notify the results and issue Loading Permit for Local & Cross Boundary Crossing - for Dwall | 24 | 17-Feb-15 | 23-Mar-15 | 0% | | | | | | | | |
| General Design Submissions | | | | | | | | | | | | |
| (G6) IFA for Tunnel GBP | | | | | | | | | | | | |
| SO's Review | 35 | 29-Apr-14 | 02-Jun-14 | 94% | | | | | | | | |
| SO Approval with Condition Received | 0 | | 03-Jun-14 | 0% | | | | | | | | |
| PAYMENT MILESTONE | | | | | | | | | | | | |
| Design and Design Checking of the Works | | | | | | | | | | | | |
| MS 2.20.3 Approve DDA for Cross Passages by the Supervising Officer by the Supervising Officer | 0 | | 31-Mar-15 | 100% | | | | | | | | |
| MS 2.32 Approve DDA for Approach Ramp Structures to Cut-and-cover Tunnels by the Supervising Officer | 0 | | 30-Apr-15 | 0% | | | | | | | | |
| MS 2.44 Approve DDA for South Ventilation Building by the Supervising Officer | 0 | | 30-Jun-15 | 0% | | | | | | | | |
| MS 2.48 Approve DDA for North Ventilation Building by the Supervising Officer | 0 | | 31-Jan-15 | 0% | | | | | | | | |
| MS 2.51 Submit DDA for Facilities Provision for TCSS | 0 | | 29-Nov-14 | 0% | | | | | | | | |
| MS 2.52 Approve DDA for Facilities Provision for TCSS by the Supervising Officer | 0 | | 28-Feb-15 | 0% | | | | | | | | |
| MS 2.56 Approve DDA for Drainage, Sewerage, Waterworks and Utilities at Southern Landfall by the Supervi | 0 | | 30-Apr-15 | 0% | | | | | | | | |
| MS 2.60 Approve DDA for Drainage, Sewerage, Waterworks and Utilities at Northern Landfall by the Supervi | 0 | | 31-Dec-14 | 0% | | | | | | | | |
| MS 2.69 Submit draft Operation and Maintenance Manual for all Tunnels and Cross Passgaes | 0 | | 29-Feb-16 | 0% | | | | | | | | |
| MS 2.70 Accept Operation and Maintenance Manual for all Tunnels and Cross Passgaes by the Supervising | 0 | | 30-Jun-16 | 0% | | | | | | | | |
| MS 2.71 Submit draft Operation and Maintenance Manual for all works except Tunnels and Cross Passgaes | 0 | | 29-Feb-16 | 0% | | | | | | | | |
| MS 2.72 Accept Operation and Maintenance Manual for all works except Tunnels and Cross Passgaes by the | 0 | | 30-Jun-16 | 0% | | | | | | | | |
| TBM Tunnel | | | | | | | | | | | | |
| MS 3.3.4 Complete walls of retrieval shaft | 0 | | 30-Jan-16 | 100% | | | | | | | | |
| MS 3.3.7 Completion of excavation, support and permanent lining for 1% of the total length (measured on pla | 0 | | 31-Dec-15 | 100% | | | | | | | | |
| MS 3.3.8 Completion of excavation, support and permanent lining for 2% of the total length (measured on pla | 0 | | 31-Dec-15 | 100% | | | | | | | | |
| MS 3.3.9 Completion of excavation, support and permanent lining for 3% of the total length (measured on pla | 0 | | 31-Dec-15 | 100% | | | | | | | | |
| MS 3.3.10 Completion of excavation, support and permanent lining for 4% of the total length (measured on pl | 0 | | 30-Jan-16 | 100% | | | | | | | | |
| MS 3.3.11 Completion of excavation, support and permanent lining for 5% of the total length (measured on pl | 0 | | 30-Jan-16 | 100% | | | | | | | | |
| MS 3.3.12 Completion of excavation, support and permanent lining for 6% of the total length (measured on pl | 0 | | 30-Jan-16 | 100% | | | | | | | | |
| MS 3.3.13 Completion of excavation, support and permanent lining for 7% of the total length (measured on pl | 0 | | 30-Jan-16 | 100% | | | | | | | | |
| MS 3.3.14 Completion of excavation, support and permanent lining for 8% of the total length (measured on pl | 0 | | 29-Feb-16 | 100% | | | | | | | | |
| MS 3.3.15 Completion of excavation, support and permanent lining for 9% of the total length (measured on pl | 0 | | 29-Feb-16 | 100% | | | | | | | | |
| MS 3.3.16 Completion of excavation, support and permanent lining for 10% of the total length (measured on p | 0 | | 29-Feb-16 | 100% | | | | | | | | |
| MS 3.3.17 Completion of excavation, support and permanent lining for 11% of the total length (measured on p | 0 | | 29-Feb-16 | 100% | | | | | | | | |
| MS 3.3.18 Completion of excavation, support and permanent lining for 12% of the total length (measured on p | 0 | | 31-Mar-16 | 100% | | | | | | | | |
| MS 3.3.19 Completion of excavation, support and permanent lining for 13% of the total length (measured on p | 0 | | 31-Mar-16 | 0% | | | | | | | | |
| MS 3.3.20 Completion of excavation, support and permanent lining for 14% of the total length (measured on p | 0 | | 31-Mar-16 | 0% | | | | | | | | |
| MS 3.3.21 Completion of excavation, support and permanent lining for 15% of the total length (measured on p | 0 | | 31-Mar-16 | 0% | | | | | | | | |
| MS 3.3.22 Completion of excavation, support and permanent lining for 16% of the total length (measured on p | 0 | | 31-Mar-16 | 0% | | | | | | | | |
| MS 3.3.23 Completion of excavation, support and permanent lining for 17% of the total length (measured on p | 0 | | 30-Apr-16 | 0% | | | | | | | | |
| MS 3.3.24 Completion of excavation, support and permanent lining for 18% of the total length (measured on p | 0 | | 30-Apr-16 | 0% | | | | | | | | |
| MS 3.3.25 Completion of excavation, support and permanent lining for 19% of the total length (measured on p | 0 | | 30-Apr-16 | 0% | | | | | | | | |
| MS 3.3.26 Completion of excavation, support and permanent lining for 20% of the total length (measured on p | 0 | | 30-Apr-16 | 0% | | | | | | | | |
| MS 3.3.27 Completion of excavation, support and permanent lining for 21% of the total length (measured on p | 0 | | 30-Apr-16 | 0% | | | | | | | | |
| MS 3.3.28 Completion of excavation, support and permanent lining for 22% of the total length (measured on p | 0 | | 30-Apr-16 | 0% | | | | | | | | |
| MS 3.3.29 Completion of excavation, support and permanent lining for 23% of the total length (measured on p | 0 | | 30-Apr-16 | 0% | | | | | | | | |
| MS 3.3.30 Completion of excavation, support and permanent lining for 24% of the total length (measured on p | 0 | | 31-May-16 | 0% | | | | | | | | |
| MS 3.3.31 Completion of excavation, support and permanent lining for 25% of the total length (measured on | 0 | | 31-May-16 | 0% | | | | | | | | |
| MS 3.3.32 Completion of excavation, support and permanent lining for 27.5% of the total length (measured on | 0 | | 31-May-16 | 0% | | | | | | | | |
| MS 3.3.33 Completion of excavation, support and permanent lining for 30% of the total length (measured on p | 0 | | 31-May-16 | 0% | | | | | | | | |
| MS 3.3.34 Completion of excavation, support and permanent lining for 32.5% of the total length (measured on | 0 | | 30-Jun-16 | 0% | | | | | | | | |
| MS 3.3.35 Completion of excavation, support and permanent lining for 35% of the total length (measured on p | 0 | | 30-Jun-16 | 0% | | | | | | | | |
| MS 3.3.36 Completion of excavation, support and permanent lining for 37.5% of the total length (measured on | 0 | | 30-Jun-16 | 0% | | | | | | | | |
| MS 3.3.37 Completion of excavation, support and permanent lining for 40% of the total length (measured on p | 0 | | 30-Jul-16 | 0% | | | | | | | | |
| MS 3.3.38 Completion of excavation, support and permanent lining for 42.5% of the total length (measured on | 0 | | 30-Jul-16 | 0% | | | | | | | | |
| MS 3.3.39 Completion of excavation, support and permanent lining for 45% of the total length (measured on p | 0 | | 30-Jul-16 | 0% | | | | | | | | |
| MS 3.3.40 Completion of excavation, support and permanent lining for 47.5% of the total length (measured on | 0 | | 30-Jul-16 | 0% | | | | | | | | |
| MS 3.3.41 Completion of excavation, support and permanent lining for 50% of the total length (measured on p | 0 | | 31-Aug-16 | 0% | | | | | | | | |
| MS 3.3.42 Completion of excavation, support and permanent lining for 52.5% of the total length (measured on | 0 | | 31-Aug-16 | 0% | | | | | | | | |
| MS 3.3.43 Completion of excavation, support and permanent lining for 55% of the total length (measured on p | 0 | | 31-Aug-16 | 0% | | | | | | | | |
| MS 3.3.44 Completion of excavation, support and permanent lining for 57.5% of the total length (measured on | 0 | | 31-Aug-16 | 0% | | | | | | | | |
| MS 3.3.45 Completion of excavation, support and permanent lining for 60% of the total length (measured on p | 0 | | 31-Aug-16 | 0% | | | | | | | | |
| MS 3.3.46 Completion of excavation, support and permanent lining for 62.5% of the total length (measured on | 0 | | 30-Sep-16 | 0% | | | | | | | | |

- Planned Bar
- Planned Bar - Critical
- ◆ Planned Milestone
- Progress bar
- ◆ Progress Milestone

TMCLK - Northern Connection Sub-Sea Tunnel Section
Detailed Works Programme (Rev. F)
Three Months Rolling Programme
Progress as of 31-Aug-16



| Date | Revision | Checked | Approved |
|-----------|-----------------------------|---------|----------|
| 12-Feb-14 | TMCLKDBJGEN-PRG08507 | WYu | SPo |
| 08-Apr-14 | TMCLKDBJGEN-PRG08507 Rev. B | SPa | WYu |
| 28-Aug-14 | TMCLKDBJGEN-PRG08507 Rev. C | CLa | WYu |
| 30-Oct-15 | TMCLKDBJGEN-PRG08507 Rev. F | WYu | |

| Activity Name | Orig Dur | DWPF Start | DWPF Finish | % Comp | 2016 | | | | | | | | | | | |
|---|----------|------------|-------------|--------|------|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|
| | | | | | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | | | |
| MS 5.1.8 Complete retaining wall foundation for 30% of the total length (measured on plan) of approach ramp structure | 0 | | 30-Nov-15 | 0% | | | | | | | | | | | | |
| MS 5.1.9 Complete retaining wall foundation for 40% of the total length (measured on plan) of approach ramp structure | 0 | | 31-Dec-15 | 0% | | | | | | | | | | | | |
| MS 5.1.10 Complete retaining wall foundation for 50% of the total length (measured on plan) of approach ramp structure | 0 | | 31-Dec-15 | 0% | | | | | | | | | | | | |
| MS 5.1.11 Complete retaining wall foundation for 60% of the total length (measured on plan) of approach ramp structure | 0 | | 30-Jan-16 | 0% | | | | | | | | | | | | |
| MS 5.1.12 Complete retaining wall foundation for 70% of the total length (measured on plan) of approach ramp structure | 0 | | 30-Jan-16 | 0% | | | | | | | | | | | | |
| MS 5.1.13 Complete retaining wall foundation for 80% of the total length (measured on plan) of approach ramp structure | 0 | | 29-Feb-16 | 0% | | | | | | | | | | | | |
| MS 5.1.14 Complete retaining wall foundation for 90% of the total length (measured on plan) of approach ramp structure | 0 | | 29-Feb-16 | 0% | | | | | | | | | | | | |
| MS 5.1.15 Complete retaining wall foundation for 100% of the total length (measured on plan) of approach ramp structure | 0 | | 31-Mar-16 | 0% | | | | | | | | | | | | |
| South Ventilation Buildings | | | | | | | | | | | | | | | | |
| MS 7.1.1 Complete 100% of cofferdam for excavation | 0 | | 30-Sep-16 | 0% | | | | | | | | | | | | ◆ MS 7.1.1 Complete 100% of cofferdam for excavation |
| MS 7.1.2 Complete 100% of excavation to the formation level | 0 | | 30-Sep-16 | 0% | | | | | | | | | | | | ◆ MS 7.1.2 Complete 100% of excavation to the formation level |
| MS 7.1.3 Complete 100% of foundation for the ventilation building | 0 | | 30-Apr-16 | 0% | | | | | | | | | | | | ◆ MS 7.1.3 Complete 100% of foundation for the ventilation building |
| MS 7.1.4 Complete concreting works of 25% area of the total construction floor area for the ventilation building | 0 | | 31-Oct-16 | 0% | | | | | | | | | | | | ◆ MS 7.1.4 Complete concreting works of 25% area of the total construction floor area for the ventilation building |
| North Ventilation Buildings | | | | | | | | | | | | | | | | |
| MS 7.2.1 Complete 100% of cofferdam for excavation | 0 | | 31-May-16 | 0% | | | | | | | | | | | | ◆ MS 7.2.1 Complete 100% of cofferdam for excavation |
| MS 7.2.2 Complete 100% of excavation to the formation level | 0 | | 31-May-16 | 0% | | | | | | | | | | | | ◆ MS 7.2.2 Complete 100% of excavation to the formation level |
| MS 7.2.4 Complete concreting works of 25% area of the total construction floor area for the ventilation building | 0 | | 30-Jul-16 | 0% | | | | | | | | | | | | ◆ MS 7.2.4 Complete concreting works of 25% area of the total construction floor area for the ventilation building |
| MS 7.2.5 Complete concreting works of 50% area of the total construction floor area for the ventilation building | 0 | | 31-Oct-16 | 0% | | | | | | | | | | | | ◆ MS 7.2.5 Complete concreting works of 50% area of the total construction floor area for the ventilation building |
| Facilities Provision for E&M Works for TBM Tunnel, Cut & Cover Tunnels and Cross Passages | | | | | | | | | | | | | | | | |
| MS 9.1.1 Complete 25% of bonding terminal, opening and accessories, etc. | 0 | | 30-Sep-16 | 0% | | | | | | | | | | | | ◆ MS 9.1.1 Complete 25% of bonding terminal, opening and accessories, etc. |
| MS 9.1.2 Complete 25% of plinth, hoisting facilities and accessories, etc. | 0 | | 30-Sep-16 | 0% | | | | | | | | | | | | ◆ MS 9.1.2 Complete 25% of plinth, hoisting facilities and accessories, etc. |

| Construction | | | | | |
|--|-----|-----------|-----------|------|---|
| Northern Landfall | | | | | |
| North Reclamation (Phase 1) | | | | | |
| Construction | | | | | |
| Zone B | | | | | |
| Reclamation | | | | | |
| Surcharge Removal - Zone B - (CH598 to 698) stage 1 | 10 | 28-Jul-16 | 08-Aug-16 | 0% | Surcharge Removal - Zone B - (CH598 to 698) stage 1 |
| Surcharge Period - Zone B - (CH648 to 698) stage 2 | 180 | 09-Aug-16 | 04-Feb-17 | 0% | |
| Box Culvert Extension | | | | | |
| Construction | | | | | |
| Ch000-010 Culvert Outfall | | | | | |
| Installation of temporary bulk head | 26 | 10-Aug-15 | 08-Sep-15 | 100% | |
| Removal of public fill at outfall area | 4 | 09-Sep-15 | 12-Sep-15 | 100% | |
| Cut sheet pile wall below water level by diver | 18 | 14-Sep-15 | 06-Oct-15 | 100% | |
| Removal of temporary seawall block | 3 | 07-Oct-15 | 09-Oct-15 | 100% | |
| Preparation & pour blinding concrete base of box culvert outfall | 8 | 10-Oct-15 | 19-Oct-15 | 100% | |
| Install precast culvert element by barge (5 nos.) | 21 | 20-Oct-15 | 13-Nov-15 | 100% | |
| Concreting in-situ Top Slab and stitch joint | 12 | 14-Nov-15 | 27-Nov-15 | 0% | |
| Removal of temporary bulk head | 18 | 28-Nov-15 | 18-Dec-15 | 0% | |
| CH000-150 Land Section | | | | | |
| ELS & Structure | | | | | |
| Pile A43/A41 CJ to Pile A41/A39 CJ | | | | | |
| Box Culvert Structure | | | | | |
| Pile cap construction | 10 | 27-May-15 | 06-Jun-15 | 100% | |
| Base slab construction including kicker | 6 | 19-Jun-15 | 26-Jun-15 | 100% | |
| Removal of strut S1 | 4 | 27-Jun-15 | 02-Jul-15 | 100% | |
| System formworks delivery & setup | 14 | 03-Jul-15 | 18-Jul-15 | 100% | |
| Walls & top slab construction | 6 | 20-Jul-15 | 25-Jul-15 | 100% | |
| Removal of strut S2 & Backfilling up to required level | 6 | 03-Aug-15 | 08-Aug-15 | 0% | |
| Pile A45/A43 CJ to Pile A43/A41 CJ | | | | | |
| Box Culvert Structure | | | | | |
| Pile cap construction | 10 | 08-Jun-15 | 18-Jun-15 | 100% | |
| Base slab construction including kicker | 6 | 27-Jun-15 | 04-Jul-15 | 100% | |
| Removal of strut S1 | 4 | 06-Jul-15 | 09-Jul-15 | 100% | |
| Walls & top slab construction | 6 | 27-Jul-15 | 01-Aug-15 | 100% | |
| Removal of strut S2 & Backfilling up to required level | 6 | 10-Aug-15 | 15-Aug-15 | 0% | |
| Pile A47/A45 CJ to Pile A45/A43 CJ | | | | | |
| Box Culvert Structure | | | | | |
| Pile cap construction | 10 | 19-Jun-15 | 02-Jul-15 | 100% | |
| Base slab construction including kicker | 6 | 06-Jul-15 | 11-Jul-15 | 100% | |
| Removal of strut S1 | 4 | 13-Jul-15 | 16-Jul-15 | 100% | |
| Walls & top slab construction | 6 | 03-Aug-15 | 08-Aug-15 | 100% | |
| Removal of strut S2 & Backfilling up to required level | 6 | 17-Aug-15 | 22-Aug-15 | 100% | |
| Pile A49/A47 CJ to Pile A47/A45 CJ | | | | | |
| Box Culvert Structure | | | | | |
| Pile cap construction | 10 | 03-Jul-15 | 14-Jul-15 | 100% | |
| Base slab construction including kicker | 6 | 15-Jul-15 | 21-Jul-15 | 100% | |
| Removal of strut S1 | 4 | 22-Jul-15 | 25-Jul-15 | 100% | |
| Walls & top slab construction | 6 | 10-Aug-15 | 15-Aug-15 | 100% | |
| Removal of strut S2 & Backfilling up to required level | 6 | 24-Aug-15 | 29-Aug-15 | 100% | |
| Pile A52/A49 CJ to Pile A49/A47 CJ | | | | | |
| Box Culvert Structure | | | | | |
| Removal of strut S1 | 4 | 10-Aug-15 | 13-Aug-15 | 100% | |
| Walls & top slab construction | 6 | 17-Aug-15 | 22-Aug-15 | 100% | |
| Removal of strut S2 & Backfilling up to required level | 6 | 31-Aug-15 | 05-Sep-15 | 100% | |
| Preparation for Temp Access Road for N8 handvoer | 24 | 07-Sep-15 | 06-Oct-15 | 100% | |
| Ch150-250 Marine Section | | | | | |
| ELS & Structure | | | | | |
| Dewatering well installation Ch180-250 | 12 | 19-Jun-15 | 04-Jul-15 | 100% | |
| Dewatering well installation Ch100-180 | 12 | 06-Jul-15 | 18-Jul-15 | 100% | |
| 1st Pumping test | 18 | 20-Jul-15 | 08-Aug-15 | 100% | |
| Toe grouting Ch100-250 | 95 | 07-Sep-15 | 31-Dec-15 | 94% | |

- Planned Bar
- Planned Bar - Critical
- ◆ Planned Milestone
- Progress bar
- ◆ Progress Milestone

TMCLK - Northern Connection Sub-Sea Tunnel Section
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 Progress as of 31-Aug-16



| Date | Revision | Checked | Approved |
|-----------|-----------------------------|---------|----------|
| 12-Feb-14 | TMCLKDBJGEN-PRG08507 | WYu | SPo |
| 08-Apr-14 | TMCLKDBJGEN-PRG08507 Rev. B | SPa | WYu |
| 28-Aug-14 | TMCLKDBJGEN-PRG08507 Rev. C | CLA | WYu |
| 30-Oct-15 | TMCLKDBJGEN-PRG08507 Rev. F | WYu | |

| Activity Name | Orig Dur | DWPF Start | DWPF Finish | % Comp | 2016 | | | | | | | | | | | |
|--|----------|------------|-------------|--------|------|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|
| | | | | | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | | | |
| 2nd Pumping test Ch100-250 | 29 | 02-Jan-16 | 04-Feb-16 | 0% | | | | | | | | | | | | |
| Pile A41/A39 CJ to Pile A39/A37 CJ | | | | | | | | | | | | | | | | |
| ELS | | | | | | | | | | | | | | | | |
| Excavation to 0.5m below strut S2 | 4 | 05-Feb-16 | 16-Feb-16 | 0% | | | | | | | | | | | | |
| Installation of strut S2 | 6 | 17-Feb-16 | 23-Feb-16 | 0% | | | | | | | | | | | | |
| Excavation to 0.5m below strut S1 | 5 | 24-Feb-16 | 29-Feb-16 | 0% | | | | | | | | | | | | |
| Installation of strut S1 | 5 | 01-Mar-16 | 05-Mar-16 | 0% | | | | | | | | | | | | |
| Excavation to FEL | 5 | 07-Mar-16 | 11-Mar-16 | 0% | | | | | | | | | | | | |
| Box Culvert Structure | | | | | | | | | | | | | | | | |
| Pile cap construction | 10 | 18-Mar-16 | 01-Apr-16 | 0% | | | | | | | | | | | | |
| Sliding formworks 1st assembly | 18 | 27-Apr-16 | 19-May-16 | 0% | | | | | | | | | | | | |
| Walls & top slab construction | 6 | 20-May-16 | 26-May-16 | 0% | | | | | | | | | | | | |
| Removal of strut S2 & Backfilling up to required level | 6 | 03-Jun-16 | 10-Jun-16 | 0% | | | | | | | | | | | | |
| Pile A39/A37 CJ to Pile A37/A35 CJ | | | | | | | | | | | | | | | | |
| ELS | | | | | | | | | | | | | | | | |
| Excavation to 0.5m below strut S2 | 4 | 17-Feb-16 | 20-Feb-16 | 0% | | | | | | | | | | | | |
| Installation of strut S2 | 6 | 22-Feb-16 | 27-Feb-16 | 0% | | | | | | | | | | | | |
| Excavation to 0.5m below strut S1 | 5 | 01-Mar-16 | 05-Mar-16 | 0% | | | | | | | | | | | | |
| Installation of strut S1 | 5 | 07-Mar-16 | 11-Mar-16 | 0% | | | | | | | | | | | | |
| Excavation to FEL | 5 | 12-Mar-16 | 17-Mar-16 | 0% | | | | | | | | | | | | |
| Box Culvert Structure | | | | | | | | | | | | | | | | |
| Removal of strut S1 | 4 | 29-Apr-16 | 04-May-16 | 0% | | | | | | | | | | | | |
| Walls & top slab construction | 6 | 27-May-16 | 02-Jun-16 | 0% | | | | | | | | | | | | |
| Removal of strut S2 & Backfilling up to required level | 6 | 11-Jun-16 | 17-Jun-16 | 0% | | | | | | | | | | | | |
| Pile A37/A35 CJ to Pile A35/A33 CJ | | | | | | | | | | | | | | | | |
| ELS | | | | | | | | | | | | | | | | |
| Excavation to 0.5m below strut S2 | 4 | 22-Feb-16 | 25-Feb-16 | 0% | | | | | | | | | | | | |
| Installation of strut S2 | 6 | 26-Feb-16 | 03-Mar-16 | 0% | | | | | | | | | | | | |
| Excavation to 0.5m below strut S1 | 5 | 07-Mar-16 | 11-Mar-16 | 0% | | | | | | | | | | | | |
| Installation of strut S1 | 5 | 12-Mar-16 | 17-Mar-16 | 0% | | | | | | | | | | | | |
| Excavation to FEL | 5 | 18-Mar-16 | 23-Mar-16 | 0% | | | | | | | | | | | | |
| Box Culvert Structure | | | | | | | | | | | | | | | | |
| Base slab construction including kicker | 6 | 29-Apr-16 | 06-May-16 | 0% | | | | | | | | | | | | |
| Removal of strut S1 | 4 | 07-May-16 | 11-May-16 | 0% | | | | | | | | | | | | |
| Walls & top slab construction | 6 | 03-Jun-16 | 10-Jun-16 | 0% | | | | | | | | | | | | |
| Removal of strut S2 & Backfilling up to required level | 6 | 18-Jun-16 | 24-Jun-16 | 0% | | | | | | | | | | | | |
| Pile A35/A33 CJ to Pile A33/P117 CJ | | | | | | | | | | | | | | | | |
| ELS | | | | | | | | | | | | | | | | |
| Excavation to 0.5m below strut S2 | 4 | 26-Feb-16 | 01-Mar-16 | 0% | | | | | | | | | | | | |
| Installation of strut S2 | 6 | 02-Mar-16 | 08-Mar-16 | 0% | | | | | | | | | | | | |
| Excavation to 0.5m below strut S1 | 5 | 12-Mar-16 | 17-Mar-16 | 0% | | | | | | | | | | | | |
| Installation of strut S1 | 5 | 18-Mar-16 | 23-Mar-16 | 0% | | | | | | | | | | | | |
| Excavation to FEL | 5 | 24-Mar-16 | 01-Apr-16 | 0% | | | | | | | | | | | | |
| Box Culvert Structure | | | | | | | | | | | | | | | | |
| Pile cap construction | 10 | 27-Apr-16 | 09-May-16 | 0% | | | | | | | | | | | | |
| Base slab construction including kicker | 6 | 10-May-16 | 17-May-16 | 0% | | | | | | | | | | | | |
| Removal of strut S1 | 4 | 18-May-16 | 21-May-16 | 0% | | | | | | | | | | | | |
| Walls & top slab construction | 6 | 11-Jun-16 | 17-Jun-16 | 0% | | | | | | | | | | | | |
| Removal of strut S2 & Backfilling up to required level | 6 | 25-Jun-16 | 02-Jul-16 | 0% | | | | | | | | | | | | |
| Pile A33/P117 CJ to Pile P113/P109 CJ | | | | | | | | | | | | | | | | |
| ELS | | | | | | | | | | | | | | | | |
| Excavation to 0.5m below strut S1 | 9 | 09-Mar-16 | 18-Mar-16 | 0% | | | | | | | | | | | | |
| Installation of strut S1 | 5 | 19-Mar-16 | 24-Mar-16 | 0% | | | | | | | | | | | | |
| Box Culvert Structure | | | | | | | | | | | | | | | | |
| Base slab construction including kicker | 6 | 18-May-16 | 24-May-16 | 0% | | | | | | | | | | | | |
| Removal of strut S1 | 4 | 25-May-16 | 28-May-16 | 0% | | | | | | | | | | | | |
| Walls & top slab construction | 6 | 18-Jun-16 | 24-Jun-16 | 0% | | | | | | | | | | | | |
| Removal of strut S2 & Backfilling up to required level | 6 | 04-Jul-16 | 09-Jul-16 | 0% | | | | | | | | | | | | |
| Pile P113/P109 CJ to Pile P105/P101 CJ | | | | | | | | | | | | | | | | |
| ELS | | | | | | | | | | | | | | | | |
| Excavation to 0.5m below strut S1 | 9 | 17-Mar-16 | 30-Mar-16 | 0% | | | | | | | | | | | | |
| Installation of strut S1 | 5 | 31-Mar-16 | 06-Apr-16 | 0% | | | | | | | | | | | | |
| Box Culvert Structure | | | | | | | | | | | | | | | | |
| Base slab construction including kicker | 6 | 25-May-16 | 31-May-16 | 0% | | | | | | | | | | | | |
| Removal of strut S1 | 4 | 01-Jun-16 | 04-Jun-16 | 0% | | | | | | | | | | | | |
| Walls & top slab construction | 6 | 25-Jun-16 | 02-Jul-16 | 0% | | | | | | | | | | | | |
| Removal of strut S2 & Backfilling up to required level | 6 | 11-Jul-16 | 16-Jul-16 | 0% | | | | | | | | | | | | |
| Pile P105/P101 CJ to Pile P97/P93 CJ | | | | | | | | | | | | | | | | |
| ELS | | | | | | | | | | | | | | | | |
| Excavation to 0.5m below strut S1 | 9 | 29-Mar-16 | 08-Apr-16 | 0% | | | | | | | | | | | | |
| Box Culvert Structure | | | | | | | | | | | | | | | | |
| Base slab construction including kicker | 6 | 01-Jun-16 | 07-Jun-16 | 0% | | | | | | | | | | | | |
| Removal of strut S1 | 4 | 08-Jun-16 | 13-Jun-16 | 0% | | | | | | | | | | | | |
| Walls & top slab construction | 6 | 04-Jul-16 | 09-Jul-16 | 0% | | | | | | | | | | | | |
| Removal of strut S2 & Backfilling up to required level | 6 | 18-Jul-16 | 23-Jul-16 | 0% | | | | | | | | | | | | |
| Pile P97/P93 CJ to Pile P89/P85 CJ | | | | | | | | | | | | | | | | |
| ELS | | | | | | | | | | | | | | | | |
| Excavation to 0.5m below strut S1 | 9 | 07-Apr-16 | 16-Apr-16 | 0% | | | | | | | | | | | | |
| Box Culvert Structure | | | | | | | | | | | | | | | | |
| Base slab construction including kicker | 6 | 08-Jun-16 | 15-Jun-16 | 0% | | | | | | | | | | | | |
| Removal of strut S1 | 4 | 16-Jun-16 | 20-Jun-16 | 0% | | | | | | | | | | | | |
| Walls & top slab construction | 6 | 11-Jul-16 | 16-Jul-16 | 0% | | | | | | | | | | | | |
| Removal of strut S2 & Backfilling up to required level | 6 | 25-Jul-16 | 30-Jul-16 | 0% | | | | | | | | | | | | |
| Pile P89/P85 CJ to Pile P81/P77 CJ | | | | | | | | | | | | | | | | |

- Planned Bar
- Planned Bar - Critical
- ◆ Planned Milestone
- Progress bar
- ◆ Progress Milestone

TMCLK - Northern Connection Sub-Sea Tunnel Section
 Detailed Works Programme (Rev. F)
 Three Months Rolling Programme
 Progress as of 31-Aug-16



| Date | Revision | Checked | Approved |
|-----------|-----------------------------|---------|----------|
| 12-Feb-14 | TMCLKDBJGEN-PRG98507 | WYu | SPo |
| 08-Apr-14 | TMCLKDBJGEN-PRG98507 Rev. B | SPa | WYu |
| 28-Aug-14 | TMCLKDBJGEN-PRG98507 Rev. C | CLa | WYu |
| 30-Oct-15 | TMCLKDBJGEN-PRG98507 Rev. F | WYu | |

| Activity Name | Orig Dur | DWPF Start | DWPF Finish | % Comp | 2016 | | | | | | | | | | | |
|---|----------|------------|-------------|--------|---|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|
| | | | | | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | | | |
| ELS | | | | | | | | | | | | | | | | |
| Excavation to 0.5m below strut S1 | 9 | 15-Apr-16 | 25-Apr-16 | 100% | Excavation to 0.5m below strut S1 | | | | | | | | | | | |
| Installation of strut S1 | 5 | 26-Apr-16 | 30-Apr-16 | 100% | Installation of strut S1 | | | | | | | | | | | |
| Excavation to FEL | 5 | 03-May-16 | 07-May-16 | 0% | Excavation to FEL | | | | | | | | | | | |
| Box Culvert Structure | | | | | | | | | | | | | | | | |
| Base slab construction including kicker | 6 | 16-Jun-16 | 22-Jun-16 | 0% | Base slab construction including kicker | | | | | | | | | | | |
| Removal of strut S1 | 4 | 23-Jun-16 | 27-Jun-16 | 0% | Removal of strut S1 | | | | | | | | | | | |
| Walls & top slab construction | 6 | 18-Jul-16 | 23-Jul-16 | 0% | Walls & top slab construction | | | | | | | | | | | |
| Removal of strut S2 & Backfilling up to required level | 6 | 01-Aug-16 | 06-Aug-16 | 0% | Removal of strut S2 & Backfilling up to required level | | | | | | | | | | | |
| Pile P81/P77 CJ to Pile P73/P69 CJ | | | | | | | | | | | | | | | | |
| ELS | | | | | | | | | | | | | | | | |
| Excavation to 0.5m below strut S1 | 9 | 23-Apr-16 | 04-May-16 | 100% | Excavation to 0.5m below strut S1 | | | | | | | | | | | |
| Installation of strut S1 | 5 | 05-May-16 | 10-May-16 | 100% | Installation of strut S1 | | | | | | | | | | | |
| Excavation to FEL | 5 | 11-May-16 | 17-May-16 | 0% | Excavation to FEL | | | | | | | | | | | |
| Box Culvert Structure | | | | | | | | | | | | | | | | |
| Base slab construction including kicker | 6 | 23-Jun-16 | 29-Jun-16 | 0% | Base slab construction including kicker | | | | | | | | | | | |
| Removal of strut S1 | 4 | 30-Jun-16 | 05-Jul-16 | 0% | Removal of strut S1 | | | | | | | | | | | |
| Walls & top slab construction | 6 | 25-Jul-16 | 30-Jul-16 | 0% | Walls & top slab construction | | | | | | | | | | | |
| Removal of strut S2 & Backfilling up to required level | 6 | 08-Aug-16 | 13-Aug-16 | 0% | Removal of strut S2 & Backfilling up to required level | | | | | | | | | | | |
| Ch250-380 Marine Section | | | | | | | | | | | | | | | | |
| Installation of Dewatering & Observation Well Ch 250-380 | 23 | 04-Nov-15 | 30-Nov-15 | 0% | Installation of Dewatering & Observation Well Ch 250-380 | | | | | | | | | | | |
| 1st Pumping Test & Analysis | 17 | 01-Dec-15 | 19-Dec-15 | 0% | 1st Pumping Test & Analysis | | | | | | | | | | | |
| Toe Grouting | 106 | 21-Dec-15 | 07-May-16 | 0% | Toe Grouting | | | | | | | | | | | |
| 2nd Pumping test & Analysis | 25 | 08-Apr-16 | 07-May-16 | 0% | 2nd Pumping test & Analysis | | | | | | | | | | | |
| Remaining toe grouting Ch250-380 | 51 | 09-May-16 | 09-Jul-16 | 0% | Remaining toe grouting Ch250-380 | | | | | | | | | | | |
| Miscellaneous works | | | | | | | | | | | | | | | | |
| Inspection Manhole (IM) | | | | | | | | | | | | | | | | |
| Inspection Manhole IM-01 to IM-04 & backfilling to +6.0mPD | 12 | 29-Sep-15 | 13-Oct-15 | 0% | Inspection Manhole IM-01 to IM-04 & backfilling to +6.0mPD | | | | | | | | | | | |
| Inspection Manhole IM-05 to IM-08 & backfilling to +6.0mPD | 18 | 15-Aug-16 | 03-Sep-16 | 0% | Inspection Manhole IM-05 to IM-08 & backfilling to +6.0mPD | | | | | | | | | | | |
| Inspection Manhole IM-09 to IM-12 & backfilling to +6.0mPD | 18 | 20-Oct-16 | 09-Nov-16 | 0% | Inspection Manhole IM-09 to IM-12 & backfilling to +6.0mPD | | | | | | | | | | | |
| Stop Log Opening (SLO) | | | | | | | | | | | | | | | | |
| SLO-01 to SLO-05 & backfilling to +6.0mPD | 24 | 14-Oct-15 | 11-Nov-15 | 0% | SLO-01 to SLO-05 & backfilling to +6.0mPD | | | | | | | | | | | |
| Balance Hole (BH) | | | | | | | | | | | | | | | | |
| BH-01 to BH-03 & backfilling to +6.0mPD | 18 | 07-Sep-15 | 26-Sep-15 | 0% | BH-01 to BH-03 & backfilling to +6.0mPD | | | | | | | | | | | |
| BH-04 to BH-06 & backfilling to +6.0mPD | 18 | 05-Sep-16 | 26-Sep-16 | 0% | BH-04 to BH-06 & backfilling to +6.0mPD | | | | | | | | | | | |
| Desilting Opening (DO) | | | | | | | | | | | | | | | | |
| DO-01 to DO-04 & backfilling to +6.0mPD | 18 | 27-Sep-16 | 19-Oct-16 | 0% | DO-01 to DO-04 & backfilling to +6.0mPD | | | | | | | | | | | |
| North Launching Shaft | | | | | | | | | | | | | | | | |
| Design Submission | | | | | | | | | | | | | | | | |
| (C1) DDA for North C&C Tunnel Permanent Structure | | | | | | | | | | | | | | | | |
| SO's Review | 35 | 24-May-14 | 27-Jun-14 | 90% | SO's Review | | | | | | | | | | | |
| SO Approval with Condition Received | 0 | | 27-Jun-14 | 0% | SO Approval with Condition Received | | | | | | | | | | | |
| (C1) DDA for North Approach Ramp Permanent Structure | | | | | | | | | | | | | | | | |
| IPs Review | 28 | 23-Oct-14 | 19-Nov-14 | 92% | IPs Review | | | | | | | | | | | |
| IP's No Objection Received | 0 | | 19-Nov-14 | 0% | IP's No Objection Received | | | | | | | | | | | |
| SO's Review | 35 | 23-Oct-14 | 26-Nov-14 | 91% | SO's Review | | | | | | | | | | | |
| SO Approval with Condition Received | 0 | | 26-Nov-14 | 0% | SO Approval with Condition Received | | | | | | | | | | | |
| North Ventilation Shaft | | | | | | | | | | | | | | | | |
| Construction | | | | | | | | | | | | | | | | |
| North Ventilation Shaft Structure | | | | | | | | | | | | | | | | |
| NVS - ML03 Tunnel Structure | 47 | 24-May-16 | 20-Jul-16 | 0% | NVS - ML03 Tunnel Structure | | | | | | | | | | | |
| NVS - ML02 Tunnel Structure | 44 | 05-Apr-16 | 27-May-16 | 22% | NVS - ML02 Tunnel Structure | | | | | | | | | | | |
| TMCLK VO-008 - Construction of Viaduct Foundations at Portion N6A | | | | | | | | | | | | | | | | |
| Viaduct Pile Cap | | | | | | | | | | | | | | | | |
| Construction | | | | | | | | | | | | | | | | |
| Pier G1c | | | | | | | | | | | | | | | | |
| Pile Cap G1c - Preparation for ELS | 6 | 24-Oct-14 | 30-Oct-14 | 0% | Pile Cap G1c - Preparation for ELS | | | | | | | | | | | |
| Pile Cap G1c - Removal of Existing ground slab | 6 | 31-Oct-14 | 06-Nov-14 | 0% | Pile Cap G1c - Removal of Existing ground slab | | | | | | | | | | | |
| Pile Cap G1c - Excavation & ELS Installation | 12 | 07-Nov-14 | 20-Nov-14 | 0% | Pile Cap G1c - Excavation & ELS Installation | | | | | | | | | | | |
| Pile Cap G1c - Blinding Concrete | 3 | 21-Nov-14 | 24-Nov-14 | 0% | Pile Cap G1c - Blinding Concrete | | | | | | | | | | | |
| Pile Cap G1c - Rebar & Concreting | 18 | 25-Nov-14 | 15-Dec-14 | 0% | Pile Cap G1c - Rebar & Concreting | | | | | | | | | | | |
| Pile Cap G1c - Backfilling & Temp Reinstatement | 6 | 16-Dec-14 | 22-Dec-14 | 0% | Pile Cap G1c - Backfilling & Temp Reinstatement | | | | | | | | | | | |
| Pier H1c | | | | | | | | | | | | | | | | |
| Pile Cap H1c - Preparation for ELS | 6 | 02-Nov-15 | 07-Nov-15 | 0% | Pile Cap H1c - Preparation for ELS | | | | | | | | | | | |
| Pile Cap H1c - Removal of Existing ground slab | 6 | 09-Nov-15 | 14-Nov-15 | 0% | Pile Cap H1c - Removal of Existing ground slab | | | | | | | | | | | |
| Pile Cap H1c - Excavation & ELS Installation | 12 | 16-Nov-15 | 28-Nov-15 | 0% | Pile Cap H1c - Excavation & ELS Installation | | | | | | | | | | | |
| North Approach TBM Tunnelling & Cross Passage | | | | | | | | | | | | | | | | |
| Construction | | | | | | | | | | | | | | | | |
| North Approach Tunnel Internal Structure - NB | | | | | | | | | | | | | | | | |
| NB - North TBM Tunnel - Invert Backfilling (Ch6688 to 6560 - 128m) Stage 1 | 54 | 01-Apr-16 | 26-May-16 | 100% | NB - North TBM Tunnel - Invert Backfilling (Ch6688 to 6560 - 128m) Stage 1 | | | | | | | | | | | |
| NB - North TBM Tunnel - Invert Precast Gallery Installation (Ch6870 to 6688 - 182m) | 77 | 29-Dec-15 | 18-Mar-16 | 100% | NB - North TBM Tunnel - Invert Precast Gallery Installation (Ch6870 to 6688 - 182m) | | | | | | | | | | | |
| NB - North TBM Tunnel - Invert Precast Gallery Installation (Ch6688 to 6560 - 128m) | 54 | 13-Apr-16 | 07-Jun-16 | 100% | NB - North TBM Tunnel - Invert Precast Gallery Installation (Ch6688 to 6560 - 128m) | | | | | | | | | | | |
| NB - North TBM Tunnel - Invert Backfilling (Ch6688 to 6560 - 128m) Stage 2 | 54 | 28-Apr-16 | 23-Jun-16 | 100% | NB - North TBM Tunnel - Invert Backfilling (Ch6688 to 6560 - 128m) Stage 2 | | | | | | | | | | | |
| CP55 - Excavation & Lining completion | 0 | | 14-Jun-16 | 0% | CP55 - Excavation & Lining completion | | | | | | | | | | | |
| CP54 - Excavation & Lining completion | 0 | | 31-Aug-16 | 0% | CP54 - Excavation & Lining completion | | | | | | | | | | | |
| CP52 - Excavation & Lining completion | 0 | | 22-Apr-16 | 100% | CP52 - Excavation & Lining completion | | | | | | | | | | | |
| CP50 - Excavation & Lining completion | 0 | | 26-Jul-16 | 0% | CP50 - Excavation & Lining completion | | | | | | | | | | | |
| NB - North TBM Tunnel - Corbel & Cable Trough installation | 42 | 31-Aug-16 | 22-Oct-16 | 0% | NB - North TBM Tunnel - Corbel & Cable Trough installation | | | | | | | | | | | |
| NB - North TBM Tunnel - OHVD Slab installation | 42 | 07-Sep-16 | 29-Oct-16 | 0% | NB - North TBM Tunnel - OHVD Slab installation | | | | | | | | | | | |
| NB - North TBM Tunnel - Fire proofing and Provision to E&MS and TCSS Contract for KD1 | 42 | 14-Sep-16 | 05-Nov-16 | 0% | NB - North TBM Tunnel - Fire proofing and Provision to E&MS and TCSS Contract for KD1 | | | | | | | | | | | |
| North Approach Tunnel Internal Structure - SB | | | | | | | | | | | | | | | | |
| SB - North TBM Tunnel - Invert Backfilling (Ch6688 to 6560 - 128m) | 54 | 21-Mar-16 | 18-May-16 | 100% | SB - North TBM Tunnel - Invert Backfilling (Ch6688 to 6560 - 128m) | | | | | | | | | | | |
| SB - North TBM Tunnel - Corbel & Cable Trough installation | 42 | 22-Oct-16 | 10-Dec-16 | 0% | SB - North TBM Tunnel - Corbel & Cable Trough installation | | | | | | | | | | | |
| SB - North TBM Tunnel - OHVD Slab installation | 42 | 29-Oct-16 | 17-Dec-16 | 0% | SB - North TBM Tunnel - OHVD Slab installation | | | | | | | | | | | |

Legend:

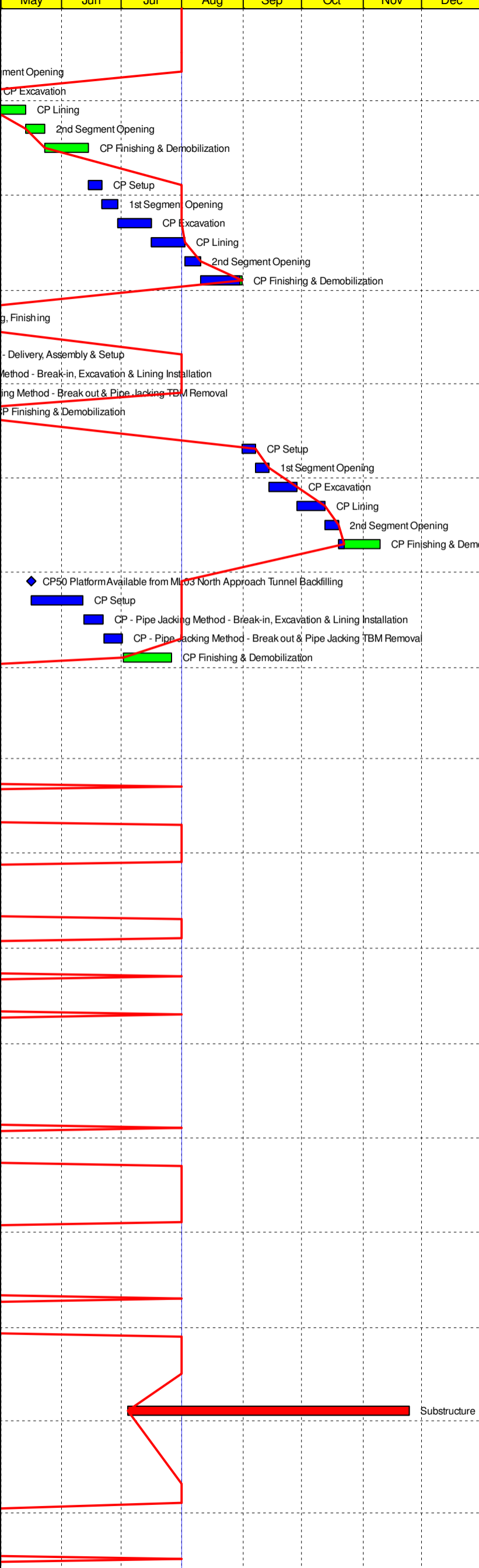
- Planned Bar
- Planned Bar - Critical
- Planned Milestone
- Progress bar
- Progress Milestone



| Date | Revision | Checked | Approved |
|-----------|-----------------------------|---------|----------|
| 12-Feb-14 | TMCLKDBJGEN-PRG98507 | WYu | SPo |
| 08-Apr-14 | TMCLKDBJGEN-PRG98507 Rev. B | SPa | WYu |
| 28-Aug-14 | TMCLKDBJGEN-PRG98507 Rev. C | CLA | WYu |
| 30-Oct-15 | TMCLKDBJGEN-PRG98507 Rev. F | WYu | |

| North Approach Cross Passage | | | | |
|---|----|-----------|-----------|------|
| CP55 - Traditional Method | | | | |
| CP Setup | 6 | 21-Mar-16 | 31-Mar-16 | 100% |
| 1st Segment Opening | 7 | 31-Mar-16 | 09-Apr-16 | 100% |
| CP Excavation | 14 | 09-Apr-16 | 26-Apr-16 | 88% |
| CP Lining | 14 | 26-Apr-16 | 13-May-16 | 0% |
| 2nd Segment Opening | 7 | 13-May-16 | 23-May-16 | 0% |
| CP Finishing & Demobilization | 18 | 23-May-16 | 14-Jun-16 | 0% |
| CP54 - Traditional Method | | | | |
| CP Setup | 6 | 14-Jun-16 | 21-Jun-16 | 100% |
| 1st Segment Opening | 7 | 21-Jun-16 | 29-Jun-16 | 100% |
| CP Excavation | 14 | 29-Jun-16 | 16-Jul-16 | 100% |
| CP Lining | 14 | 16-Jul-16 | 02-Aug-16 | 100% |
| 2nd Segment Opening | 7 | 02-Aug-16 | 10-Aug-16 | 100% |
| CP Finishing & Demobilization | 18 | 10-Aug-16 | 31-Aug-16 | 100% |
| CP53 - Pipe Jacking Method | | | | |
| CP - Waterproofing, Finishing | 21 | 20-Feb-16 | 16-Mar-16 | 40% |
| CP52 - Pipe Jacking Method | | | | |
| CP - Pipe Jacking TBM - Delivery, Assembly & Setup | 23 | 01-Feb-16 | 05-Mar-16 | 100% |
| CP - Pipe Jacking Method - Break-in, Excavation & Lining Installation | 9 | 05-Mar-16 | 14-Mar-16 | 100% |
| CP - Pipe Jacking Method - Break out & Pipe Jacking TBM Removal | 10 | 14-Mar-16 | 24-Mar-16 | 100% |
| CP Finishing & Demobilization | 21 | 24-Mar-16 | 22-Apr-16 | 0% |
| CP51 - Traditional Method | | | | |
| CP Setup | 6 | 31-Aug-16 | 07-Sep-16 | 100% |
| 1st Segment Opening | 7 | 07-Sep-16 | 14-Sep-16 | 100% |
| CP Excavation | 14 | 14-Sep-16 | 28-Sep-16 | 100% |
| CP Lining | 14 | 28-Sep-16 | 12-Oct-16 | 100% |
| 2nd Segment Opening | 7 | 12-Oct-16 | 19-Oct-16 | 100% |
| CP Finishing & Demobilization | 18 | 19-Oct-16 | 09-Nov-16 | 20% |
| CP50 - Pipe Jacking Method | | | | |
| CP50 Platform Available from ML03 North Approach Tunnel Backfilling | 0 | 16-May-16 | | 100% |
| CP Setup | 23 | 16-May-16 | 11-Jun-16 | 100% |
| CP - Pipe Jacking Method - Break-in, Excavation & Lining Installation | 9 | 12-Jun-16 | 21-Jun-16 | 100% |
| CP - Pipe Jacking Method - Break out & Pipe Jacking TBM Removal | 10 | 22-Jun-16 | 01-Jul-16 | 100% |
| CP Finishing & Demobilization | 21 | 02-Jul-16 | 26-Jul-16 | 0% |

| North Ventilation Building | | | | |
|---|-----|-----------|-----------|------|
| Design Submission | | | | |
| (A11) Submissions to Design Advisory Panel of ArchSD | | | | |
| ArchSD's comment | 30 | 10-Jun-14 | 09-Jul-14 | 93% |
| (I1) DDA for North Vent.Bldgs. GBP & Arch.Submission | | | | |
| IPs Review | 28 | 21-Aug-14 | 17-Sep-14 | 92% |
| IP's No Objection Received | 0 | | 17-Sep-14 | 0% |
| SO's Review | 35 | 21-Aug-14 | 24-Sep-14 | 94% |
| SO Approval with Condition Received | 0 | | 24-Sep-14 | 0% |
| (I1) DDA for North & South Vent.Bldg. ABWF works | | | | |
| Preparation of DDANorth & South ABWF | 18 | 25-Sep-14 | 17-Oct-14 | 100% |
| Review & Comment by JV | 24 | 18-Oct-14 | 14-Nov-14 | 91% |
| Designer prepare DDA | 15 | 15-Nov-14 | 02-Dec-14 | 0% |
| Formal Submission of DDA to ICE/ IPs | 0 | | 02-Dec-14 | 0% |
| Advanced Submission to SO | 0 | | 02-Dec-14 | 0% |
| IPs/ SO's Advance Comments/ ICE Comments | 28 | 03-Dec-14 | 30-Dec-14 | 0% |
| Comments Received | 0 | | 30-Dec-14 | 0% |
| Designer to Reply RIC + Update Submission | 21 | 31-Dec-14 | 24-Jan-15 | 0% |
| Submit Updated DDA to SO/ ICE/ IPs | 0 | 26-Jan-15 | | 0% |
| ICE Approval & Issue Check Cert | 18 | 26-Jan-15 | 14-Feb-15 | 0% |
| IPs Review | 28 | 26-Jan-15 | 22-Feb-15 | 0% |
| SO's Review | 35 | 26-Jan-15 | 01-Mar-15 | 0% |
| (I2) DDA for North Vent.Bldgs.Structural Design incl.Vent.Connections | | | | |
| IPs Review | 28 | 24-Dec-14 | 20-Jan-15 | 92% |
| IP's No Objection Received | 0 | | 20-Jan-15 | 0% |
| SO's Review | 35 | 24-Dec-14 | 27-Jan-15 | 92% |
| SO Approval with Condition Received | 0 | | 27-Jan-15 | 0% |
| (I3) DDA for North & South Vent.Bldgs. Service and E&M Provision | | | | |
| Designer to Reply RIC + Update Submission | 21 | 18-Dec-14 | 14-Jan-15 | 100% |
| Submit Updated DDA to SO/ ICE/ IPs | 0 | 15-Jan-15 | | 100% |
| ICE Approval & Issue Check Cert | 12 | 15-Jan-15 | 28-Jan-15 | 0% |
| Submit ICE Check Cert to SO | 6 | 29-Jan-15 | 04-Feb-15 | 0% |
| IPs Review | 28 | 15-Jan-15 | 11-Feb-15 | 92% |
| IP's No Objection Received | 0 | | 11-Feb-15 | 0% |
| SO's Review | 35 | 15-Jan-15 | 18-Feb-15 | 91% |
| SO Approval with Condition Received | 0 | | 18-Feb-15 | 0% |
| (C3) DDA for North Vent Shaft & Duct Permanent Structure | | | | |
| ICE Approval & Issue Check Cert | 12 | 22-Nov-14 | 05-Dec-14 | 100% |
| Construction | | | | |
| Substructure | 120 | 04-Jul-16 | 24-Nov-16 | 0% |
| North Surface Roadworks, Utility & Drainage works | | | | |
| Design Submission | | | | |
| (A20) DDA for Traffic Sign, Road Marking, Street Furnitures, Sign Gantry & etc | | | | |
| SO's Review | 35 | 11-Dec-14 | 14-Jan-15 | 100% |
| SO Approval with Condition Received | 0 | | 14-Jan-15 | 100% |
| (C2) DDA for Sewerage, Drainage, Waterworks & Utility works for North Landfall | | | | |
| IPs Review | 28 | 08-Nov-14 | 05-Dec-14 | 92% |
| IP's No Objection Received | 0 | | 05-Dec-14 | 0% |



- Planned Bar
- Planned Bar - Critical
- ◆ Planned Milestone
- Progress bar
- ◆ Progress Milestone

TMCLK - Northern Connection Sub-Sea Tunnel Section
 Detailed Works Programme (Rev. F)
 Three Months Rolling Programme
 Progress as of 31-Aug-16



| Date | Revision | Checked | Approved |
|-----------|-----------------------------|---------|----------|
| 12-Feb-14 | TMCLKDBJGEN-PRG08507 | WYu | SPo |
| 08-Apr-14 | TMCLKDBJGEN-PRG08507 Rev. B | SPa | WYu |
| 28-Aug-14 | TMCLKDBJGEN-PRG08507 Rev. C | CLA | WYu |
| 30-Oct-15 | TMCLKDBJGEN-PRG08507 Rev. F | WYu | |

| Activity Name | Orig Dur | DWPF Start | DWPF Finish | % Comp | 2016 | | | | | | | | | | | |
|---|----------|------------|-------------|--------|------|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|
| | | | | | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | | | |
| SO's Review | 35 | 08-Nov-14 | 12-Dec-14 | 94% | | | | | | | | | | | | |
| SO Approval with Condition Received | 0 | | 12-Dec-14 | 0% | | | | | | | | | | | | |
| Sub-sea Tunnel | | | | | | | | | | | | | | | | |
| Sub-sea TBM Tunnelling | | | | | | | | | | | | | | | | |
| Major Procurement | | | | | | | | | | | | | | | | |
| Precast Segment ID12.40 - Production for Sub-sea TBM Tunnel | | | | | | | | | | | | | | | | |
| ID12.40 TBM Segment Ring Fabrication - 12 rings per day | 300 | 22-Nov-14 | 19-Dec-15 | 67% | | | | | | | | | | | | |
| Design Submission | | | | | | | | | | | | | | | | |
| (B6) Risk Assessment of Submarine Cable - Tunnelling Works | | | | | | | | | | | | | | | | |
| CLP Review (4 weeks) | 28 | 17-Mar-15 | 13-Apr-15 | 100% | | | | | | | | | | | | |
| CLP Comment Received | 0 | | 13-Apr-15 | 100% | | | | | | | | | | | | |
| SO's Condition Approval | 35 | 12-Mar-15 | 15-Apr-15 | 100% | | | | | | | | | | | | |
| (G1) DDA for TBM Tunnel Lining Structural Design - Sub-sea tunnel | | | | | | | | | | | | | | | | |
| Sub-sea TBM Tunnel Segment - Fabrication | 265 | 06-Oct-14 | 29-Aug-15 | 75% | | | | | | | | | | | | |
| (G3) DDA for TBM Tunnel Internal Structures (Sub-sea) | | | | | | | | | | | | | | | | |
| Sub-sea Tunnel - Precast Gallery Fabrication | 244 | 22-Jan-15 | 21-Nov-15 | 42% | | | | | | | | | | | | |
| Construction | | | | | | | | | | | | | | | | |
| Sub-sea TBM Tunnel - NB ID12.2m - S881 | | | | | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6522 to 6500 - 22m) | 5 | 01-Apr-16 | 06-Apr-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6500 to 6430 - 70m) | 15 | 06-Apr-16 | 21-Apr-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6430 to 6350 - 80m) | 17 | 21-Apr-16 | 08-May-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6350 to 6300 - 50m) | 10 | 08-May-16 | 19-May-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch6300 to 6260 - 40m) | 5 | 19-May-16 | 24-May-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - CDG with Saturation (Ch6260 to 6240 - 20m) | 2 | 24-May-16 | 26-May-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6240 to 6175 - 65m) | 11 | 26-May-16 | 06-Jun-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch6175 to 6135 - 40m) | 5 | 06-Jun-16 | 11-Jun-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - CDG with Saturation (Ch6135 to 6100 - 35m) | 3 | 11-Jun-16 | 14-Jun-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6100 to 6050 - 50m) | 9 | 14-Jun-16 | 24-Jun-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch6050 to 6010 - 40m) | 5 | 24-Jun-16 | 29-Jun-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - CDG with Saturation (Ch6010 to 5830 - 180m) | 14 | 29-Jun-16 | 13-Jul-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch5830 to 5810 - 20m) | 2 | 13-Jul-16 | 16-Jul-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Transition with Saturation (Ch5810 to 5740 - 70m) | 12 | 16-Jul-16 | 28-Jul-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch5740 to 5550 - 190m) | 22 | 28-Jul-16 | 20-Aug-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - CDG with Saturation (Ch5550 to 5330 - 220m) | 18 | 20-Aug-16 | 07-Sep-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - CDG with Saturation (Ch5330 to 4950 - 380m) | 30 | 07-Sep-16 | 07-Oct-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - CDG with Saturation (Ch4950 to 4870 - 80m) | 6 | 07-Oct-16 | 13-Oct-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - ALLUVIUMS silty with Trimix (Ch4870 to 4750 - 120m) | 8 | 13-Oct-16 | 21-Oct-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - ALLUVIUMS sandy with Trimix (Ch4750 to 4600 - 150m) | 10 | 21-Oct-16 | 31-Oct-16 | 0% | | | | | | | | | | | | |
| Sub-sea TBM Tunnel - SB ID12.2m - S882 | | | | | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6451 to 6371 - 80m) | 17 | 30-Jan-16 | 19-Feb-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch6321 to 6281 - 40m) | 5 | 29-Feb-16 | 05-Mar-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6121 to 6071 - 50m) | 9 | 25-Apr-16 | 04-May-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch6071 to 6031 - 40m) | 5 | 04-May-16 | 09-May-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - CDG with Saturation (Ch6031 to 5851 - 180m) | 14 | 09-May-16 | 24-May-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch5851 to 5831 - 20m) | 2 | 24-May-16 | 26-May-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Transition with Saturation (Ch5831 to 5761 - 70m) | 12 | 26-May-16 | 07-Jun-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch5761 to 5571 - 190m) | 22 | 07-Jun-16 | 30-Jun-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - CDG with Saturation (Ch5571 to 5351 - 220m) | 18 | 30-Jun-16 | 19-Jul-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - CDG with Saturation (Ch5351 to 4971 - 380m) | 30 | 19-Jul-16 | 19-Aug-16 | 43% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - CDG with Saturation (Ch4971 to 4891 - 80m) | 6 | 19-Aug-16 | 25-Aug-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - ALLUVIUMS silty with Trimix (Ch4891 to 4771 - 120) | 8 | 25-Aug-16 | 02-Sep-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - ALLUVIUMS sandy with Trimix (Ch4771 to 4621 - 150m) | 10 | 02-Sep-16 | 12-Sep-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - ALLUVIUMS sandy with Trimix (Ch4621 to 4421 - 200m) | 13 | 12-Sep-16 | 25-Sep-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - ALLUVIUMS silty with Trimix (Ch4421 to 4321 - 100m) | 6 | 25-Sep-16 | 01-Oct-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - ALLUVIUMS sandy with Trimix (Ch4321 to 4221 - 100m) | 6 | 01-Oct-16 | 07-Oct-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - ALLUVIUMS silty with Trimix (Ch4221 to 3851 - 370m) | 26 | 07-Oct-16 | 02-Nov-16 | 0% | | | | | | | | | | | | |
| Sub-sea TBM Tunnel - NB - Precast Invert Gallery | | | | | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP48 | 16 | 26-May-16 | 11-Jun-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP47 | 12 | 11-Jun-16 | 24-Jun-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP46 | 9 | 24-Jun-16 | 03-Jul-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP45 | 10 | 03-Jul-16 | 13-Jul-16 | 100% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP44 | 14 | 13-Jul-16 | 28-Jul-16 | 21% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP43 | 11 | 28-Jul-16 | 08-Aug-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP42 | 11 | 08-Aug-16 | 20-Aug-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP41 | 9 | 20-Aug-16 | 29-Aug-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP40 | 9 | 29-Aug-16 | 07-Sep-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP39 | 3 | 07-Sep-16 | 10-Sep-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP38 | 8 | 12-Sep-16 | 20-Sep-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP37 | 8 | 20-Sep-16 | 28-Sep-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP36 | 8 | 28-Sep-16 | 06-Oct-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP35 | 7 | 06-Oct-16 | 13-Oct-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP34 | 8 | 13-Oct-16 | 21-Oct-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP33 | 4 | 21-Oct-16 | 25-Oct-16 | 0% | | | | | | | | | | | | |
| NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP32 | 6 | 25-Oct-16 | 31-Oct-16 | 0% | | | | | | | | | | | | |
| Sub-sea TBM Tunnel - SB - Precast Invert Gallery | | | | | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP47 | 11 | 18-Apr-16 | 29-Apr-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP46 | 11 | 29-Apr-16 | 10-May-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP45 | 8 | 10-May-16 | 19-May-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP44 | 8 | 19-May-16 | 27-May-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP43 | 15 | 27-May-16 | 11-Jun-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP42 | 13 | 11-Jun-16 | 25-Jun-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP41 | 10 | 25-Jun-16 | 05-Jul-16 | 100% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP40 | 8 | 05-Jul-16 | 13-Jul-16 | 100% | | | | | | | | | | | | |

■ Planned Bar
■ Planned Bar - Critical
◆ Planned Milestone
■ Progress bar
◆ Progress Milestone

TMCLK - Northern Connection Sub-Sea Tunnel Section
 Detailed Works Programme (Rev. F)
 Three Months Rolling Programme
 Progress as of 31-Aug-16



| Date | Revision | Checked | Approved |
|-----------|-----------------------------|---------|----------|
| 12-Feb-14 | TMCLKDBJGEN-PRG98507 | WYu | SPo |
| 08-Apr-14 | TMCLKDBJGEN-PRG98507 Rev. B | SPa | WYu |
| 28-Aug-14 | TMCLKDBJGEN-PRG98507 Rev. C | CLa | WYu |
| 30-Oct-15 | TMCLKDBJGEN-PRG98507 Rev. F | WYu | |

| Activity Name | Orig Dur | DWPF Start | DWPF Finish | % Comp | 2016 | | | | | | | | | | | |
|---|----------|------------|-------------|--------|------|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|
| | | | | | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP39 | 9 | 13-Jul-16 | 23-Jul-16 | 89% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP38 | 7 | 23-Jul-16 | 30-Jul-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP37 | 8 | 30-Jul-16 | 07-Aug-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP36 | 8 | 07-Aug-16 | 16-Aug-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP35 | 7 | 16-Aug-16 | 23-Aug-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP34 | 7 | 23-Aug-16 | 30-Aug-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP33 | 16 | 30-Aug-16 | 15-Sep-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP32 | 6 | 15-Sep-16 | 21-Sep-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP31 | 10 | 21-Sep-16 | 01-Oct-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP30 | 7 | 01-Oct-16 | 08-Oct-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP29 | 6 | 08-Oct-16 | 14-Oct-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP28 | 11 | 14-Oct-16 | 25-Oct-16 | 0% | | | | | | | | | | | | |
| SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP27 | 6 | 25-Oct-16 | 31-Oct-16 | 0% | | | | | | | | | | | | |

Sub-sea Tunnel Cross Passage & Internal Structure

Design Submission

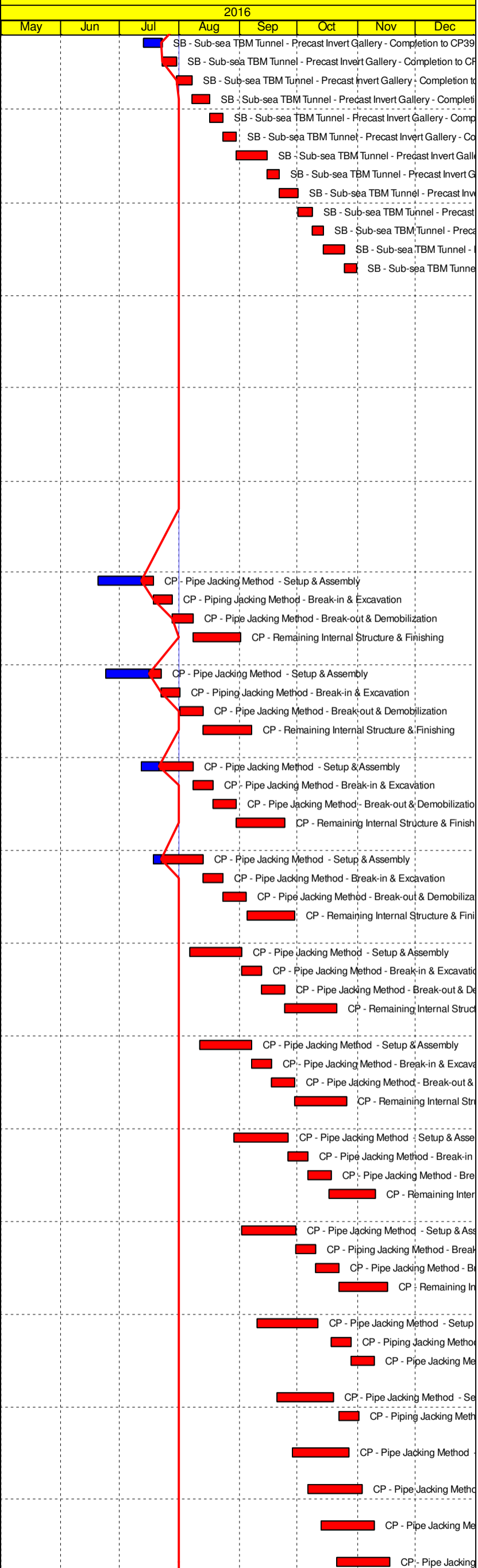
(G4) DDA for Cross Passage - Permanent works - incl. Geotechnical Assessment - Sub-sea tunnel

| | | | | |
|---|----|-----------|-----------|------|
| IPs/SO's Advance Comments/ICE Comments | 28 | 21-Dec-14 | 17-Jan-15 | 100% |
| Comments Received | 0 | | 17-Jan-15 | 100% |
| Designer to Reply RfC + Update Submission | 21 | 19-Jan-15 | 11-Feb-15 | 100% |
| Submit Updated DDA to SO/ICE/IPs | 0 | 12-Feb-15 | | 100% |
| ICE Approval & Issue Check Cert | 12 | 12-Feb-15 | 04-Mar-15 | 100% |
| Submit ICE Check Cert to SO | 6 | 05-Mar-15 | 11-Mar-15 | 100% |
| IPs Review | 28 | 12-Feb-15 | 11-Mar-15 | 100% |
| IP's No Objection Received | 0 | | 11-Mar-15 | 100% |
| SO's Review | 35 | 12-Feb-15 | 18-Mar-15 | 100% |
| SO Approval with Condition Received | 0 | | 18-Mar-15 | 100% |

Construction

Sub-sea Tunnel Cross Passage

| | | | | |
|---|----|-----------|-----------|-----|
| CP48 - ML03 - Ch6489 | | | | |
| CP - Pipe Jacking Method - Setup & Assembly | 23 | 20-Jun-16 | 18-Jul-16 | 43% |
| CP - Piping Jacking Method - Break-in & Excavation | 10 | 18-Jul-16 | 28-Jul-16 | 0% |
| CP - Pipe Jacking Method - Break-out & Demobilization | 11 | 28-Jul-16 | 08-Aug-16 | 0% |
| CP - Remaining Internal Structure & Finishing | 21 | 08-Aug-16 | 01-Sep-16 | 0% |
| CP47 - ML03 - Ch6390 | | | | |
| CP - Pipe Jacking Method - Setup & Assembly | 23 | 24-Jun-16 | 22-Jul-16 | 43% |
| CP - Piping Jacking Method - Break-in & Excavation | 10 | 22-Jul-16 | 01-Aug-16 | 0% |
| CP - Pipe Jacking Method - Break-out & Demobilization | 12 | 01-Aug-16 | 13-Aug-16 | 0% |
| CP - Remaining Internal Structure & Finishing | 21 | 13-Aug-16 | 07-Sep-16 | 0% |
| CP46 - ML03 - Ch6292 | | | | |
| CP - Pipe Jacking Method - Setup & Assembly | 23 | 12-Jul-16 | 08-Aug-16 | 35% |
| CP - Pipe Jacking Method - Break-in & Excavation | 10 | 08-Aug-16 | 18-Aug-16 | 0% |
| CP - Pipe Jacking Method - Break-out & Demobilization | 12 | 18-Aug-16 | 30-Aug-16 | 0% |
| CP - Remaining Internal Structure & Finishing | 21 | 30-Aug-16 | 24-Sep-16 | 0% |
| CP45 - ML03 - Ch6193 | | | | |
| CP - Pipe Jacking Method - Setup & Assembly | 23 | 18-Jul-16 | 13-Aug-16 | 17% |
| CP - Pipe Jacking Method - Break-in & Excavation | 10 | 13-Aug-16 | 23-Aug-16 | 0% |
| CP - Pipe Jacking Method - Break-out & Demobilization | 12 | 23-Aug-16 | 04-Sep-16 | 0% |
| CP - Remaining Internal Structure & Finishing | 21 | 05-Sep-16 | 29-Sep-16 | 0% |
| CP44 - ML03 - Ch6095 | | | | |
| CP - Pipe Jacking Method - Setup & Assembly | 23 | 06-Aug-16 | 02-Sep-16 | 0% |
| CP - Pipe Jacking Method - Break-in & Excavation | 10 | 02-Sep-16 | 12-Sep-16 | 0% |
| CP - Pipe Jacking Method - Break-out & Demobilization | 12 | 12-Sep-16 | 24-Sep-16 | 0% |
| CP - Remaining Internal Structure & Finishing | 21 | 24-Sep-16 | 21-Oct-16 | 0% |
| CP43 - ML03 - Ch5996 | | | | |
| CP - Pipe Jacking Method - Setup & Assembly | 23 | 11-Aug-16 | 07-Sep-16 | 0% |
| CP - Pipe Jacking Method - Break-in & Excavation | 10 | 07-Sep-16 | 17-Sep-16 | 0% |
| CP - Pipe Jacking Method - Break-out & Demobilization | 12 | 17-Sep-16 | 29-Sep-16 | 0% |
| CP - Remaining Internal Structure & Finishing | 21 | 29-Sep-16 | 26-Oct-16 | 0% |
| CP42 - ML03 - Ch5898 | | | | |
| CP - Pipe Jacking Method - Setup & Assembly | 23 | 29-Aug-16 | 26-Sep-16 | 0% |
| CP - Pipe Jacking Method - Break-in & Excavation | 10 | 26-Sep-16 | 06-Oct-16 | 0% |
| CP - Pipe Jacking Method - Break-out & Demobilization | 12 | 06-Oct-16 | 18-Oct-16 | 0% |
| CP - Remaining Internal Structure & Finishing | 21 | 17-Oct-16 | 10-Nov-16 | 0% |
| CP41 - ML03 - Ch5800 | | | | |
| CP - Pipe Jacking Method - Setup & Assembly | 23 | 02-Sep-16 | 30-Sep-16 | 0% |
| CP - Piping Jacking Method - Break-in & Excavation | 10 | 30-Sep-16 | 10-Oct-16 | 0% |
| CP - Pipe Jacking Method - Break-out & Demobilization | 12 | 10-Oct-16 | 22-Oct-16 | 0% |
| CP - Remaining Internal Structure & Finishing | 21 | 22-Oct-16 | 16-Nov-16 | 0% |
| CP40 - ML03 - Ch5703 | | | | |
| CP - Pipe Jacking Method - Setup & Assembly | 23 | 10-Sep-16 | 11-Oct-16 | 0% |
| CP - Piping Jacking Method - Break-in & Excavation | 10 | 18-Oct-16 | 28-Oct-16 | 0% |
| CP - Pipe Jacking Method - Break-out & Demobilization | 12 | 28-Oct-16 | 09-Nov-16 | 0% |
| CP39 - ML03 - Ch5607 | | | | |
| CP - Pipe Jacking Method - Setup & Assembly | 23 | 20-Sep-16 | 19-Oct-16 | 0% |
| CP - Piping Jacking Method - Break-in & Excavation | 10 | 22-Oct-16 | 01-Nov-16 | 0% |
| CP38 - ML03 - Ch5510 | | | | |
| CP - Pipe Jacking Method - Setup & Assembly | 23 | 28-Sep-16 | 27-Oct-16 | 0% |
| CP37 - ML03 - Ch5413 | | | | |
| CP - Pipe Jacking Method - Setup & Assembly | 23 | 06-Oct-16 | 03-Nov-16 | 0% |
| CP36 - ML03 - Ch5315 | | | | |
| CP - Pipe Jacking Method - Setup & Assembly | 23 | 13-Oct-16 | 09-Nov-16 | 0% |
| CP35 - ML03 - Ch5217 | | | | |
| CP - Pipe Jacking Method - Setup & Assembly | 23 | 21-Oct-16 | 17-Nov-16 | 0% |



| | |
|--------------------------------------|------------------------|
| ■ | Planned Bar |
| ■ | Planned Bar - Critical |
| ■ | Progress bar |
| ◆ | Planned Milestone |
| ◆ | Progress Milestone |



| Date | Revision | Checked | Approved |
|-----------|-----------------------------|---------|----------|
| 12-Feb-14 | TMCLKDBJGEN-PRG08507 | WYu | SPo |
| 08-Apr-14 | TMCLKDBJGEN-PRG08507 Rev. B | SPa | WYu |
| 28-Aug-14 | TMCLKDBJGEN-PRG08507 Rev. C | CLa | WYu |
| 30-Oct-15 | TMCLKDBJGEN-PRG08507 Rev. F | WYu | |

| Activity Name | Orig Dur | DWPF Start | DWPF Finish | % Comp | 2016 | | | | | | | | | | | |
|---|----------|------------|-------------|--------|------|-----|-----|-----|-----|-----|-----|-----|--|--|--|--|
| | | | | | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | | | |
| C&C Tunnel - 5th 85m - Tunnel Structure | 83 | 19-Oct-16 | 26-Jan-17 | 0% | | | | | | | | | | | | |
| C&C Tunnel - 6th 85m - Excavation by ramp | 27 | 22-Aug-16 | 22-Sep-16 | 0% | | | | | | | | | | | | |
| C&C Tunnel - 6th 85m - Excavation by vertical mean | 52 | 23-Sep-16 | 24-Nov-16 | 0% | | | | | | | | | | | | |
| South Retrieval Shaft | | | | | | | | | | | | | | | | |
| Design Submission | | | | | | | | | | | | | | | | |
| (F4) Gantry Crane Support/Foundations in Southern Landfall | | | | | | | | | | | | | | | | |
| Preparation of IFA Gantry Crane / Foundation | 18 | 27-Jul-15 | 15-Aug-15 | 0% | | | | | | | | | | | | |
| Review & Comment by JV | 18 | 17-Aug-15 | 05-Sep-15 | 0% | | | | | | | | | | | | |
| Designer prepare IFA | 10 | 07-Sep-15 | 17-Sep-15 | 0% | | | | | | | | | | | | |
| Formal Submission of IFA to ICE/ IPs | 0 | | 17-Sep-15 | 0% | | | | | | | | | | | | |
| Advanced Submission to SO | 0 | | 17-Sep-15 | 0% | | | | | | | | | | | | |
| IPs/ SO's Advance Comments/ ICE Comments | 28 | 18-Sep-15 | 15-Oct-15 | 0% | | | | | | | | | | | | |
| Method Statement Submission | | | | | | | | | | | | | | | | |
| Method Statement of Construction Methodology of Retrieval Shaft | | | | | | | | | | | | | | | | |
| Preparation Method Statement for Retrieval Shaft | 25 | 24-Aug-15 | 21-Sep-15 | 0% | | | | | | | | | | | | |
| Submit Method Statement to SO | 0 | | 21-Sep-15 | 0% | | | | | | | | | | | | |
| SO Reviews & Comments | 28 | 22-Sep-15 | 19-Oct-15 | 0% | | | | | | | | | | | | |
| Re-submission | 18 | 20-Oct-15 | 10-Nov-15 | 0% | | | | | | | | | | | | |
| Construction | | | | | | | | | | | | | | | | |
| South Landfall GI Works/DW Setting Up | 48 | 06-Aug-15 | 02-Oct-15 | 13% | | | | | | | | | | | | |
| South Retrieval Shaft - Diaphragm Wall | 98 | 03-Oct-15 | 29-Jan-16 | 3% | | | | | | | | | | | | |
| Retrieval Shaft - Excavation - Soft (other than Fill) | 140 | 15-Apr-16 | 30-Sep-16 | 0% | | | | | | | | | | | | |
| Retrieval Shaft - Temp. Slab/Prepare for TBM Breakthrough | 48 | 03-Oct-16 | 28-Nov-16 | 0% | | | | | | | | | | | | |
| South Approach Ramp | | | | | | | | | | | | | | | | |
| Construction | | | | | | | | | | | | | | | | |
| Approach Ramp (CH1580-1850) - Pipe Pile/Sheet Piles Wall | 126 | 03-Oct-15 | 09-Mar-16 | 0% | | | | | | | | | | | | |
| Approach Ramp (CH1580-1850) - Tension Piles | 103 | 03-Oct-15 | 04-Feb-16 | 0% | | | | | | | | | | | | |
| South Ventilation Building | | | | | | | | | | | | | | | | |
| Design Submission | | | | | | | | | | | | | | | | |
| (I1) DDA for South Vent.Bldg. GBP & Arch.Submission | | | | | | | | | | | | | | | | |
| IPs Review | 28 | 22-Dec-14 | 18-Jan-15 | 88% | | | | | | | | | | | | |
| IP's No Objection Received | 0 | | 18-Jan-15 | 0% | | | | | | | | | | | | |
| SO's Review | 35 | 22-Dec-14 | 25-Jan-15 | 91% | | | | | | | | | | | | |
| SO Approval with Condition Received | 0 | | 26-Jan-15 | 0% | | | | | | | | | | | | |
| (I2) DDA for South Vent.Bldg. Foundation Design | | | | | | | | | | | | | | | | |
| Review & Comment by JV | 18 | 27-Apr-15 | 18-May-15 | 88% | | | | | | | | | | | | |
| Designer prepare DDA | 10 | 19-May-15 | 30-May-15 | 0% | | | | | | | | | | | | |
| Formal Submission of DDA to ICE/ IPs | 0 | | 30-May-15 | 0% | | | | | | | | | | | | |
| Advanced Submission to SO | 0 | | 30-May-15 | 0% | | | | | | | | | | | | |
| IPs/ SO's Advance Comments/ ICE Comments | 28 | 31-May-15 | 27-Jun-15 | 0% | | | | | | | | | | | | |
| Comments Received | 0 | | 27-Jun-15 | 0% | | | | | | | | | | | | |
| Designer to Reply RtC + Update Submission | 21 | 29-Jun-15 | 23-Jul-15 | 0% | | | | | | | | | | | | |
| Submit Updated DDA to SO/ ICE/ IPs | 0 | 24-Jul-15 | | 0% | | | | | | | | | | | | |
| ICE Approval & Issue Check Cert | 18 | 24-Jul-15 | 13-Aug-15 | 0% | | | | | | | | | | | | |
| IPs Review | 28 | 24-Jul-15 | 20-Aug-15 | 0% | | | | | | | | | | | | |
| SO's Review | 35 | 24-Jul-15 | 27-Aug-15 | 0% | | | | | | | | | | | | |
| (I2) DDA for South Vent.Bldg.Structural Design incl.Vent.Connections | | | | | | | | | | | | | | | | |
| Review & Comment by JV | 18 | 18-Feb-15 | 17-Mar-15 | 76% | | | | | | | | | | | | |
| Designer prepare DDA | 10 | 18-Mar-15 | 28-Mar-15 | 0% | | | | | | | | | | | | |
| Formal Submission of DDA to ICE/ IPs | 0 | | 28-Mar-15 | 0% | | | | | | | | | | | | |
| Advanced Submission to SO | 0 | | 28-Mar-15 | 0% | | | | | | | | | | | | |
| IPs/ SO's Advance Comments/ ICE Comments | 28 | 29-Mar-15 | 25-Apr-15 | 0% | | | | | | | | | | | | |
| Comments Received | 0 | | 25-Apr-15 | 0% | | | | | | | | | | | | |
| Designer to Reply RtC + Update Submission | 21 | 27-Apr-15 | 21-May-15 | 0% | | | | | | | | | | | | |
| Submit Updated DDA to SO/ ICE/ IPs | 0 | 22-May-15 | | 0% | | | | | | | | | | | | |
| ICE Approval & Issue Check Cert | 18 | 22-May-15 | 12-Jun-15 | 0% | | | | | | | | | | | | |
| IPs Review | 28 | 22-May-15 | 18-Jun-15 | 0% | | | | | | | | | | | | |
| SO's Review | 35 | 22-May-15 | 25-Jun-15 | 0% | | | | | | | | | | | | |
| (J1) DDA Temp.works for Construction of Sth.Vent.Bldg. | | | | | | | | | | | | | | | | |
| Designer to Reply RtC + Update Submission | 21 | 24-Aug-15 | 16-Sep-15 | 90% | | | | | | | | | | | | |
| Submit Updated DDA to SO/ ICE/ IPs | 0 | 17-Sep-15 | | 0% | | | | | | | | | | | | |
| ICE Approval & Issue Check Cert | 12 | 17-Sep-15 | 02-Oct-15 | 0% | | | | | | | | | | | | |
| Submit ICE Check Cert to SO | 6 | 03-Oct-15 | 09-Oct-15 | 0% | | | | | | | | | | | | |
| IPs Review | 28 | 17-Sep-15 | 14-Oct-15 | 0% | | | | | | | | | | | | |
| IP's No Objection Received | 0 | | 14-Oct-15 | 0% | | | | | | | | | | | | |
| SO's Review | 35 | 17-Sep-15 | 21-Oct-15 | 0% | | | | | | | | | | | | |
| SO Approval with Condition Received | 0 | | 22-Oct-15 | 0% | | | | | | | | | | | | |
| Construction | | | | | | | | | | | | | | | | |
| Mobilization & Setting Up Piling Rigs | 64 | 06-Aug-15 | 22-Oct-15 | 0% | | | | | | | | | | | | |
| S - Pile Test | 24 | 09-Apr-16 | 07-May-16 | 0% | | | | | | | | | | | | |
| S - Sheet Piling | 48 | 23-Oct-15 | 17-Dec-15 | 0% | | | | | | | | | | | | |
| S - Excavation | 100 | 09-May-16 | 05-Sep-16 | 0% | | | | | | | | | | | | |
| Substructure | 95 | 06-Sep-16 | 30-Dec-16 | 0% | | | | | | | | | | | | |
| South Surface Roadworks, Utility & Drainage works | | | | | | | | | | | | | | | | |
| Design Submission | | | | | | | | | | | | | | | | |
| (E1) AIP - Southern Landfall Seawall Modification | | | | | | | | | | | | | | | | |
| SO Review (35 Days) | 35 | 03-Mar-17 | 06-Apr-17 | 100% | | | | | | | | | | | | |
| SO Approval with Condition Received | 0 | | 06-Apr-17 | 100% | | | | | | | | | | | | |
| (E1) DDA - Southern Landfall Seawall Modification | | | | | | | | | | | | | | | | |
| Preparation of DDA Modification of Seawall at Sth Landfall | 18 | 07-Apr-17 | 02-May-17 | 100% | | | | | | | | | | | | |
| Review & Comment by JV | 18 | 04-May-17 | 24-May-17 | 100% | | | | | | | | | | | | |
| Designer prepare DDA | 10 | 25-May-17 | 06-Jun-17 | 100% | | | | | | | | | | | | |
| Formal Submission of DDA to ICE/ IPs | 0 | | 06-Jun-17 | 100% | | | | | | | | | | | | |

- Planned Bar
- Planned Bar - Critical
- ◆ Planned Milestone
- Progress bar
- ◆ Progress Milestone

TMCLK - Northern Connection Sub-Sea Tunnel Section
Detailed Works Programme (Rev. F)
Three Months Rolling Programme
Progress as of 31-Aug-16



| Date | Revision | Checked | Approved |
|-----------|-----------------------------|---------|----------|
| 12-Feb-14 | TMCLKDBJGEN-PRG08507 | WYu | SPo |
| 08-Apr-14 | TMCLKDBJGEN-PRG08507 Rev. B | SPa | WYu |
| 28-Aug-14 | TMCLKDBJGEN-PRG08507 Rev. C | CLA | WYu |
| 30-Oct-15 | TMCLKDBJGEN-PRG08507 Rev. F | WYu | |

| Activity Name | Orig Dur | DWPF Start | DWPF Finish | % Comp | 2016 | | | | | | | | | | | |
|--|----------|------------|-------------|--------|------|-----|-----|-----|-----|-----|-----|-----|--|--|--|---|
| | | | | | May | Jun | Jul | Aug | Sep | Oct | Nov | Dec | | | | |
| Advanced Submission to SO | 0 | | 06-Jun-17 | 100% | | | | | | | | | | | | |
| IPs/ SO's Advance Comments/ ICE Comments | 28 | 07-Jun-17 | 04-Jul-17 | 83% | | | | | | | | | | | | |
| Comments Received | 0 | | 04-Jul-17 | 0% | | | | | | | | | | | | |
| Designer to Reply RiC + Update Submission | 21 | 05-Jul-17 | 28-Jul-17 | 0% | | | | | | | | | | | | |
| Submit Updated DDA to SO/ ICE/ IPs | 0 | 29-Jul-17 | | 0% | | | | | | | | | | | | |
| ICE Approval & Issue Check Cert | 12 | 29-Jul-17 | 11-Aug-17 | 0% | | | | | | | | | | | | |
| Submit ICE Check Cert to SO | 6 | 12-Aug-17 | 18-Aug-17 | 0% | | | | | | | | | | | | |
| IPs Review | 28 | 29-Jul-17 | 25-Aug-17 | 0% | | | | | | | | | | | | |
| IP's No Objection Received | 0 | | 25-Aug-17 | 0% | | | | | | | | | | | | |
| SO's Review | 35 | 29-Jul-17 | 01-Sep-17 | 0% | | | | | | | | | | | | |
| SO Approval with Condition Received | 0 | | 01-Sep-17 | 0% | | | | | | | | | | | | |
| (E3) DDA for Sewerage, Drainage, Waterworks & Utility works for South Landfall | | | | | | | | | | | | | | | | |
| ICE Approval & Issue Check Cert | 12 | 05-Mar-15 | 18-Mar-15 | 100% | | | | | | | | | | | | |
| Submit ICE Check Cert to SO | 6 | 19-Mar-15 | 25-Mar-15 | 100% | | | | | | | | | | | | |
| IPs Review | 28 | 05-Mar-15 | 01-Apr-15 | 88% | | | | | | | | | | | | |
| IP's No Objection Received | 0 | | 01-Apr-15 | 0% | | | | | | | | | | | | |
| SO's Review | 35 | 05-Mar-15 | 08-Apr-15 | 91% | | | | | | | | | | | | |
| SO Approval with Condition Received | 0 | | 08-Apr-15 | 0% | | | | | | | | | | | | |
| Method Statement Submission | | | | | | | | | | | | | | | | |
| Method Statement of Ground Treatment for TBMs Passing under Southern Landfall Seawall | | | | | | | | | | | | | | | | |
| Preparation Method Statement for Ground Improvement in South Landfall | 9 | 20-Jul-15 | 29-Jul-15 | 0% | | | | | | | | | | | | |
| Submit Method Statement to SO | 0 | | 29-Jul-15 | 0% | | | | | | | | | | | | |
| SO Reviews & Comments | 28 | 30-Jul-15 | 26-Aug-15 | 0% | | | | | | | | | | | | |
| Re-submission | 6 | 27-Aug-15 | 02-Sep-15 | 0% | | | | | | | | | | | | |
| SO's Review | 28 | 03-Sep-15 | 30-Sep-15 | 0% | | | | | | | | | | | | |
| SO's Approval | 0 | | 30-Sep-15 | 0% | | | | | | | | | | | | |
| Construction | | | | | | | | | | | | | | | | |
| Temporary Platform for Ground Treatment for TBM passing under Southern Seawall | 48 | 06-Aug-15 | 02-Oct-15 | 0% | | | | | | | | | | | | |
| Grouting Treatment for TBM passing under Southern Seawall | 339 | 03-Oct-15 | 25-Nov-16 | 0% | | | | | | | | | | | | Grouting Treat |
| Testing & Commissioning/Inspection & Handover | | | | | | | | | | | | | | | | |
| Final Inspection & Handover | | | | | | | | | | | | | | | | |
| Design Submission | | | | | | | | | | | | | | | | |
| (A12) Maintenance Matrix | | | | | | | | | | | | | | | | |
| Prepare Re-submission | 18 | 12-Mar-16 | 06-Apr-16 | 88% | | | | | | | | | | | | Re-submission |
| 2nd Submission | 0 | | 06-Apr-16 | 0% | | | | | | | | | | | | mission |
| SO's Condition Approval | 35 | 07-Apr-16 | 11-May-16 | 0% | | | | | | | | | | | | SO's Condition Approval |
| (A13) Operation & Maintenance Manual | | | | | | | | | | | | | | | | |
| Preparation of Operation and Maintenance Manual | 48 | 24-Dec-15 | 27-Feb-16 | 0% | | | | | | | | | | | | and Maintenance Manual |
| 1st Submission | 0 | | 27-Feb-16 | 0% | | | | | | | | | | | | |
| SO's Comments for 1st Submission | 35 | 28-Feb-16 | 02-Apr-16 | 0% | | | | | | | | | | | | ments for 1st Submission |
| Prepare Re-submission | 24 | 05-Apr-16 | 03-May-16 | 0% | | | | | | | | | | | | Prepare Re-submission |
| 2nd Submission | 0 | | 03-May-16 | 0% | | | | | | | | | | | | 2nd Submission |
| SO's Condition Approval | 35 | 04-May-16 | 07-Jun-16 | 0% | | | | | | | | | | | | SO's Condition Approval |
| (A14) As-built & As-fabricated Drawings | | | | | | | | | | | | | | | | |
| Preparation of As-built and As-fabricated Drawings | 48 | 24-Dec-15 | 27-Feb-16 | 0% | | | | | | | | | | | | d As-fabricated Drawings |
| 1st Submission | 0 | | 27-Feb-16 | 0% | | | | | | | | | | | | |
| SO's Comments for 1st Submission | 35 | 28-Feb-16 | 02-Apr-16 | 0% | | | | | | | | | | | | ments for 1st Submission |
| Prepare Re-submission | 24 | 05-Apr-16 | 03-May-16 | 0% | | | | | | | | | | | | Prepare Re-submission |
| 2nd Submission | 0 | | 03-May-16 | 0% | | | | | | | | | | | | 2nd Submission |
| SO's Condition Approval | 35 | 04-May-16 | 07-Jun-16 | 0% | | | | | | | | | | | | SO's Condition Approval |
| (A15) Health & Safety File incl. As-built Dwgs & Records, Maintenance Schedules, O&M Manual | | | | | | | | | | | | | | | | |
| Preparation of Health and Safety File including as-built drawings and records, maintenance schedules, op | 48 | 24-Dec-15 | 27-Feb-16 | 0% | | | | | | | | | | | | Safety File including as-built drawings and records, maintenance schedules, operation and mai |
| 1st Submission | 0 | | 27-Feb-16 | 0% | | | | | | | | | | | | |
| SO's Comments for 1st Submission | 35 | 28-Feb-16 | 02-Apr-16 | 0% | | | | | | | | | | | | ments for 1st Submission |
| Prepare Re-submission | 24 | 05-Apr-16 | 03-May-16 | 0% | | | | | | | | | | | | Prepare Re-submission |
| 2nd Submission | 0 | | 03-May-16 | 0% | | | | | | | | | | | | 2nd Submission |
| SO's Condition Approval | 35 | 04-May-16 | 07-Jun-16 | 0% | | | | | | | | | | | | SO's Condition Approval |

- Planned Bar
- Planned Bar - Critical
- ◆ Planned Milestone
- Progress bar
- ◆ Progress Milestone



| Date | Revision | Checked | Approved |
|-----------|-----------------------------|---------|----------|
| 12-Feb-14 | TMCLKDBJGEN-PRG98507 | WYu | SPo |
| 08-Apr-14 | TMCLKDBJGEN-PRG98507 Rev. B | SPa | WYu |
| 28-Aug-14 | TMCLKDBJGEN-PRG98507 Rev. C | CLa | WYu |
| 30-Oct-15 | TMCLKDBJGEN-PRG98507 Rev. F | WYu | |

Appendix C

Environmental Mitigation
and Enhancement Measure
Implementation Schedules

*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|--------------------|-----------------------|---|--|----------------------|---|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| Air Quality | | | | | | | | | |
| 4.8.1 | 3.8 | An effective watering programme of twice daily watering with complete coverage, is estimated to reduce by 50%. This is recommended for all areas in order to reduce dust levels to a minimum; | All areas / throughout construction period | Contractor | TMEIA Avoid smoke impacts and disturbance | | Y | | ✓ |
| 4.8.1 | 3.8 | Watering of the construction sites in Lantau for 8 times/day and in Tuen Mun for 12 times/day to reduce dust emissions by 87.5% and 91.7% respectively and shall be undertaken. | All areas / throughout construction period | Contractor | TMEIA Avoid dust generation | | Y | | ✓ |
| 4.8.1 | 3.8 | The Contractor shall, to the satisfaction of the Engineer, install effective dust suppression measures and take such other measures as may be necessary to ensure that at the Site boundary and any nearby sensitive receiver, dust levels are kept to acceptable levels. | All areas / throughout construction period | Contractor | TMEIA Avoid dust generation | | Y | | ✓ |
| 4.8.1 | 3.8 | The Contractor shall not burn debris or other materials on the works areas. | All areas / throughout construction period | Contractor | TMEIA Avoid dust generation | | Y | | ✓ |
| 4.8.1 | 3.8 | In hot, dry or windy weather, the watering programme shall maintain all exposed road surfaces and dust sources wet. | All unpaved haul roads / throughout construction period in hot, dry or windy weather | Contractor | TMEIA Avoid smoke impacts and disturbance | | Y | | <> |
| 4.8.1 | 3.8 | Where breaking of oversize rock/concrete is required, watering shall be implemented to control dust. Water spray shall be used during the handling of fill material at the site and at active cuts, excavation and fill sites where dust is likely to be created. | All areas / throughout construction period | Contractor | TMEIA Avoid dust generation | | Y | | ✓ |
| 4.8.1 | 3.8 | Open dropping heights for excavated materials shall be controlled to a maximum height of 2m to minimise the fugitive dust arising from unloading. | All areas / throughout construction period | Contractor | TMEIA Avoid dust generation | | Y | | ✓ |
| 4.8.1 | 3.8 | During transportation by truck, materials shall not be loaded to a level higher than the side and tail boards, and shall be dampened or covered before transport. | All areas / throughout construction period | Contractor | TMEIA Avoid dust generation | | Y | | ✓ |

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

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|---------------|-----------------------|---|---|----------------------|----------------------------------|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| 4.8.1 | 3.8 | Materials having the potential to create dust shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin. The tarpaulin shall be properly secured and shall extend at least 300mm over the edges of the side and tail boards. | All areas / throughout construction period | Contractor | TMEIA Avoid dust generation | | Y | | <> |
| 4.8.1 | 3.8 | No earth, mud, debris, dust and the like shall be deposited on public roads. Wheel washing facility shall be usable prior to any earthworks excavation activity on the site. | All site exits / throughout construction period | Contractor | TMEIA Avoid dust | | Y | | ✓ |
| 4.8.1 | 3.8 | Areas of exposed soil shall be minimised to areas in which works have been completed shall be restored as soon as is | All exposed surfaces / throughout construction period | Contractor | TMEIA Avoid dust generation | | Y | | ✓ |
| 4.8.1 | 3.8 | All stockpiles of aggregate or spoil shall be enclosed or covered and water applied in dry or windy condition. | All areas / throughout construction period | Contractor | TMEIA Avoid dust generation | | Y | | <> |
| 4.11 | Section 3 | EM&A in the form of 1 hour and 24 hour dust monitoring and site audit. | All representative existing ASRs / throughout construction period | Contractor | EM&A Manual | | Y | | ✓ |

WATER QUALITY

Marine Works (Sequence A)

| | | | | | | | | | |
|-----|---------|---|--|------------|---------|--|---|--|---|
| 6.1 | Annex A | Construction of seawalls to be advanced by at least 200m before the main reclamation dredging and filling can commence. The protection by advanced seawall is a dynamic process depending on the progress of the construction activities and the stage when such protection could be realised is illustrated in Figure 6.2a and detailed in Appendix D6a. The part of the works where such measures can be undertaken for the majority of the time includes the following locations: - TM-CLKL northern reclamation; | All areas/ prior to dredging and backfilling works | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | a maximum of 50% public fill to be used for all seawall filling below +2.5mPD for TM-CLKL southern and northern landfalls. | TM-CLKL seawall filling | Contractor | TM-EIAO | | Y | | ✓ |

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

Note: Funding Agent for all mitigation measures will be the Highways Department of the Hong Kong SAR Government

*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|---------------|--|--|--|----------------------|---|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| 6.1 | - | a maximum of 30% public fill to be used for reclamation filling below +2.5mPD for TM-CLKL southern landfall | TM-CLKL southern landfall reclamation filling | Contractor | TM-EIAO | | Y | | N/A |
| 6.1 | - | a maximum of 100% public fill to be used for reclamation filling below +2.5mPD for TM-CLKL northern landfall | TM-CLKL northern landfall reclamation filling | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | Use of cage type silt curtains round allgrab dredgers during the HKBCF, HKLR and TM-CLKL southern reclamation works. | All areas dredging works | Contractor | TM-EIAO | | Y | | ✓ |
| | Figure 1.1 of Annex C | A layer of floating type silt curtain will be applied when dredging and reclamation works are being undertaken at Portion N-a as shown in Figure 1.1 of Annex C of the EM&A Manual. | All areas/ through out marine works | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | Trailer suction hopper dredgers shall not allow mud to overflow. | All areas/ throughout construction period | Contractor | Marine Fill Committee Guidelines. DASO permit conditions. | | Y | | ✓ |
| 6.1 | - | The use of Lean Material Overboard (LMOB) systems shall be prohibited. | All areas/ throughout construction period | Contractor | Marine Fill Committee Guidelines. DASO permit conditions. | | Y | | ✓ |
| 6.1 | Annex A Figure 6.2b Appendix D6b | For other parts of the reclamation works construction of seawalls to be advanced by at least 200m before the main reclamation dredging and filling can commence. It should be noted that the protection by advanced seawall is a dynamic process depending on the progress of the construction activities and the stage when such protection could be realised is illustrated in Figure 6.2b and detailed in Appendices D6b. The part of the works where such measures can be undertaken for the majority of the time includes the following locations: - TM-CLKL northern reclamation; | TM-CLKL northern landfall, Portion D of HKBCF and HKLR | Contractor | TM-EIAO | | Y | | ✓ |

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Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|-----------------------------|-----------------------|--|---|----------------------|---|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| | | - Reclamation filling for Portion D of HKBCF; Reclamation filling for FSD berth of HKBCF; and - Reclamation dredging and filling for Portion 1 of HKLR; | | | | | | | |
| 6.1 | - | The filling material for the other parts of the works are the same as Sequence A; | All other areas/backfilling works | Contractor | TM-EIAO | | Y | | N/A |
| 6.1 | 5.7 | Cage type silt curtain (with steel enclosure) shall be used for grab dredgers working in the site of HKBCF and TM- CLKL southern reclamation. Cage type silt curtains will be applied round all grab dredgers at other works area. | HKBCF, HKLR and TM-CLKL grab dredging | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | Annex A | A layer of floating type silt curtain will be applied around all works as defined in Appendix D6b. | All areas/ through out marine works | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | TM-CLKL northern landfall: - Reclamation filling shall not proceed until at least 200m section of leading seawall at both the east and west sides of the reclamation are formed above +2.5 mPD, except for 100m gaps for marine access; | All areas/ through out marine works | Contractor | TM-EIAO | | Y | | ✓ |
| <i>General Marine Works</i> | | | | | | | | | |
| 6.1 | - | Use of TMB for the construction of the submarine tunnel. | Tunnel works / Construction phase | Contractor | TM-EIAO | | Y | | N/A |
| 6.1 | - | Export dredged spoils from NWWCZ. | All areas as much as possible / dredging activities | Contractor | DASO Permit conditions | | Y | | ✓ |
| 6.1 | - | Where public fill is proposed for filling below +2.5mPD, the fine content in the public fill will be controlled to 25% | All areas/ backfilling works | Contractor | TM-EIAO | | Y | | N/A |
| 6.1 | - | Where sand fill is proposed for filling below +2.5mPD, the fine content in the sand fill will be controlled to 5%. | All areas/ backfilling works | Contractor | TM-EIAO | | Y | | N.A |
| 6.1 | - | Mechanical grabs shall be designed and maintained to avoid spillage and should seal tightly while being lifted. | All areas/ throughout construction period | Contractor | Marine Fill Committee Guidelines. DASO permit | | Y | | ✓ |

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*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|---------------|-----------------------|--|---|----------------------|---|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| | | | | | conditions. | | | | |
| 6.1 | - | Barges and hopper dredgers shall have tight fitting seals to their bottom openings to prevent leakage of material. | All areas/ throughout construction period | Contractor | Marine Fill Committee Guidelines. DASO permit conditions. | | Y | | ✓ |
| 6.1 | - | Any pipe leakages shall be repaired quickly. Plant should not be operated with leaking pipes. | All areas/ throughout construction period | Contractor | Marine Fill Committee Guidelines. DASO permit conditions. | | Y | | ✓ |
| 6.1 | - | Loading of barges and hoppers shall be controlled to prevent splashing of dredged material to the surrounding water. Barges or hoppers shall not be filled to a level which will cause overflow of materials or pollution of water during loading or transportation. | All areas/ throughout construction period | Contractor | Marine Fill Committee Guidelines. DASO permit conditions. | | Y | | ✓ |
| 6.1 | - | Excess material shall be cleaned from the decks and exposed fittings of barges and hopper dredgers before the vessel is moved. | All areas/ throughout construction period | Contractor | Marine Fill Committee Guidelines. DASO permit conditions. | | Y | | ✓ |
| 6.1 | - | Adequate freeboard shall be maintained on barges to reduce the likelihood of decks being washed by wave action; | All areas/ throughout construction period | Contractor | Marine Fill Committee Guidelines. DASO permit conditions. | | Y | | N/A |
| 6.1 | - | All vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash. | All areas/ throughout construction period | Contractor | Marine Fill Committee Guidelines. DASO permit | | Y | | N/A |

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*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|-------------------|-----------------------|--|---|----------------------|---|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| | | | | | conditions. | | | | |
| 6.1 | - | The works shall not cause foam, oil, grease, litter or other objectionable matter to be present in the water within and adjacent to the works site. | All areas/ throughout construction period | Contractor | Marine Fill Committee Guidelines. DASO permit conditions. | | Y | | ✓ |
| 6.1 | 5.2 | Silt curtain shall have proved effectiveness from the producer and shall be fully maintained throughout the works by the contractor. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | The daily maximum production rates shall not exceed those assumed in the water quality assessment. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | The dredging and filling works shall be scheduled to spread the works evenly over a working day. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| <i>Land Works</i> | | | | | | | | | |
| 6.1 | - | Wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | <> |
| 6.1 | - | Sewage effluent and discharges from on- site kitchen facilities shall be directed to Government sewer in accordance with the requirements of the WPCO or collected for disposal offsite. The use of soakaways shall be avoided. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | Storm drainage shall be directed to storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels, earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | <> |
| 6.1 | - | Silt removal facilities, channels and manholes shall be maintained and any deposited silt and grit shall be removed regularly, including specifically at the onset of and after each rainstorm. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |

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Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|---------------|-----------------------|---|---|----------------------|----------------------------------|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| 6.1 | - | Temporary access roads should be surfaced with crushed stone or gravel. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | Rainwater pumped out from trenches or foundation excavations should be discharged into storm drains via silt removal facilities. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | <> |
| 6.1 | - | Measures should be taken to prevent the washout of construction materials, soil, silt or debris into any drainage system. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | Open stockpiles of construction materials (e.g. aggregates and sand) on site should be covered with tarpaulin or similar fabric during rainstorms. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | 5.8 | Manholes (including any newly constructed ones) should always be adequately covered and temporarily sealed so as to prevent silt, construction materials or debris from getting into the drainage system, and to prevent storm run-off from getting into foul sewers. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | Discharges of surface run-off into foul sewers must always be prevented in order not to unduly overload the foul sewerage system. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | All vehicles and plant should be cleaned before they leave the construction site to ensure that no earth, mud or debris is deposited by them on roads. A wheel washing bay should be provided at every site exit. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | Wheel wash overflow shall be directed to silt removal facilities before being discharged to the storm drain. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | Section of construction road between the wheel washing bay and the public road should be surfaced with crushed stone or coarse gravel. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | Wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |

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Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|---------------------------------|-----------------------|---|--|-------------------------------|----------------------------------|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| 6.1 | - | Vehicle and plant servicing areas, vehicle wash bays and lubrication facilities shall be located under roofed areas. The drainage in these covered areas shall be connected to foul sewers via a petrol interceptor in accordance with the requirements of the WPCO or collected for off site disposal. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | N/A |
| 6.1 | - | The Contractor shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | Waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance. | All areas/ throughout construction period | Contractor | TM-EIAO Waste Disposal Ordinance | | Y | | ✓ |
| 6.1 | - | All fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | Surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system. | All areas/ throughout construction period | Contractor | TM-EIAO | | Y | | ✓ |
| 6.1 | - | Roadside gullies to trap silt and grit shall be provided prior to discharging the stormwater into the marine environment. The sumps will be maintained and cleaned at regular intervals. | Roadside/ design and operation | Design Consultant/ Contractor | TM-EIAO | Y | | Y | ✓ |
| 6.1 | Section 5 | All construction works shall be subject to routine audit to ensure implementation of all EIA recommendations and good working practice. | All areas/ throughout construction period | Contractor | EM&A Manual | | Y | | ✓ |
| <i>Water Quality Monitoring</i> | | | | | | | | | |
| 6.1 | Section 5 | Water quality monitoring shall be undertaken for suspended solids, turbidity, and dissolved oxygen. Nutrients and metal parameters shall also be measured for Mf sediment operations (only HKBCF and HKLR required handling of Mf sediment) during baseline, backfilling and post construction period. | Designated monitoring stations as defined in EM&A Manual, Section 5/ Before, through-out marine construction period, post construction and monthly operational phase water quality | Contractor | EM&A Manual | | Y | Y | ✓ |

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Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|---------------|-----------------------|---|------------------------|----------------------|----------------------------------|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| | | One year operation phase water quality monitoring at designated stations. | monitoring for a year. | | | | | | |

ECOLOGY

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*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|---------------|-----------------------|--|--|--|----------------------------------|-----------------------|---|---|---------------------------------|
| | | | | | | D | C | O | |
| 8.14 | 6.3 | Specification for and implement pre, during and post construction dolphin abundance monitoring. | All Areas/Detailed Design/ during construction works/post construction | Design Consultant/ Contractor | TMEIA | Y | Y | Y | ✓ |
| 8.14 | 6.3,6.5 | Specification and implementation of 250m dolphin exclusion zone. | All dredging and reclamation areas/Detailed Design/during all reclamation and dredging works | Design Consultant/ Contractor | TMEIA | Y | Y | | ✓ |
| 8.15 | 6.3, 6.5 | Specification and deployment of an artificial reef of an area of 3,600m2 in an area where fishing activities are prohibited. | Area of prohibited fishing activities/Detailed Design/towards end of construction period | TM-CLKL/ HKBCF Design Consultant/TM-CLKL/ HKBCF Contractor | TMEIA | Y | | Y | N/A. To be implemented by AFCD. |
| 8.14 | 6.3, 6.5 | Specification and implementation of marine vessel control specifications | All areas/Detailed Design/during construction works | Design Consultant/ Contractor | TMEIA | Y | Y | | ✓ |
| 8.14 | 6.3, 6.5 | Design and implementation of acoustic decoupling methods for dredging and reclamation works | All areas/ Detailed Design/during dredging and reclamation works | Design Consultant/ Contractor | TMEIA | Y | Y | | ✓ |
| 8.15 | 6.3, 6.4 | Pre-construction phase survey and coral translocation | Detailed Design/Prior to construction | Design Consultant/ Contractor | TMEIA | Y | Y | | ✓ |
| 8.15 | 6.5 | Audit coral translocation success | Post translocation | Contractor | TMEIA | | Y | | ✓ |
| 7.13 | 6.5 | The loss of habitat shall be supplemented by enhancement planting in accordance with the landscape mitigation schedule. | All areas / As soon as accessible | Contractor | TMEIA | | Y | | N/A. |
| 7.13 | 6.5 | Spoil heaps shall be covered at all times. | All areas / Throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 7.13 | 6.5 | Avoid damage and disturbance to the remaining and surrounding natural habitat | All areas / Throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 7.13 | 6.5 | Placement of equipment in designated areas within the existing disturbed land | All areas / Throughout construction period | Contractor | TMEIA | | Y | | ✓ |

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*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|---------------|-----------------------|---|--|----------------------|----------------------------------|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| 7.13 | 6.5 | Disturbed areas to be reinstated immediately after completion of the works. | All areas / Throughout construction period | Contractor | TMEIA | | Y | | ✓ |

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*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
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| | | | | | | D | C | O | |
| 7.13 | 6.5 | Construction activities should be restricted to the proposed works boundary. | All areas / Throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| LANDSCAPE AND VISUAL | | | | | | | | | |
| 10.9 | 7.6 | The colour and shape of the toll control buildings, ventilation building and administration building shall adopt a design which could blend it into the vicinity elements, and the details will be developed in detailed design stage (DM2) | All areas/detailed design | Design Consultant | TMEIA | Y | | | N/A |
| 10.9 | 7.6 | Aesthetic design of the viaduct, retaining wall and other structures will be developed under ACABAS submission (DM5) | All areas/detailed design | Design Consultant | TMEIA | Y | | | N/A |
| 10.9 | 7.6 | Screening of construction works by hoardings around works area in visually unobtrusive colours, to screen works (CM5) | All areas/detailed design/ during construction/ post construction | Design Consultant/ Contractor | TMEIA | Y | Y | | ✓ |
| 10.9 | 7.6 | Control night-time lighting and glare by hooding all lights (CM6) | All areas/detailed design/ during construction | Design Consultant/ Contractor | TMEIA | Y | Y | | N/A |
| 10.9 | 7.6 | Ensure no run-off into water body adjacent to the Project Area (CM7) | All areas/detailed design/ during construction | Design Consultant/ Contractor | TMEIA | Y | Y | | ✓ |
| 10.9 | 7.6 | Avoidance of excessive height and bulk of buildings and structures (CM8) | All areas/detailed design/ during construction | Design Consultant/ Contractor | TMEIA | Y | Y | | ✓ |
| 10.9 | 7.6 | Aesthetically pleasing design (visually unobtrusive and non-reflective) as regard to the form, material and finishes shall be incorporated to all buildings, engineering structures and associated infrastructure facilities (OM5) | All areas/detailed design/ during construction / during operation | Design Consultant/ Contractor | TMEIA | Y | Y | Y | N/A |
| 10.9 | 7.6 | Avoidance of excessive height and bulk of buildings and structures (OM6) | All areas/detailed design/ during construction / during operation | Design Consultant/ Contractor | TMEIA | Y | Y | Y | N/A |
| WASTE | | | | | | | | | |
| 12.6 | | The Contractor shall identify a coordinator for the management of waste. | Contract mobilisation | Contractor | TMEIA | | Y | | ✓ |

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*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|---------------|-----------------------|---|--|----------------------|---|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| 12.6 | | The Contractor shall prepare and implement a Waste Management Plan which specifies procedures such as a ticketing system, to facilitate tracking of loads and to ensure that illegal disposal of wastes does not occur, and protocols for the maintenance of records of the quantities of wastes generated, recycled and disposed. A recording system for the amount of waste generated, recycled and disposed (locations) should be established. | Contract mobilisation | Contractor | TMEIA, Works Branch Technical Circular No. 5/99 for the Trip-ticket System for Disposal of Construction and Demolition Material | | Y | | ✓ |
| 12.6 | | The Contractor shall apply for and obtain the appropriate licenses for the disposal of public fill, chemical waste and effluent discharges. | Contract mobilisation | Contractor | TMEIA, Land (Miscellaneous Provisions) Ordinance (Cap 28); Waste Disposal Ordinance (Cap 354); Dumping at Sea Ordinance (Cap 466); Water Pollution Control Ordinance. | | Y | | ✓ |
| 12.6 | 8.1 | Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedures including waste reduction, reuse and recycling. | Contract Mobilisation | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | The extent of cutting operation should be optimised where possible. Earth retaining structures and bored pile walls should be proposed to minimise the extent of cutting. | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | The surplus surcharge should be transferred to a fill bank | Reclamation areas / after surcharge works | Contractor | TMEIA | | Y | | N/A |
| 12.6 | 8.1 | Rock armour from the existing seawall should be reused on the new sloping seawall as far as possible | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | The site and surroundings shall be kept tidy and litter free. | All areas / throughout construction period | Contractor | TMEIA | | Y | | <> |

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*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|---------------|-----------------------|---|---|----------------------|----------------------------------|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| 12.6 | 8.1 | No waste shall be burnt on site. | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | Provisions to be made in contract documents to allow and promote the use of recycled aggregates where appropriate. | Detailed Design | Design Consultant | TMEIA | Y | | | ✓ |
| 12.6 | 8.1 | The Contractor shall be prohibited from disposing of C&D materials at any sensitive locations. The Contractor should propose the final disposal sites in the EMP and WMP for approval before implementation. | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | Stockpiled material shall be covered by tarpaulin and /or watered as appropriate to prevent windblown dust/ surface run off. | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | Excavated material in trucks shall be covered by tarpaulins to reduce the potential for spillage and dust generation. | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | Wheel washing facilities shall be used by all trucks leaving the site to prevent transfer of mud onto public roads. | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | Dredged marine mud shall be disposed of in a gazetted marine disposal ground under the requirements of the Dumping at Seas Ordinance. | Reclamation areas / throughout dredging works | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | Standard formwork or pre-fabrication should be used as far as practicable so as to minimise the C&D materials arising. The use of more durable formwork/plastic facing for construction works should be considered. The use of wooden hoardings should be avoided and metal hoarding should be used to facilitate recycling. Purchasing of construction materials should avoid over-ordering and wastage. | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |

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*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|---------------|-----------------------|--|--|----------------------|----------------------------------|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| 12.6 | 8.1 | The Contractor should recycle as many C&D materials (this is a waste section) as possible on-site. The public fill and C&D waste should be segregated and stored in separate containers or skips to facilitate the reuse or recycling of materials and proper disposal. Where practicable, the concrete and masonry should be crushed and used as fill materials. Steel reinforcement bar should be collected for use by scrap steel mills. Different areas of the sites should be considered for segregation and storage activities. | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | All falsework will be steel instead of wood. | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | Chemical waste producers should register with the EPD. Chemical waste should be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes as follows: f Suitable for the substance to be held, resistant to corrosion, maintained in good conditions and securely closed; f Having a capacity of <450L unless the specifications have been approved by the EPD; and f Displaying a label in English and Chinese according to the instructions prescribed in Schedule 2 of the Regulations. f Clearly labelled and used solely for the storage of chemical wastes; f Enclosed with at least 3 sides; f 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; f Adequate ventilation; | All areas / throughout construction period | Contractor | TMEIA | | Y | | <> |

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Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|---------------|-----------------------|--|------------------|----------------------|----------------------------------|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| | | f Sufficiently covered to prevent rainfall | | | | | | | |

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*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|---------------|-----------------------|--|--|----------------------|----------------------------------|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| | | entering (water collected within the bund must be tested and disposed of as chemical waste, if necessary); and f Incompatible materials are adequately separated. | | | | | | | |
| 12.6 | 8.1 | Waste oils, chemicals or solvents shall not be disposed of to drain, | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | Adequate numbers of portable toilets should be provided for on-site workers. Portable toilets should be maintained in reasonable states, which will not deter the workers from utilising them. | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | Night soil should be regularly collected by licensed collectors. | All areas / throughout construction period | Contractor | TMEIA | | Y | | N/A |
| 12.6 | 8.1 | General refuse arising on-site should be stored in enclosed bins or compaction units separately from C&D and chemical wastes. Sufficient dustbins shall be provided for storage of waste as required under the Public Cleansing and Prevention of Nuisances By-laws. In addition, general refuse shall be cleared daily and shall be disposed of to the nearest licensed landfill or refuse transfer station. Burning of refuse on construction sites is prohibited. | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | All waste containers shall be in a secure area on hardstanding; | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | Training shall be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including waste reduction, reuse and recycling. | All areas / throughout construction period | Contractor | TMEIA | | Y | | ✓ |
| 12.6 | 8.1 | Office wastes can be reduced by recycling of paper if such volume is sufficiently large to warrant collection. Participation in a local collection scheme by the Contractor should be advocated. Waste separation facilities for paper, aluminium cans, plastic bottles, etc should be provided on-site. | Site Offices/ throughout construction period | Contractor | TMEIA | | Y | | ✓ |

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

*Contract No. HY/2012/08
Tuen Mun – Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Environmental Mitigation and Enhancement Measure Implementation Schedule*

| EIA Reference | EM&A Manual Reference | Environmental Protection Measures | Location/ Timing | Implementation Agent | Relevant Standard or Requirement | Implementation Stages | | | Status * |
|--------------------------|-----------------------|--|--|----------------------|----------------------------------|-----------------------|---|---|----------|
| | | | | | | D | C | O | |
| 12.6 | Section 8 | EM&A of waste handling, storage, transportation, disposal procedures and documentation through the site audit programme shall be undertaken. | All areas / throughout construction period | Contractor | EM&A Manual | | Y | | ✓ |
| CULTURAL HERITAGE | | | | | | | | | |
| 11.8 | Section 9 | EM&A in the form of audit of the mitigation measures | All areas / throughout construction period | Highways Department | EIAO-TM | | Y | | N/A |

*** Remarks:**

- ✓ Compliance of Mitigation Measures
- <> Compliance of Mitigation but need improvement
- x Non-compliance of Mitigation Measures
- ▲ Non-compliance of Mitigation Measures but rectified by Contractor
- Δ Deficiency of Mitigation Measures but rectified by Contractor
- N/A Not Applicable in Reporting Period

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

Appendix D

Summary of Action and Limit Levels

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

| Parameters | Action | Limit |
|---|--|-------|
| 24 Hour TSP Level in $\mu\text{g}/\text{m}^3$ | ASR1 = 213 ASR5 = 238 AQMS1 = 213 ASR6 = 238 ASR10 = 214 | 260 |
| 1 Hour TSP Level in $\mu\text{g}/\text{m}^3$ | ASR1 = 331 ASR5 = 340 AQMS1 = 335 ASR6 = 338 ASR10 = 337 | 500 |

Table D2 *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 D3 *Derived Value of Action Level (AL) and Limit Level (LL)*

| | North Lantau Social Cluster | |
|--------------|--|------------------------|
| | NEL | NWL |
| Action Level | STG < 4.2 & ANI < 15.5 | STG < 6.9 & ANI < 31.3 |
| Limit Level | NEL = [STG < 2.4 & ANI < 8.9] and NWL = [STG < 3.9 & ANI < 17.9] | |

Appendix E

EM&A Monitoring Schedules

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Air Quality Impact Monitoring Schedule - June 2016**

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

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

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Air Quality Impact Monitoring Schedule - July 2016**

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

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

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Air Quality Impact Monitoring Schedule - August 2016**

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

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

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Impact Dolphin Monitoring Survey Monitoring Schedule - June 2016**

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

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Impact Dolphin Monitoring Survey Monitoring Schedule - July 2016**

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

**HY/2012/08 - Tuen Mun - Chek Lap Kok Link
Northern Connection Sub-sea Tunnel Section
Impact Dolphin Monitoring Survey Monitoring Schedule - August 2016**

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

Appendix F

Impact Air Quality Monitoring Results

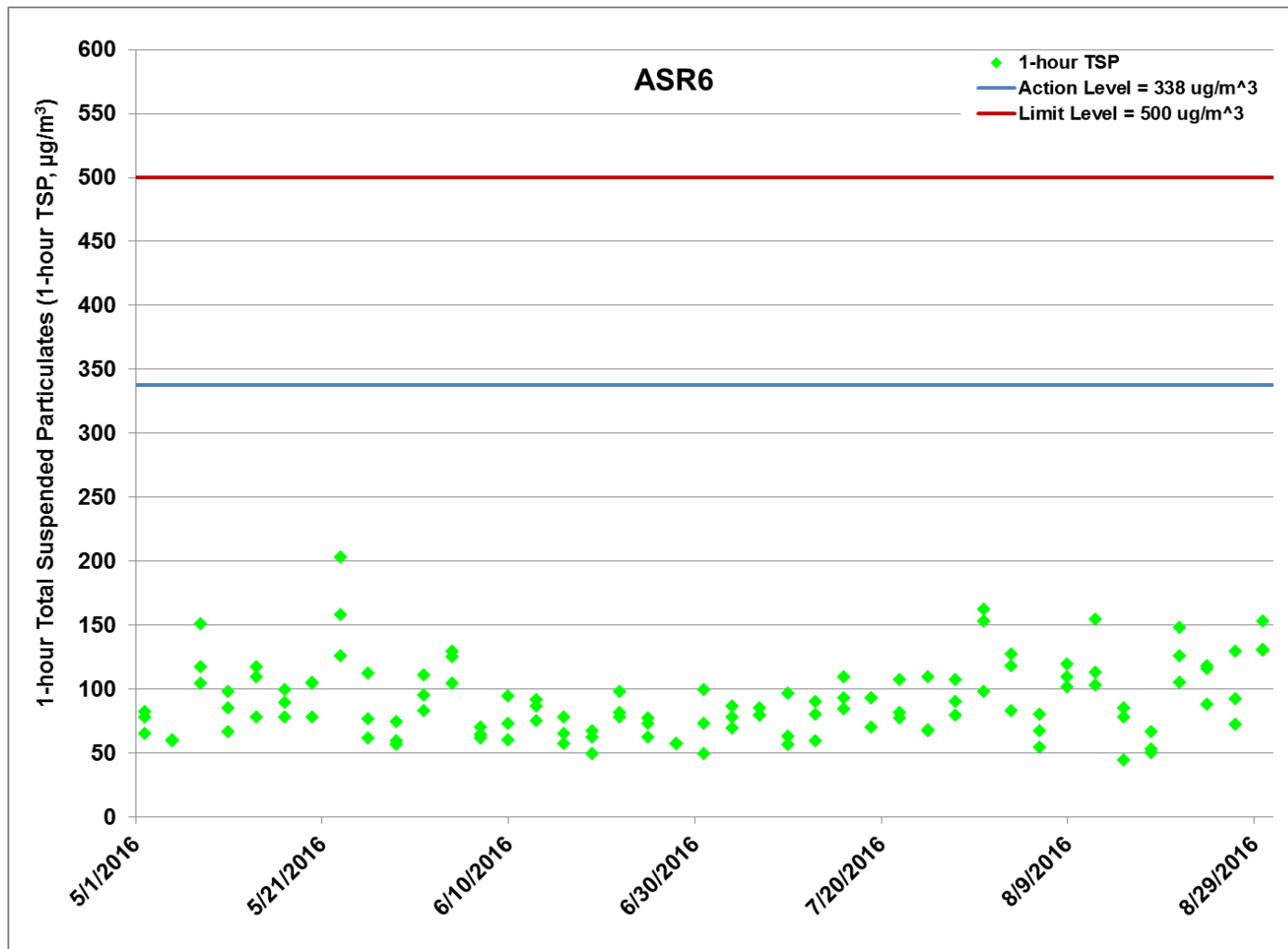


Figure F.2 Impact Monitoring - 1-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR6 between 1 May 2016 and 31 August 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/5/2016 - 31/8/2016) and Box Culvert Extension (1/5/2016 - 31/8/2016). Ref: 0212330_Impact AQM graphs_ August 2016_REV a.xlsx



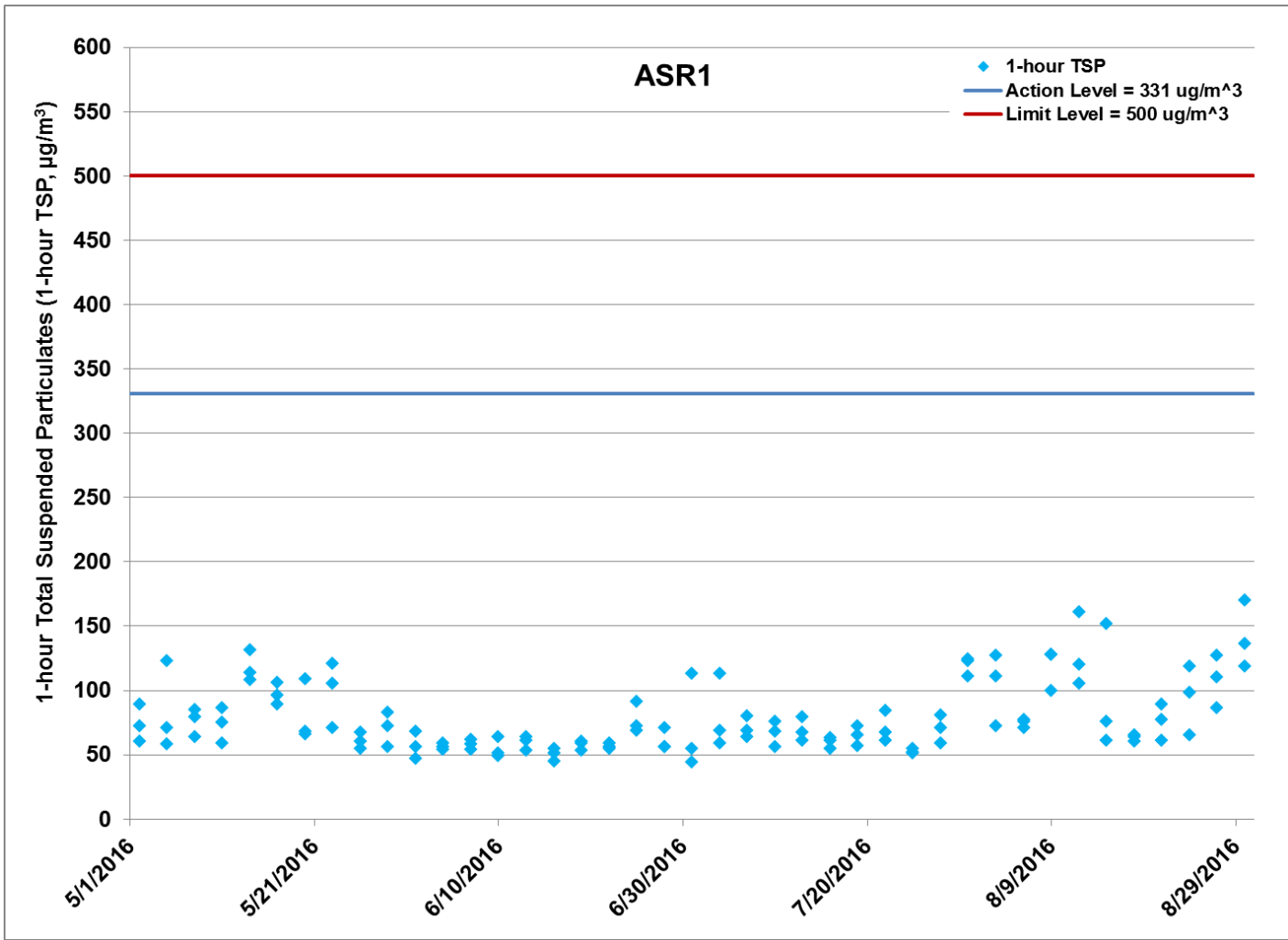


Figure F.3 Impact Monitoring - 1-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR1 between 1 May 2016 and 31 August 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/5/2016 - 31/8/2016) and Box Culvert Extension (1/5/2016 - 31/8/2016). Ref: 0212330_Impact AQM graphs_ August 2016_REV a.xlsx



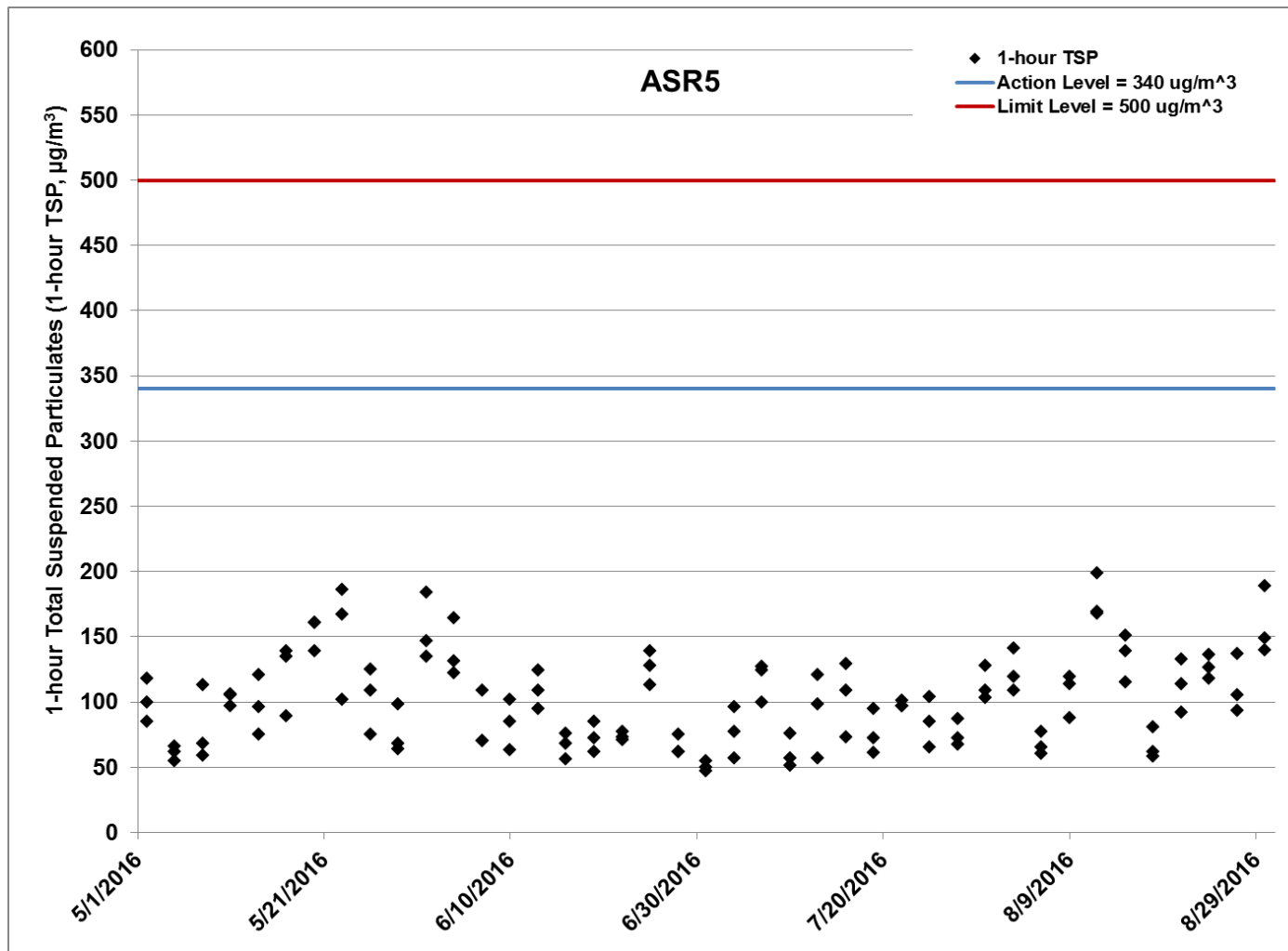


Figure F.4 Impact Monitoring - 1-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR5 between 1 May 2016 and 31 August 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/5/2016 - 31/8/2016) and Box Culvert Extension (1/5/2016 - 31/8/2016). Ref: 0212330_Impact AQM graphs_ August 2016_REV a.xlsx



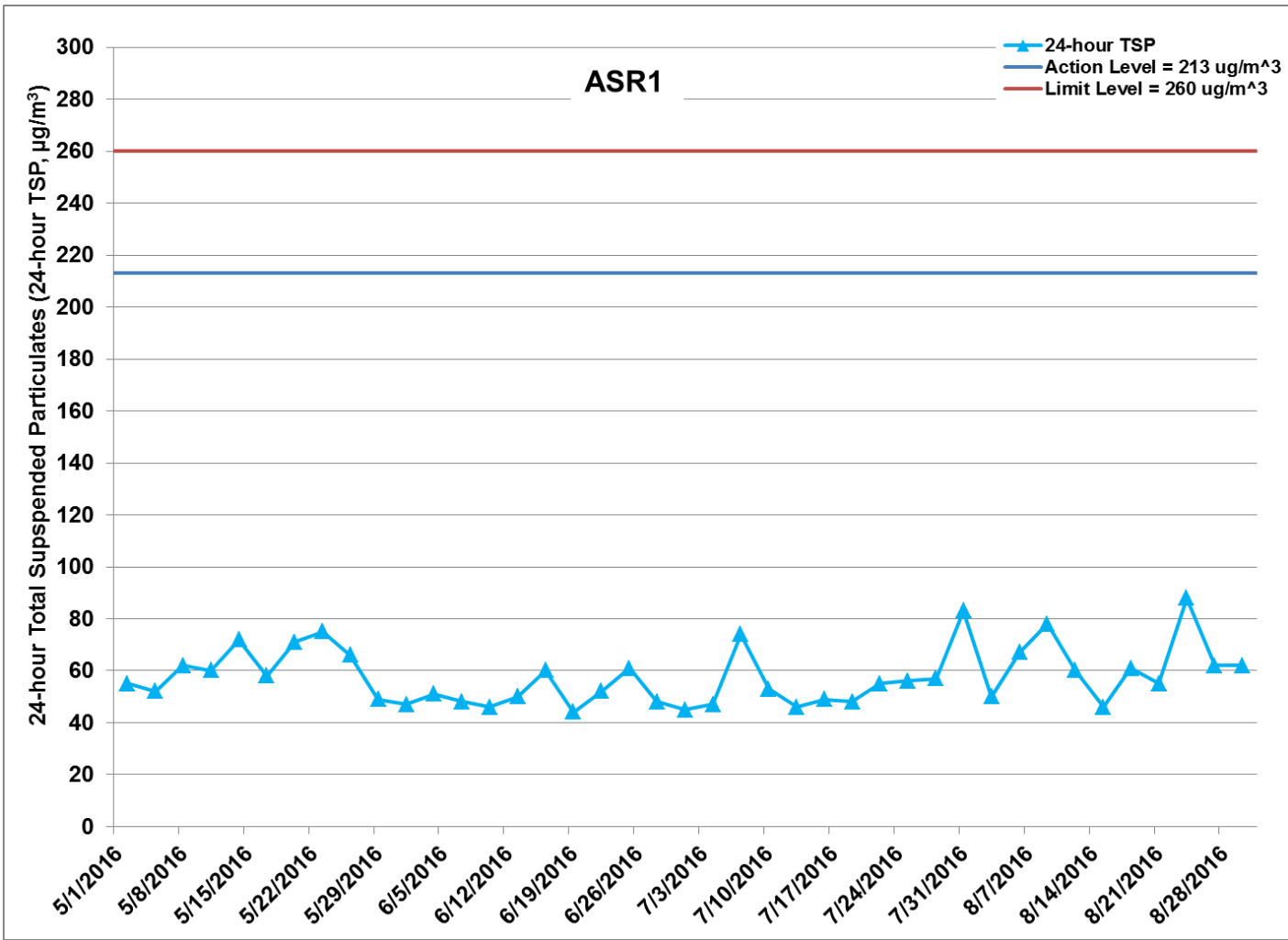


Figure F.6 Impact Monitoring - 24-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR1 between 1 May 2016 and 31 August 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/5/2016 - 31/8/2016) and Box Culvert Extension (1/5/2016 - 31/8/2016). Ref: 0212330_Impact AQM graphs_ August 2016_REV a.xlsx



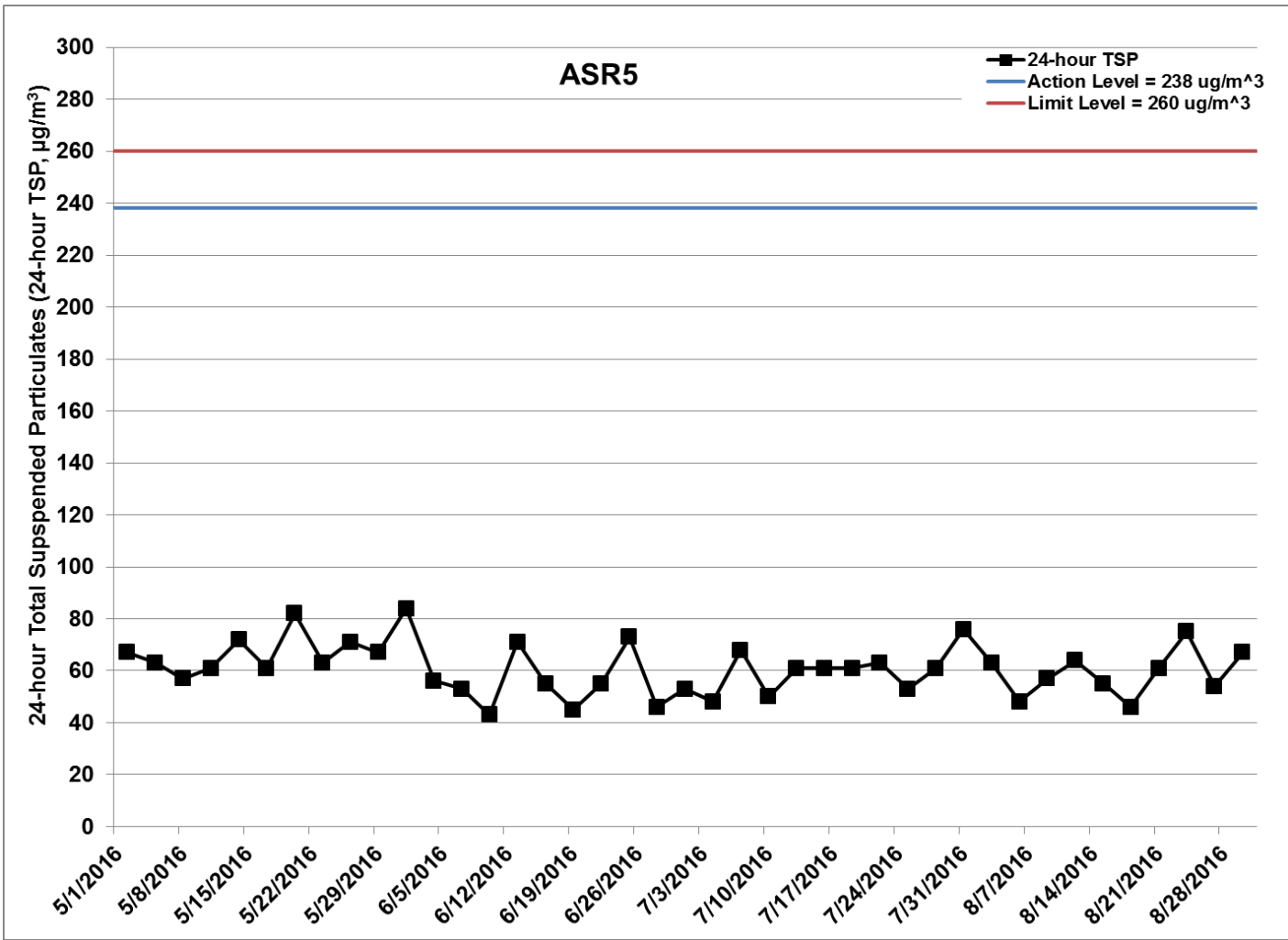


Figure F.7 Impact Monitoring - 24-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR5 between 1 May 2016 and 31 August 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/5/2016 - 31/8/2016) and Box Culvert Extension (1/5/2016 - 31/8/2016). Ref: 0212330_Impact AQM graphs_ August 2016_REV a.xlsx



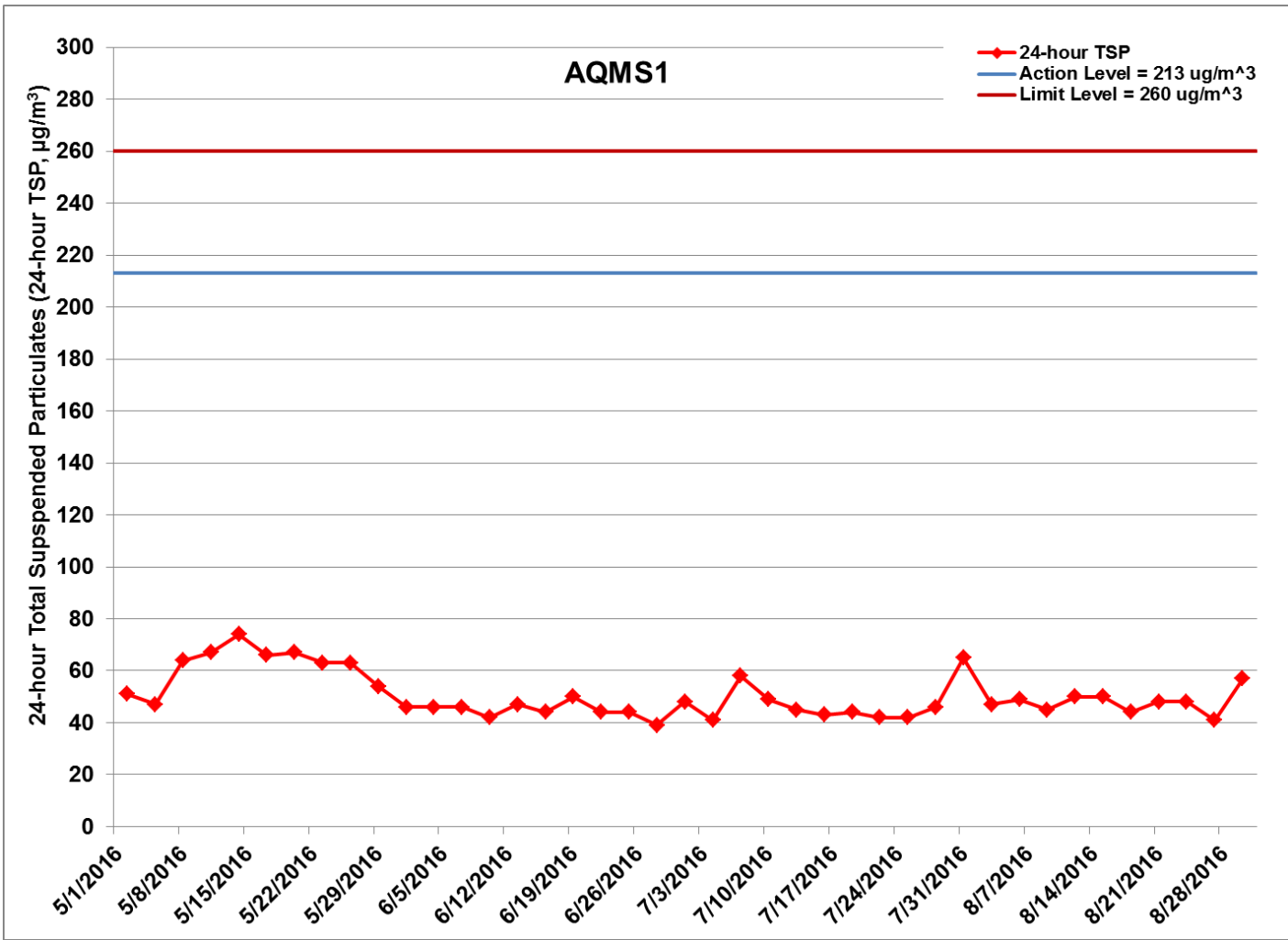


Figure F.8 Impact Monitoring - 24-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at AQMS1 between 1 May 2016 and 31 August 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/5/2016 - 31/8/2016) and Box Culvert Extension (1/5/2016 - 31/8/2016). Ref: 0212330_Impact AQM graphs_ August 2016_REV a.xlsx



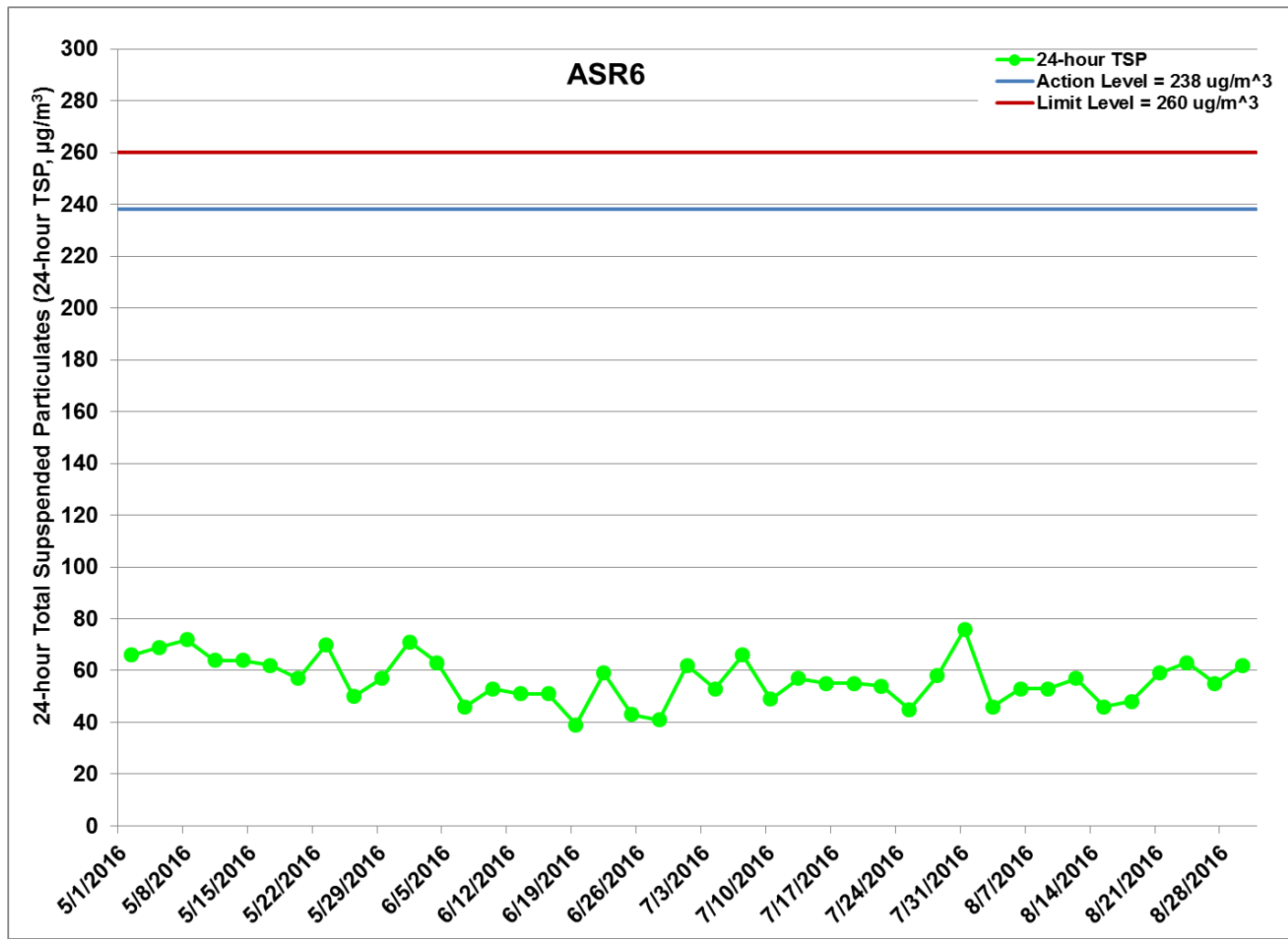


Figure F.9 Impact Monitoring - 24-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR6 between 1 May 2016 and 31 August 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/5/2016 - 31/8/2016) and Box Culvert Extension (1/5/2016 - 31/8/2016). Ref: 0212330_Impact AQM graphs_ August 2016_REV a.xlsx



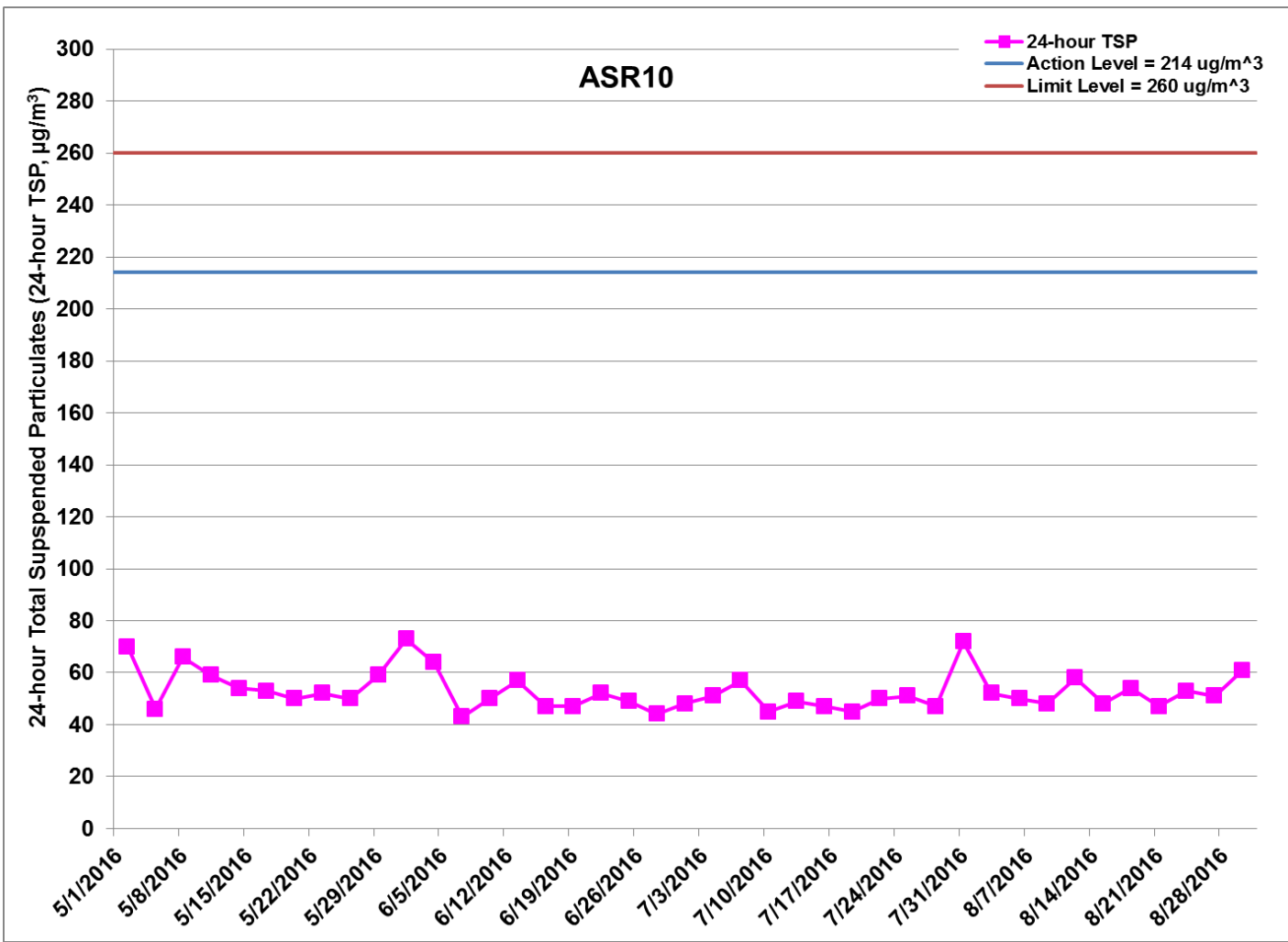


Figure F.10 Impact Monitoring - 24-hour Total Suspended Particulates ($\mu\text{g}/\text{m}^3$) at ASR10 between 1 May 2016 and 31 August 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/5/2016 - 31/8/2016) and Box Culvert Extension (1/5/2016 - 31/8/2016). Ref: 0212330_Impact AQM graphs_ August 2016_REV a.xlsx



Appendix G

Impact Dolphin Monitoring Survey

CONTRACT NO. HY/2012/08

**Hong Kong-Zhuhai-Macao Bridge Tuen Mun – Chek Lap Kok Link
(Northern Connection Sub-sea Tunnel Section)
Dolphin Quarterly Monitoring**

11th Quarterly Progress Report (June-August 2016)

submitted to Dragages – Bouygues Joint Venture & ERM Hong Kong Ltd.

Submitted by

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

25 November 2016

1. Introduction

- 1.1. As part of the Hong Kong-Zhuhai-Macao Bridge, the Tuen Mun-Chek Lap Kok Link (TM-CLKL) Northern Connection Sub-sea Tunnel Section (Contract no. HY/2012/08) comprises the sub-sea TBM tunnels (two tubes with cross passages) across the Urmston Road to connect Tuen Area 40 and Hong Kong Boundary Crossing Facilities (HKBCF) of approximately 4 km in length with dual 2-lane carriageway, the tunnels at both the southern landfall and the northern landfall for construction of approach roads to the sub-sea TBM tunnels of approximately 1.5 km in length, as well as the northern landfall reclamation of approximately 16.5 hectares and about 20.km long seawalls. Dragages – Bouygues Joint Venture (hereinafter called the “Contractor”) was awarded as the main contractor for the Northern Connection Sub-sea Tunnel Section, and ERM Hong Kong Limited would serve as the Environmental Team to implement the Environmental Monitoring and Audit (EM&A) programme.
- 1.2. According to the updated EM&A Manual (for TM-CLKL), monthly line-transect vessel surveys for Chinese White Dolphin should be conducted to cover the Northwest (NWL) and Northeast Lantau (NEL) survey areas as in AFCD annual marine mammal monitoring programme. However, as such surveys have been undertaken by the HKLR03 and HKBCF projects in the same areas (i.e. NWL and NEL), a combined monitoring approach is recommended by the Highways Department, that the TM-CLKL EM&A project can utilize the monitoring data collected by HKLR03 or HKBCF project to avoid any redundancy in monitoring effort. Such exemption for the dolphin monitoring will end upon the completion of the dolphin monitoring carried out by HKLR03 contract.
- 1.3. In November 2013, the Director of Hong Kong Cetacean Research Project (HKCRP), Dr. Samuel Hung, has been appointed by ERM Hong Kong Limited as the dolphin specialist for the TM-CLKL Northern Connection Sub-sea Tunnel Section EM&A project. He is responsible for the dolphin monitoring study, including the data collection on Chinese White Dolphins during the construction phase (i.e. impact period) of the TM-CLKL project in Northwest Lantau (NWL) and Northeast Lantau (NEL) survey areas.

- 1.4. During the construction period of HKLR, the dolphin specialist would be in charge of reviewing and collating information collected by HKLR03 dolphin monitoring programme to examine any potential impacts of TM-CLKL construction works on the dolphins.
- 1.5. From the monitoring results, any changes in dolphin occurrence within the study area will be examined for possible causes, and appropriate actions and additional mitigation measures will be recommended as necessary.
- 1.6. This report is the 11th quarterly progress report under the TM-CLKL construction phase dolphin monitoring programme submitted to the Contractor, summarizing the results of the surveys findings during the period of June to August 2016, utilizing the survey data collected by HKLR03 impact phase monitoring project.

2. Monitoring Methodology

2.1. Vessel-based Line-transect Survey

- 2.1.1. According to the requirement of the updated EM&A manual, dolphin monitoring programme should cover all transect lines in NEL and NWL survey areas (see Figure 1) twice per month throughout the entire construction period. The co-ordinates of all transect lines are shown in Table 1. The coordinates of several starting points have been revised due to the obstruction of the permanent structures in association to the construction works of HKLR and the southern viaduct of TM-CLKL, as well as provision of adequate buffer distance from the Airport Restricted Areas. The EPD issued a memo and confirmed that they had no objection on the revised transect lines on 19 August 2015, and the revised coordinates are in red and marked with an asterisk in Table 1.

Table 1. Co-ordinates of transect lines conducted by HKLR03 project

| Line No. | | Easting | Northing | | Line No. | | Easting | Northing |
|----------|-------------|---------|----------|--|----------|-------------|---------|----------|
| 1 | Start Point | 804671 | 815456* | | 13 | Start Point | 816506 | 819480 |
| 1 | End Point | 804671 | 831404 | | 13 | End Point | 816506 | 824859 |
| 2 | Start Point | 805475 | 815913* | | 14 | Start Point | 817537 | 820220 |
| 2 | End Point | 805477 | 826654 | | 14 | End Point | 817537 | 824613 |
| 3 | Start Point | 806464 | 819435 | | 15 | Start Point | 818568 | 820735 |
| 3 | End Point | 806464 | 822911 | | 15 | End Point | 818568 | 824433 |
| 4 | Start Point | 807518 | 819771 | | 16 | Start Point | 819532 | 821420 |
| 4 | End Point | 807518 | 829230 | | 16 | End Point | 819532 | 824209 |
| 5 | Start Point | 808504 | 820220 | | 17 | Start Point | 820451 | 822125 |
| 5 | End Point | 808504 | 828602 | | 17 | End Point | 820451 | 823671 |

| | | | | | | | | |
|----|-------------|--------|---------|--|----|-------------|--------|--------|
| 6 | Start Point | 809490 | 820466 | | 18 | Start Point | 821504 | 822371 |
| 6 | End Point | 809490 | 825352 | | 18 | End Point | 821504 | 823761 |
| 7 | Start Point | 810499 | 820880* | | 19 | Start Point | 822513 | 823268 |
| 7 | End Point | 810499 | 824613 | | 19 | End Point | 822513 | 824321 |
| 8 | Start Point | 811508 | 821123* | | 20 | Start Point | 823477 | 823402 |
| 8 | End Point | 811508 | 824254 | | 20 | End Point | 823477 | 824613 |
| 9 | Start Point | 812516 | 821303* | | 21 | Start Point | 805476 | 827081 |
| 9 | End Point | 812516 | 824254 | | 21 | End Point | 805476 | 830562 |
| 10 | Start Point | 813525 | 820872 | | 22 | Start Point | 806464 | 824033 |
| 10 | End Point | 813525 | 824657 | | 22 | End Point | 806464 | 829598 |
| 11 | Start Point | 814556 | 818853* | | 23 | Start Point | 814559 | 821739 |
| 11 | End Point | 814556 | 820992 | | 23 | End Point | 814559 | 824768 |
| 12 | Start Point | 815542 | 818807 | | | | | |
| 12 | End Point | 815542 | 824882 | | | | | |

Note: Co-ordinates in red and marked with asterisk are revised co-ordinates of transect line.

- 2.1.2. The HKLR03 survey team used standard line-transect methods (Buckland et al. 2001) to conduct the systematic vessel surveys, and followed the same technique of data collection that has been adopted over the last 16 years of marine mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung 2013, 2014). For each monitoring vessel survey, a 15-m inboard vessel with an open upper deck (about 4.5 m above water surface) was used to make observations from the flying bridge area.
- 2.1.3. Two experienced observers (a data recorder and a primary observer) made up the on-effort survey team, and the survey vessel transited different transect lines at a constant speed of 13-15 km per hour. The data recorder searched with unaided eyes and filled out the datasheets, while the primary observer searched for dolphins and porpoises continuously through 7 x 50 *Fujinon* marine binoculars. Both observers searched the sea ahead of the vessel, between 270° and 90° (in relation to the bow, which is defined as 0°). One to two additional experienced observers were available on the boat to work in shift (i.e. rotate every 30 minutes) in order to minimize fatigue of the survey team members. All observers were experienced in small cetacean survey techniques and identifying local cetacean species.
- 2.1.4. During on-effort survey periods, the survey team recorded effort data including time, positions (latitude and longitude), weather conditions (Beaufort sea state and visibility), and distance traveled in each series (a continuous period of search effort) with the assistance of a handheld GPS (*Garmin eTrex Legend*).
- 2.1.5. Data including time, position and vessel speed were also automatically and continuously logged by handheld GPS throughout the entire survey for subsequent review.

- 2.1.6. When dolphins were sighted, the survey team would end the survey effort, and immediately record the initial sighting distance and angle of the dolphin group from the survey vessel, as well as the sighting time and position. Then the research vessel was diverted from its course to approach the animals for species identification, group size estimation, assessment of group composition, and behavioural observations. The perpendicular distance (PSD) of the dolphin group to the transect line was later calculated from the initial sighting distance and angle.
- 2.1.7. Survey effort being conducted along the parallel transect lines that were perpendicular to the coastlines (as indicated in Figure 1) was labeled as “primary” survey effort, while the survey effort conducted along the connecting lines between parallel lines was labeled as “secondary” survey effort. According to HKCRP long-term dolphin monitoring data, encounter rates of Chinese white dolphins deduced from effort and sighting data collected along primary and secondary lines were similar in NEL and NWL survey areas. Therefore, both primary and secondary survey effort were presented as on-effort survey effort in this report.

2.2. Photo-identification Work

- 2.2.1. When a group of Chinese White Dolphins were sighted during the line-transect survey, the HKLR03 survey team would end effort and approach the group slowly from the side and behind to take photographs of them. Every attempt was made to photograph every dolphin in the group, and even photograph both sides of the dolphins, since the colouration and markings on both sides may not be symmetrical.
- 2.2.2. A professional digital camera (*Canon EOS 7D* or *60D* model), equipped with long telephoto lenses (100-400 mm zoom), were available on board for researchers to take sharp, close-up photographs of dolphins as they surfaced. The images were shot at the highest available resolution and stored on Compact Flash memory cards for downloading onto a computer.
- 2.2.3. All digital images taken in the field were first examined, and those containing potentially identifiable individuals were sorted out. These photographs would then be examined in greater detail, and were carefully compared to the existing Chinese White Dolphin photo-identification catalogue maintained by HKCRP since 1995.
- 2.2.4. Chinese White Dolphins can be identified by their natural markings, such as nicks, cuts, scars and deformities on their dorsal fin and body, and their unique spotting patterns were also used as secondary identifying features (Jefferson 2000).
- 2.2.5. All photographs of each individual were then compiled and arranged in chronological order, with data including the date and location first identified (initial sighting), re-sightings, associated dolphins, distinctive features, and age classes entered into a computer database.

2.3. Data Analysis

- 2.3.1. Distribution Analysis – The line-transect survey data was integrated with the Geographic

Information System (GIS) in order to visualize and interpret different spatial and temporal patterns of dolphin distribution using sighting positions. Location data of dolphin groups were plotted on map layers of Hong Kong using a desktop GIS (ArcView[®] 3.1) to examine their distribution patterns in details. The dataset was also stratified into different subsets to examine distribution patterns of dolphin groups with different categories of group sizes, young calves and activities.

- 2.3.2. Encounter rate analysis – Encounter rates of Chinese white dolphins (number of on-effort sightings per 100 km of survey effort, and total number of dolphins sighted on-effort per 100 km of survey effort) were calculated in NEL and NWL survey areas in relation to the amount of survey effort conducted during each month of monitoring survey. Only data collect under Beaufort 3 or below condition would be used for the encounter rate analyses. Dolphin encounter rates were calculated in two ways for comparisons with the HZMB baseline monitoring results as well as to AFCD long-term marine mammal monitoring results.

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

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

- 2.3.3. Quantitative grid analysis on habitat use – To conduct quantitative grid analysis of habitat use, positions of on-effort sightings of Chinese White Dolphins collected during the quarterly impact phase monitoring period were plotted onto 1-km² grids among NWL and NEL survey areas on GIS. Sighting densities (number of on-effort sightings per km²) and dolphin densities (total number of dolphins from on-effort sightings per km²) were then calculated for each 1 km by 1 km grid with the aid of GIS. Sighting density grids and dolphin density grids were then further normalized with the amount of survey effort conducted within each grid. The total amount of survey effort spent on each grid was calculated by examining the survey coverage on each line-transect survey to determine how many times the grid was surveyed during the study period. For example, when the survey boat traversed through a specific grid 50 times, 50 units of survey effort were counted for that grid. With the amount of survey effort calculated for each grid, the sighting density and dolphin density of each grid were then normalized (i.e. divided by the unit of survey effort).

The newly-derived unit for sighting density was termed SPSE, representing the number of on-effort sightings per 100 units of survey effort. In addition, the derived unit for actual dolphin density was termed DPSE, representing the number of dolphins per 100 units of

survey effort. Among the 1-km² 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-km² grid within the study area:

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

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

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

- 2.3.4. Behavioural analysis – When dolphins were sighted during vessel surveys, their behaviour was observed. Different activities were categorized (i.e. feeding, socializing, traveling, and milling/resting) and recorded on sighting datasheets. This data was then input into a separate database with sighting information, which can be used to determine the distribution of behavioural data with a desktop GIS. Distribution of sightings of dolphins engaged in different activities and behaviours would then be plotted on GIS and carefully examined to identify important areas for different activities of the dolphins.
- 2.3.5. Ranging pattern analysis – Location data of individual dolphins that occurred during the 3-month impact phase monitoring period were obtained from the dolphin sighting database and photo-identification catalogue. To deduce home ranges for individual dolphins using the fixed kernel methods, the program Animal Movement Analyst Extension, was loaded as an extension with ArcView[®] 3.1 along with another extension Spatial Analyst 2.0. Using the fixed kernel method, the program calculated kernel density estimates based on all sighting positions, and provided an active interface to display kernel density plots. The kernel estimator then calculated and displayed the overall ranging area at 95% UD level.

3. Monitoring Results

3.1. Summary of survey effort and dolphin sightings

- 3.1.1. During the period of June to August 2016, six sets of systematic line-transect vessel surveys were conducted under the HKLR03 monitoring works to cover all transect lines in NWL and NEL survey areas twice per month.
- 3.1.2. From these HKLR03 surveys, a total of 897.06 km of survey effort was collected, with 92.5% of the total survey effort being conducted under favourable weather conditions (i.e. Beaufort Sea State 3 or below with good visibility). Among the two areas, 341.80 km and 555.26 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 648.70 km, while the effort on

secondary lines was 248.36 km. Survey effort conducted on both primary and secondary lines were considered as on-effort survey data. A summary table of the survey effort is shown in Appendix I.

- 3.1.4. During the six sets of HKLR03 monitoring surveys from June to August 2016, a total of ten groups of 34 Chinese White Dolphins were sighted. Seven of the ten dolphin sightings were made during on-effort search, while all seven on-effort dolphin sightings were made on primary lines. A summary table of dolphin sightings is shown in Appendix II. In this quarterly period, all except one group (a lone dolphin) were sighted in NWL, while an off-effort sighting of a lone dolphin was made on June 6th in NEL. In fact, since August 2014, only two sightings of two lone dolphins were made respectively in NEL during HKLR03 monitoring surveys.
- 3.2. *Distribution*
- 3.2.1. Distribution of dolphin sightings made during the HKLR03 monitoring surveys from June to August 2016 is shown in Figure 1. Dolphin sightings made in the present quarter were mainly located to the east of Lung Kwu Chau and to the west of Sha Chau near western territorial boundary (Figure 1). Two sightings were made to the west of Shum Wat very close to the Hong Kong Link Road alignment at the southwestern corner of NWL survey area (Figure 1). The lone dolphin sighted in NEL was located between Shum Shui Kok and Yam O (Figure 1).
- 3.2.2. Notably, all dolphin sightings were located far away from the alignment of TM-CLKL as well as the HKBCF and HKLR03 reclamation sites (Figure 1). On the other hand, two dolphin groups were sighted near the HKLR09 alignment (Figure 1).
- 3.2.3. Sighting distribution of dolphins during the present impact phase monitoring period (June to August 2016) was drastically different from the one during the baseline monitoring period (September to November 2011). In the present quarter, dolphins have almost disappeared from the NEL region with the exception of a lone dolphin occurred near Shum Shui Kok (Figure 1). This was in stark contrast to their frequent occurrence around the Brothers Islands, near Shum Shui Kok and in the vicinity of HKBCF reclamation site during the baseline period (Figure 1). The nearly complete abandonment of NEL region by the dolphins has been consistently recorded in the past 14 quarters of HKLR03 monitoring, which has resulted in zero to extremely low dolphin encounter rates in this area.
- 3.2.4. In NWL survey area, dolphin occurrence was also very different between the baseline and impact phase periods. During the present impact monitoring period, much fewer dolphins occurred in this survey area (mostly to the east of Lung Kwu Chau and west of Sha Chau) than during the baseline period, when many dolphin groups were frequently sighted between Lung Kwu Chau and Black Point, around Sha Chau, near Pillar Point and to the west of the Chek Lap Kok Airport (Figure 1).
- 3.2.5. Another comparison in dolphin distribution was made between the four quarterly periods of summer months in 2013-16 (Figure 2). Among the four summer periods, dolphins were regularly sighted throughout the North Lantau region in 2013, but their usage there

has gradually diminished in 2014 and subsequently to a very low level in 2015 and 2016 (Figure 2).

3.3. Encounter rate

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

Table 2. Dolphin encounter rates (sightings per 100 km of survey effort) during June to August 2016

| SURVEY AREA | DOLPHIN MONITORING DATES | Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort) | Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort) |
|------------------|--------------------------|--|--|
| | | Primary Lines Only | Primary Lines Only |
| Northeast Lantau | Set 1 (1 & 6 Jun 2016) | 0.00 | 0.00 |
| | Set 2 (13 & 17 Jun 2016) | 0.00 | 0.00 |
| | Set 3 (5 & 12 Jul 2016) | 0.00 | 0.00 |
| | Set 4 (18 & 27 Jul 2016) | 0.00 | 0.00 |
| | Set 5 (5 & 9 Aug 2016) | 0.00 | 0.00 |
| | Set 6 (17 & 23 Aug 2016) | 0.00 | 0.00 |
| Northwest Lantau | Set 1 (1 & 6 Jun 2016) | 0.00 | 0.00 |
| | Set 2 (13 & 17 Jun 2016) | 0.00 | 0.00 |
| | Set 3 (5 & 12 Jul 2016) | 4.60 | 9.20 |
| | Set 4 (18 & 27 Jul 2016) | 0.00 | 0.00 |
| | Set 5 (5 & 9 Aug 2016) | 4.24 | 28.28 |
| | Set 6 (17 & 23 Aug 2016) | 1.48 | 7.40 |

Table 3. Comparison of average dolphin encounter rates from impact monitoring period (June – August 2016) and baseline monitoring period (September – November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions; ± denotes the standard deviation of the average encounter rates)

| | Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort) | | Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort) | |
|------------------|--|---------------------------|--|---------------------------|
| | June – August 2016 | September - November 2011 | June – August 2016 | September - November 2011 |
| Northeast Lantau | 0.0 | 6.00 ± 5.05 | 0.0 | 22.19 ± 26.81 |
| Northwest Lantau | 1.72 ± 2.17 | 9.85 ± 5.85 | 7.48 ± 10.98 | 44.66 ± 29.85 |

- 3.3.2. To facilitate the comparison with the AFCD long-term monitoring results, the encounter rates were also calculated for the present quarter using both primary and secondary survey effort. The encounter rates of sightings (STG) and dolphins (ANI) in NWL were 1.43 sightings and 6.34 dolphins per 100 km of survey effort respectively, while the encounter rates of sightings (STG) and dolphins (ANI) in NEL were both nil for this quarter.
- 3.3.3. In NEL, the average dolphin encounter rates (both STG and ANI) in the present three-month impact monitoring period were both zero with no on-effort sighting being made, and such extremely low occurrence of dolphins in NEL have been consistently recorded in the past fourteen quarters of HKLR03 monitoring (Table 4). This is a serious concern as the dolphin occurrence in NEL in the past few years (0.0-1.0 for ER(STG) and 0.0-3.9 for ER(ANI)) have remained exceptionally low when compared to the baseline period (Table 4). Dolphins have been virtually absent from NEL waters since January 2014, with only three groups of six dolphins sighted there since then despite consistent and intensive survey effort being conducted in this survey area.

Table 4. Comparison of average dolphin encounter rates in Northeast Lantau survey area from all quarters of HKLR03 impact monitoring period and baseline monitoring period (September-November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions; the encounter rates in **summer** months were highlighted in blue; ± denotes the standard deviation of the average encounter rates)

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

3.3.4. On the other hand, the average dolphin encounter rates (STG and ANI) in NWL during the present impact phase monitoring period (reductions of 82.5% and 83.3% respectively) were only small fractions of the ones recorded during the three-month baseline period, indicating a dramatic decline in dolphin usage of this survey area as well during the present impact phase period (Table 5).

Table 5. Comparison of average dolphin encounter rates in Northwest Lantau survey area from all quarters of impact monitoring period and baseline monitoring period (September-November 2011) (Note: encounter rates deduced from the baseline monitoring period have been recalculated based only on survey effort and on-effort sighting data made along the primary transect lines under favourable conditions; encounter rates in **summer** months were highlighted in blue; \pm denotes the standard deviation of the average encounter rates)

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

3.3.5. During the same summer quarters, dolphin encounter rates in NWL during 2016 reached to the lowest point among the four summer periods, and were much lower than the ones recorded in 2013 and 2014 (Table 5). Such temporal trend should be closely monitored in the upcoming monitoring quarters.

3.3.6. As discussed recently in Hung (2016), the dramatic decline in dolphin usage of NEL waters in the past few years (including the declines in abundance, encounter rate and habitat use in NEL, as well as shifts of individual core areas and ranges away from NEL

waters) was possibly related to the HZMB construction works that were commenced since 2012. It appeared that such noticeable decline has already extended to NWL waters progressively in the past few years.

- 3.3.7. A two-way ANOVA with repeated measures and unequal sample size was conducted to examine whether there were any significant differences in the average encounter rates between the baseline and impact monitoring periods. The two variables that were examined included the two periods (baseline and impact phases) and two locations (NEL and NWL).
- 3.3.8. For the comparison between the baseline period and the present quarter (fifteenth quarter of the impact phase being assessed), the p-values for the differences in average dolphin encounter rates of STG and ANI were 0.0031 and 0.0227 respectively. If the alpha value is set at 0.05, significant differences were detected between the baseline and present quarters in both the average dolphin encounter rates of STG and ANI.
- 3.3.9. For the comparison between the baseline period and the cumulative quarters in impact phase (i.e. first fifteen quarters of the impact phase being assessed), the p-values for the differences in average dolphin encounter rates of STG and ANI were 0.000009 and 0.000001 respectively. Even if the alpha value is set at 0.00001, significant differences were still detected in both the average dolphin encounter rates of STG and ANI (i.e. between the two periods and the locations).
- 3.3.10. As indicated in both dolphin distribution patterns and encounter rates, dolphin usage has been significantly reduced in both NEL and NWL survey areas during the present quarterly period, and such low occurrence of dolphins has also been consistently documented in previous quarters. This raises serious concern, as the timing of the decline in dolphin usage in North Lantau waters coincided well with the construction schedule of the HZMB-related projects (Hung 2016).
- 3.3.11. To ensure the continuous usage of North Lantau waters by the dolphins, every possible measure should be implemented by the contractors and relevant authorities of HZMB-related works to minimize all disturbances to the dolphins.
- 3.4. *Group size*
- 3.4.1. Group size of Chinese White Dolphins ranged from one to eleven individuals per group in North Lantau region during June to August 2016. The average dolphin group sizes from these three months were compared with the ones deduced from the baseline period in September to November 2011, as shown in Table 6.
- 3.4.2. The average dolphin group size in NWL waters during June to August 2016 was slightly lower than the one recorded during the three-month baseline period (Table 6). Most of these dolphin groups were composed of 1-3 individuals only, while there were two medium-sized groups of five and seven individuals respectively, and one large group of eleven individuals.

Table 6. Comparison of average dolphin group sizes from impact monitoring period (June – August 2016) and baseline monitoring period (September – November 2011) (Note: \pm denotes the standard deviation of the average group size)

| | Average Dolphin Group Size | |
|-------------------------|----------------------------|---------------------------|
| | June – August 2016 | September – November 2011 |
| Overall | 3.40 \pm 3.34 (n = 10) | 3.72 \pm 3.13 (n = 66) |
| Northeast Lantau | 1.00 (n = 1) | 3.18 \pm 2.16 (n = 17) |
| Northwest Lantau | 3.67 \pm 3.43 (n = 9) | 3.92 \pm 3.40 (n = 49) |

- 3.4.3. As there was only one single dolphin sighted in NEL waters during this quarter, the average group size was much lower than the one recorded during the baseline period (Table 6).
- 3.4.4. Distribution of the larger dolphin groups (i.e. five individuals or more per group) during the present quarter is shown in Figure 3, with comparison to the one in baseline period. During the summer months of 2016, the two medium-sized groups were sighted near Pak Chau and to the east of Lung Kwu Chau respectively, while one large group of eleven individuals was sighted to the west of Sha Chau near the western territorial boundary (Figure 3). Such distribution pattern was very different from the baseline period, when the larger dolphin groups were more frequently sighted and more evenly distributed in NWL waters, with a few more sighted in NEL waters (Figure 3).
- 3.5. *Habitat use*
- 3.5.1. From June to August 2016, the more important habitats utilized by Chinese White Dolphins were located to the west of Sha Chau at the western territorial boundary, as well as to the northeast of Lung Kwu Chau (Figures 4a and 4b). One grid located to the west of Shum Wat overlapped with the HKLR09 alignment also recorded moderate density of dolphins. On the contrary, all grids near TM-CLKL alignment as well as the HKLR03/HKBCF reclamation sites did not record any presence of dolphins at all during on-effort search in the present quarterly period (Figure 4b).
- 3.5.2. It should be emphasized though that the amount of survey effort collected in each grid during the three-month period was fairly low (6-12 units of survey effort for most grids), and therefore the habitat use pattern derived from the three-month dataset should be treated with caution. A more complete picture of dolphin habitat use pattern should be examined when more survey effort for each grid will be collected throughout the impact phase monitoring programme.
- 3.5.3. When compared with the habitat use patterns during the baseline period, dolphin usage in NEL and NWL has drastically diminished in both areas during the present impact monitoring period (Figure 5). During the baseline period, many grids between Siu Mo To and Shum Shui Kok in NEL recorded moderately high to high dolphin densities, which was in stark contrast to the complete absence of dolphins there during the present impact phase period (Figure 5).

- 3.5.4. The density patterns were also very different in NWL between the baseline and impact phase monitoring periods, with higher dolphin usage throughout the area, especially around Sha Chau, near Black Point, to the west of the airport, as well as between Pillar Point and airport platform during the baseline period. In contrast, the only areas with moderate to high dolphin densities were restricted to the waters near Sha Chau and Lung Kwu Chau during the present impact phase period (Figure 5).
- 3.6. *Mother-calf pairs*
- 3.6.1. During the present quarterly period, neither unspotted calf nor unspotted juvenile was sighted with any female in the North Lantau region.
- 3.6.2. The absence of young calves in the past three consecutive quarters was in stark contrast to their regular occurrence in North Lantau waters during the baseline period. This should be of a serious concern, and the occurrence of young calves in North Lantau waters should be closely monitored in the upcoming quarters.
- 3.7. *Activities and associations with fishing boats*
- 3.7.1. Only one of the ten dolphin groups were engaged in socializing activity, while none of them was engaged in feeding, traveling or milling/resting activity during the three-month study period.
- 3.7.2. The percentage of sightings associated with socializing activities (10.0%) was higher than the one recorded during the baseline period (5.4%). However, it should be noted the sample size on total numbers of dolphin sightings during the present quarter (ten dolphin groups) was much lower than the baseline period (66 dolphin groups).
- 3.7.3. Distribution of dolphins engaged in various activities during the present impact phase period and the baseline period is shown in Figure 6. The only dolphin group engaged in socializing activity was sighted to the west of Shum Wat near the HKLR09 alignment during the present quarterly period, which was very different from the baseline period when various dolphin activities occurred throughout the North Lantau region (Figure 6).
- 3.7.4. As consistently recorded in the past monitoring quarters, none of the ten dolphin groups was found to be associated with any operating fishing vessel in North Lantau waters during the present impact phase period.
- 3.8. *Summary of photo-identification works*
- 3.8.1. From June to August 2016, over 1,200 digital photographs of Chinese White Dolphins were taken during the impact phase monitoring surveys for the photo-identification work.
- 3.8.2. In total, 15 individuals sighted 15 times altogether were identified (see summary table in Appendix III and photographs of identified individuals in Appendix IV). All of these re-sightings were made in NWL.
- 3.8.3. Notably, three of these 15 individuals (NL104, NL136 and NL302) were also sighted in West Lantau waters during the HKLR09 monitoring surveys from June to August 2016. Moreover, one individual (NL150) was sighted in both NWL and SWL survey areas

during the same quarter, showing extensive individual movement between different survey areas.

3.9. *Individual range use*

3.9.1. Ranging patterns of the 15 individuals identified during the three-month study period were determined by fixed kernel method, and are shown in Appendix V.

3.9.2. All identified dolphins sighted in the present quarter were utilizing NWL waters only, but have completely avoided NEL waters where many of them have utilized as their core areas in the past (Appendix V). This is in contrary to the extensive movements between NEL and NWL survey areas observed in the earlier impact monitoring quarters as well as the baseline period.

3.9.3. On the other hand, four individuals (NL104, NL136, NL150 and NL302) consistently utilized both North Lantau waters in the past have extended their range use to WL and SWL waters during the present quarter. In the upcoming quarters, individual range use and movements should be continuously monitored to examine whether there has been any consistent shifts of individual home ranges from North Lantau to West or Southwest Lantau, as such shift could possibly be related to the HZMB-related construction works (see Hung 2015, 2016).

4. Conclusion

4.1. During this quarter of dolphin monitoring, no adverse impact from the activities of the TMCLKL construction project on Chinese White Dolphins was noticeable from general observations.

4.2. Although the dolphins infrequently occurred along the alignment of TMCLKL northern connection sub-sea tunnel section in the past and during the baseline monitoring period, it is apparent that dolphin usage has been significantly reduced in NEL, and many individuals have shifted away from the important habitat around the Brothers Islands.

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

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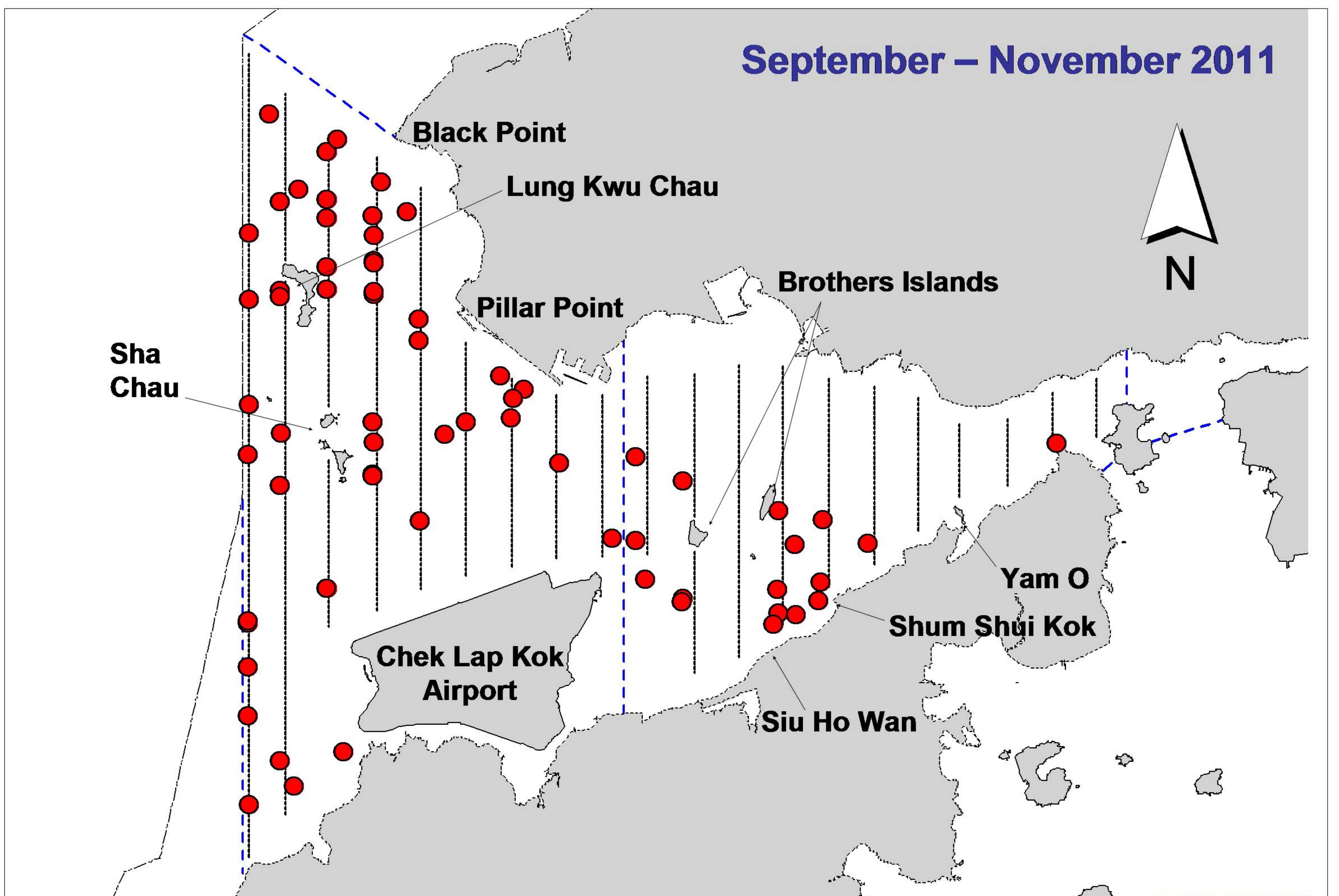
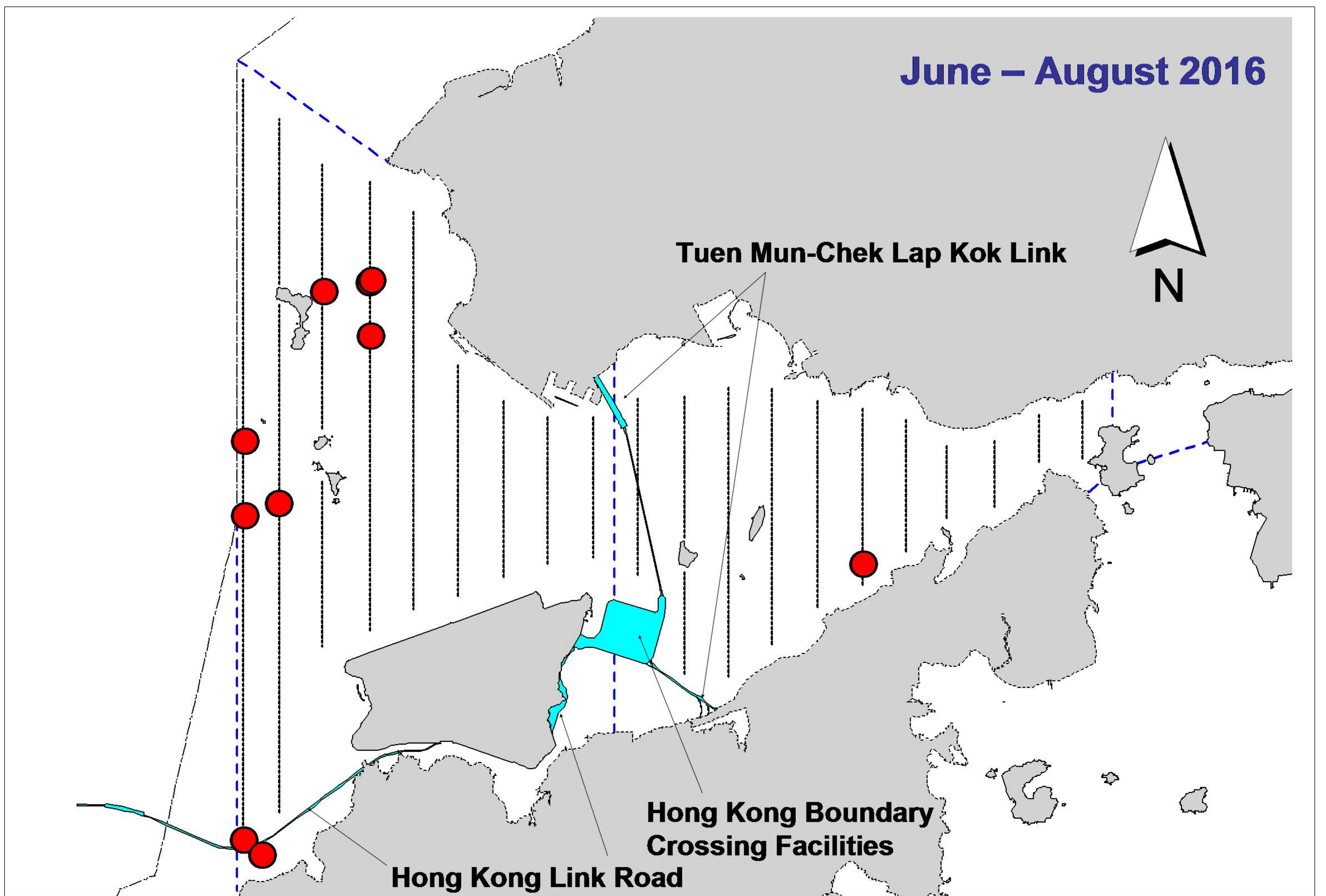


Figure 1. Distribution of Chinese white dolphin sighting in Northwest and Northeast Lantau during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

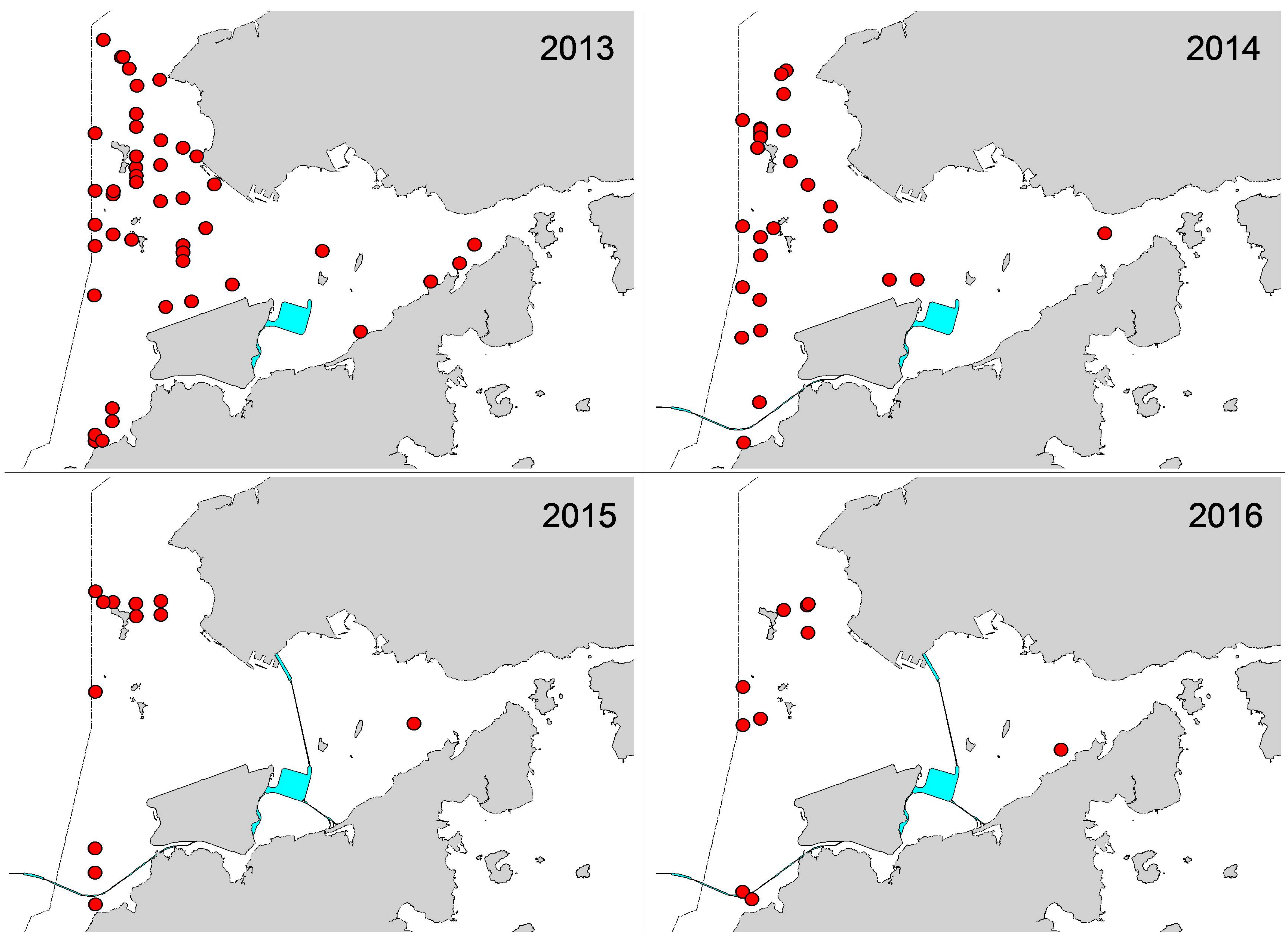


Figure 2. Distribution of Chinese white dolphin sightings in Northwest and Northeast Lantau during the same summer quarters (June-August) of HKLR03 impact phase in 2013-16

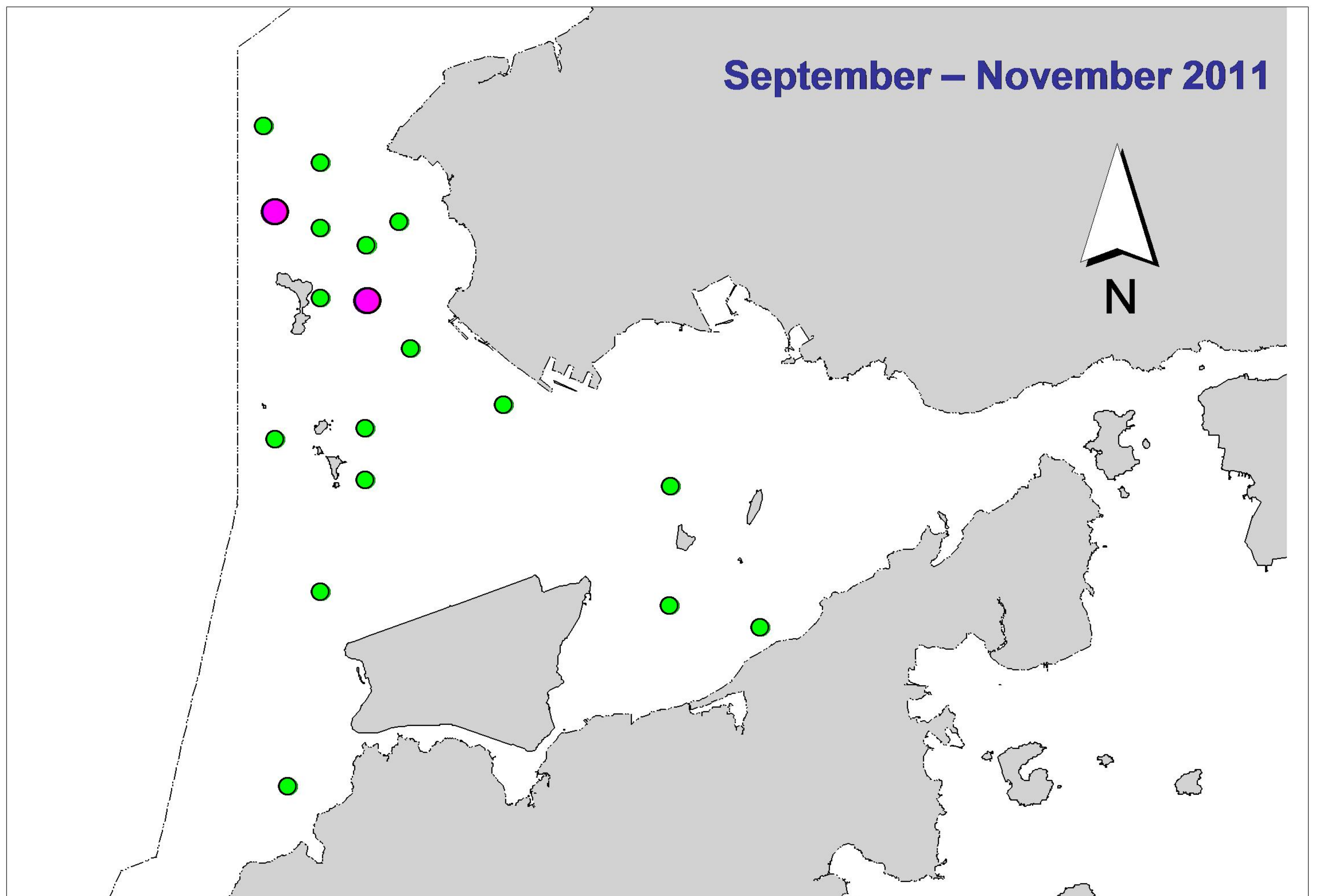
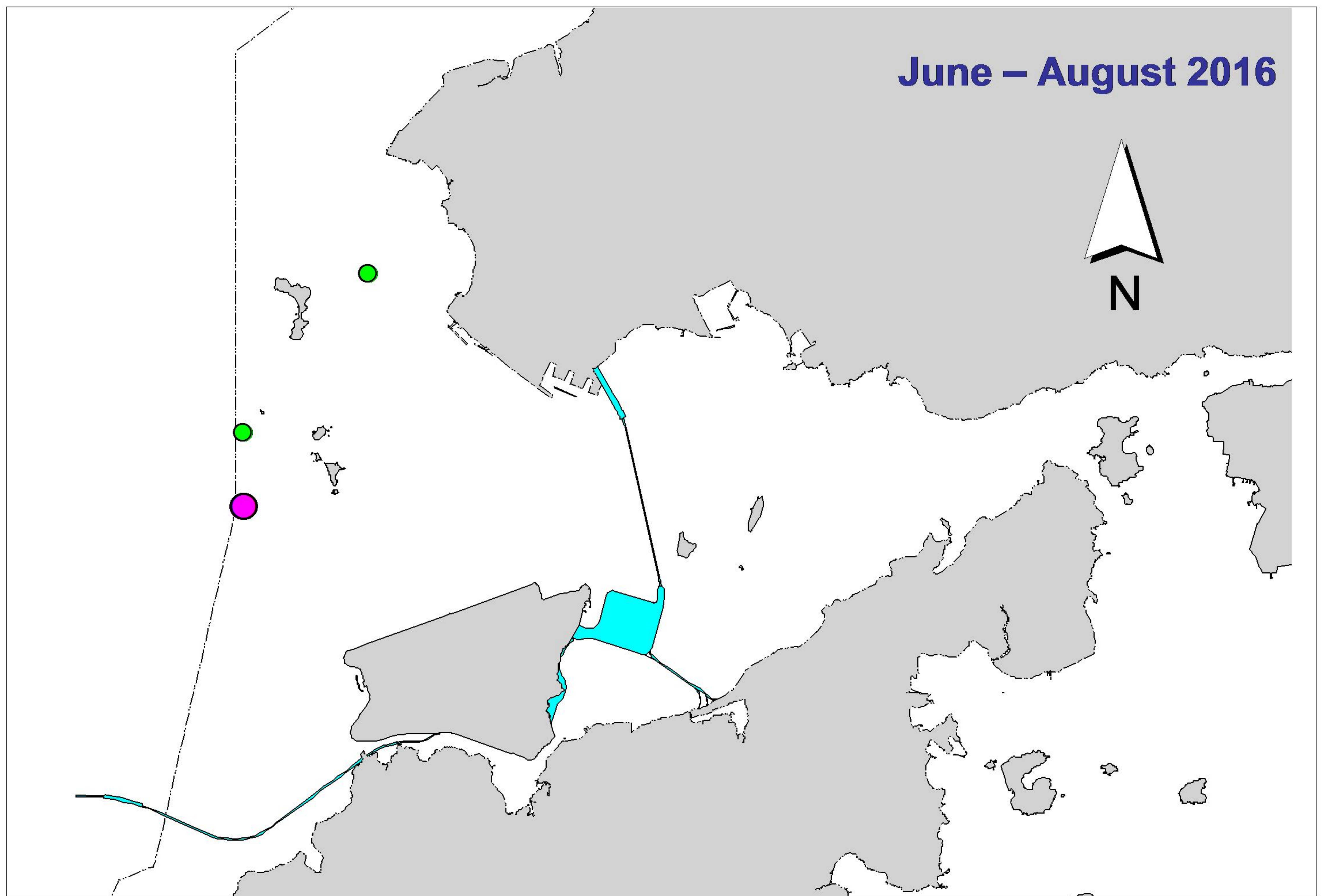


Figure 3. Distribution of Chinese white dolphins with larger group sizes during HKLR03 impact phase (top) and baseline monitoring surveys (bottom) (green dots: group sizes of 5 or more; purple dots: group sizes of 10 or more)

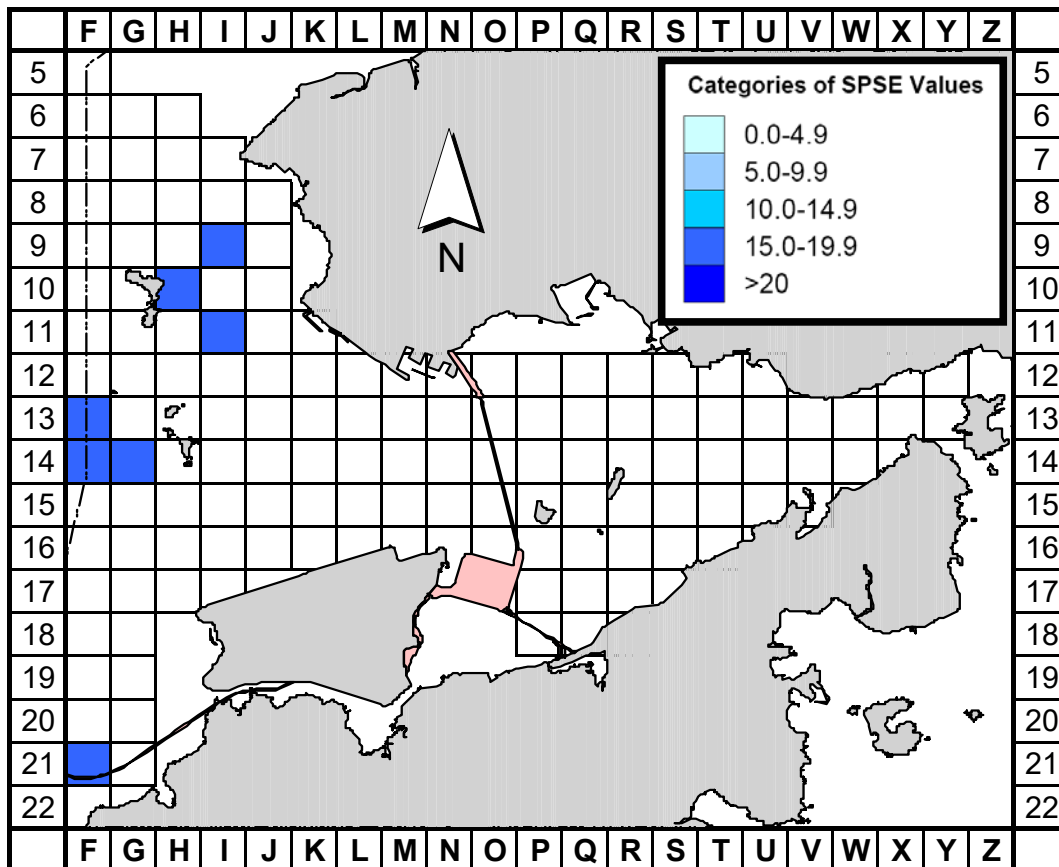


Figure 4a. Sighting density of Chinese white dolphins with corrected survey effort per km² in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (June-August 2016) (SPSE = no. of on-effort sightings per 100 units of survey effort)

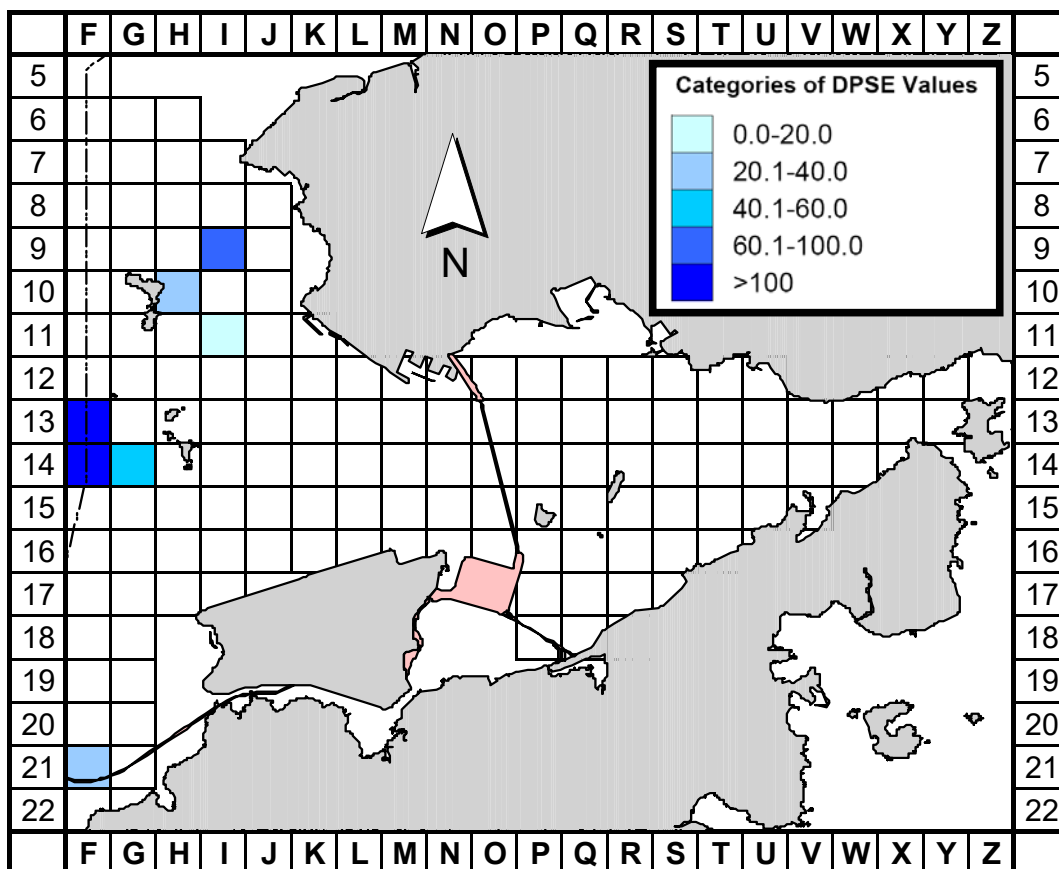


Figure 4b. Density of Chinese white dolphins with corrected survey effort per km² in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (June-August 2016) (DPSE = no. of dolphins per 100 units of survey effort)

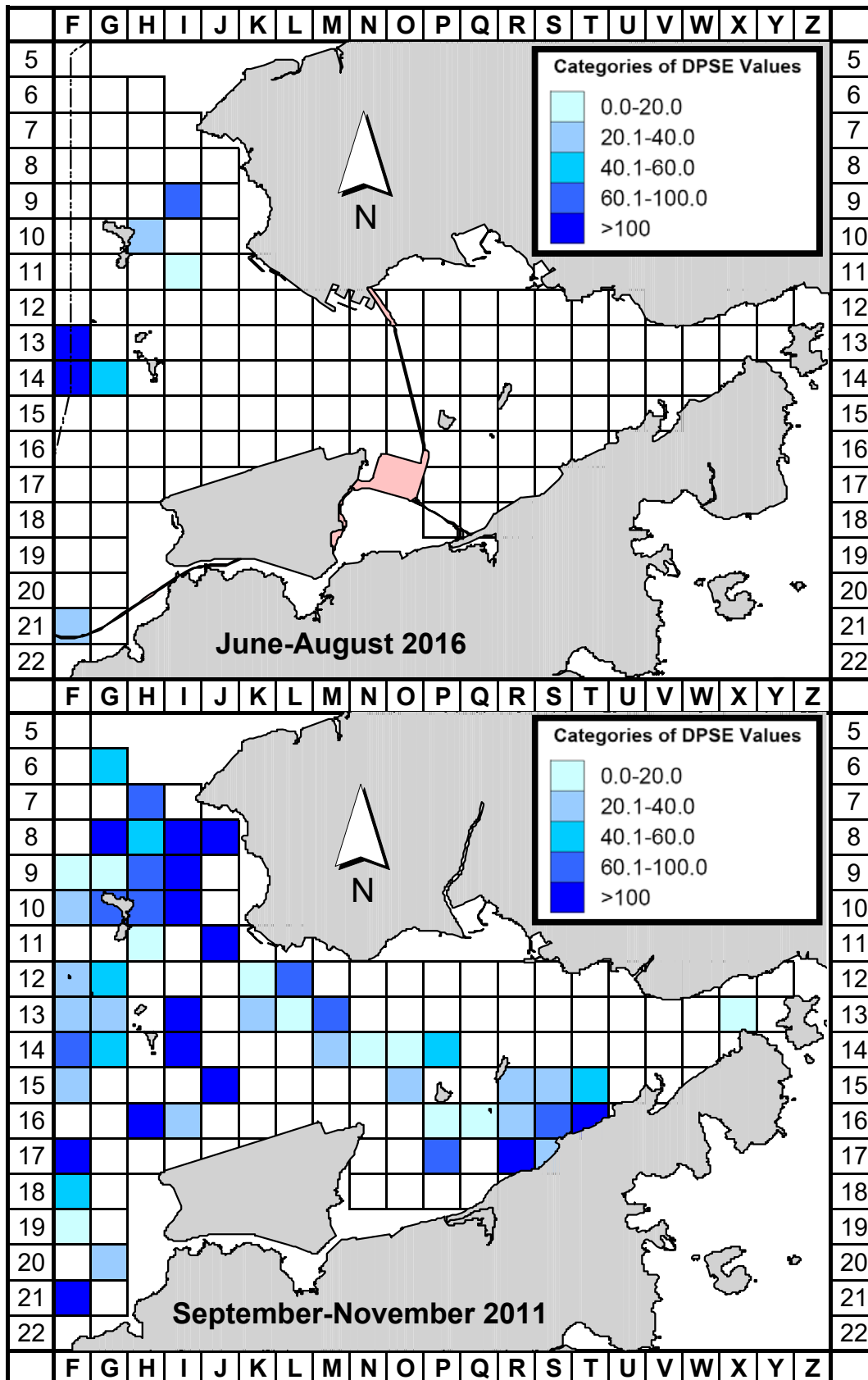


Figure 5. Comparison of density of Chinese white dolphins with corrected survey effort per km² in Northwest and Northeast Lantau survey area between the impact monitoring period (June-August 2016) and baseline monitoring period (September-November 2011) (DPSE = no. of dolphins per 100 units of survey effort)

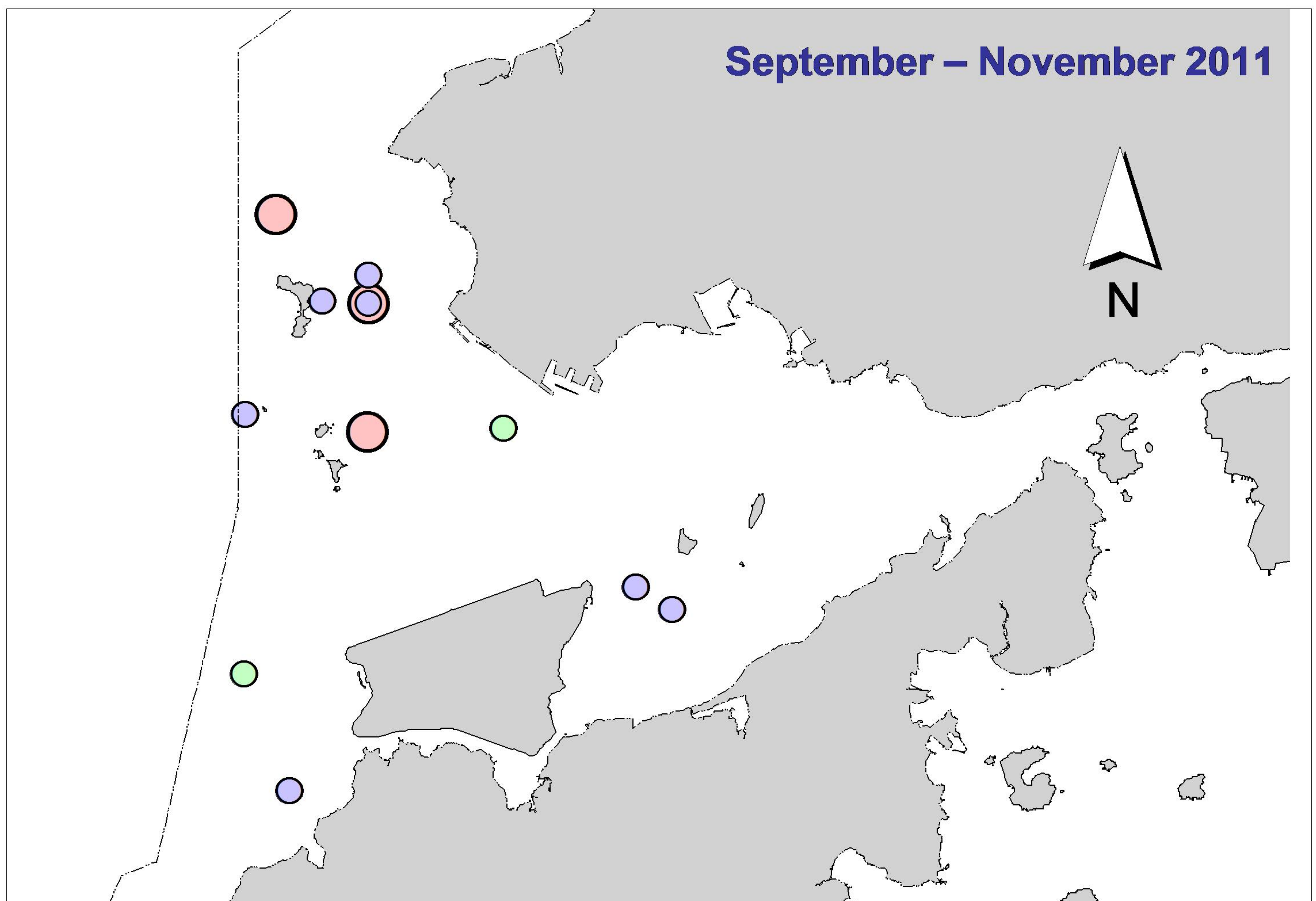
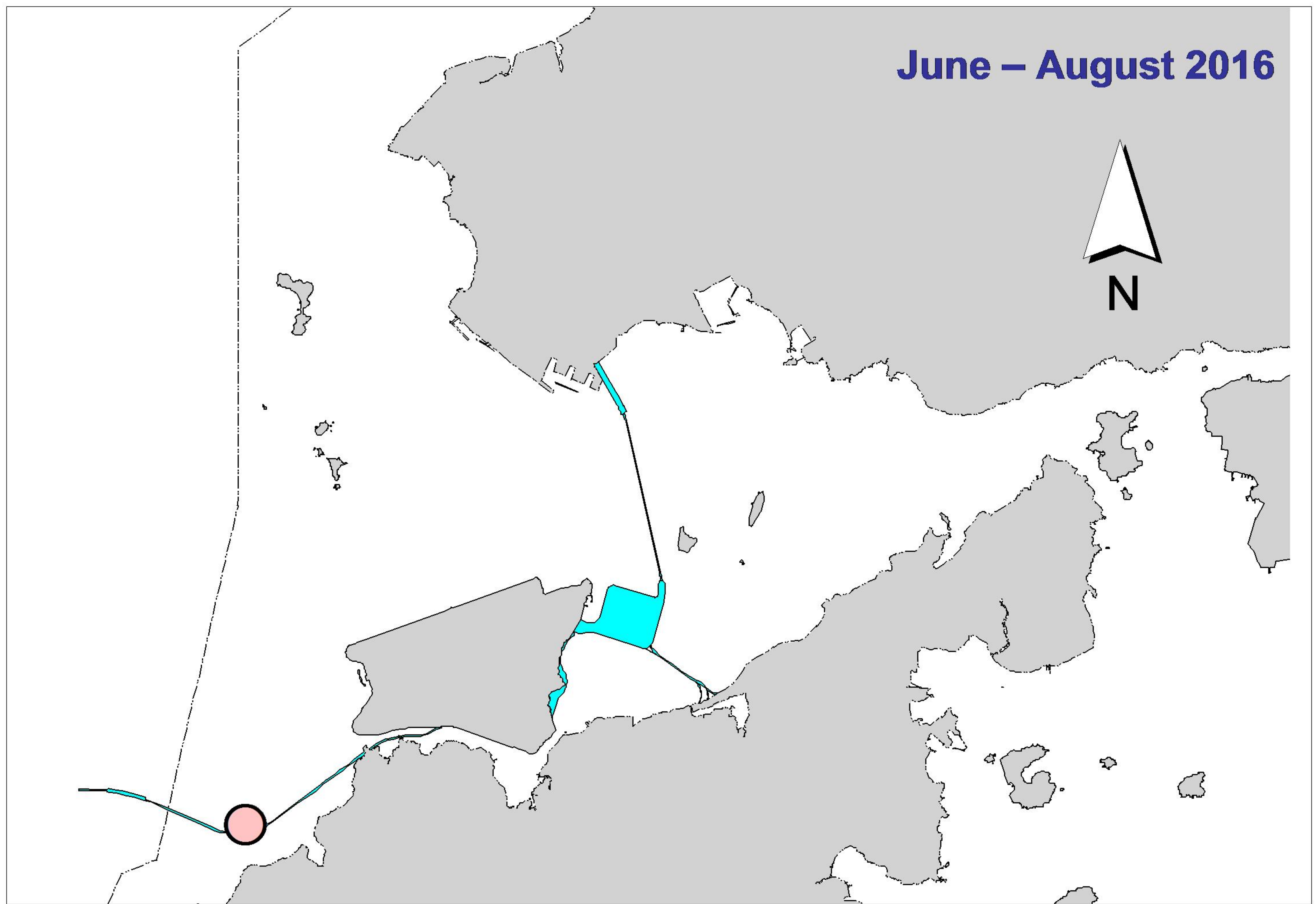


Figure 6. Distribution of Chinese white dolphins engaged in feeding (purple dots), socializing (pink dots) and traveling (green dots) activities during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

Appendix I. HKLR03 Survey Effort Database (June-August 2016)

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

| DATE | AREA | BEAU | EFFORT | SEASON | VESSEL | TYPE | P/S |
|-----------|-----------|------|--------|--------|---------------|------|-----|
| 1-Jun-16 | NW LANTAU | 3 | 5.57 | SUMMER | STANDARD31516 | HKLR | P |
| 1-Jun-16 | NW LANTAU | 4 | 24.03 | SUMMER | STANDARD31516 | HKLR | P |
| 1-Jun-16 | NW LANTAU | 5 | 1.80 | SUMMER | STANDARD31516 | HKLR | P |
| 1-Jun-16 | NW LANTAU | 3 | 2.80 | SUMMER | STANDARD31516 | HKLR | S |
| 1-Jun-16 | NW LANTAU | 4 | 5.30 | SUMMER | STANDARD31516 | HKLR | S |
| 1-Jun-16 | NE LANTAU | 2 | 6.91 | SUMMER | STANDARD31516 | HKLR | P |
| 1-Jun-16 | NE LANTAU | 3 | 12.82 | SUMMER | STANDARD31516 | HKLR | P |
| 1-Jun-16 | NE LANTAU | 2 | 8.05 | SUMMER | STANDARD31516 | HKLR | S |
| 1-Jun-16 | NE LANTAU | 3 | 2.52 | SUMMER | STANDARD31516 | HKLR | S |
| 6-Jun-16 | NW LANTAU | 1 | 4.44 | SUMMER | STANDARD31516 | HKLR | P |
| 6-Jun-16 | NW LANTAU | 2 | 30.16 | SUMMER | STANDARD31516 | HKLR | P |
| 6-Jun-16 | NW LANTAU | 3 | 5.59 | SUMMER | STANDARD31516 | HKLR | P |
| 6-Jun-16 | NW LANTAU | 2 | 13.61 | SUMMER | STANDARD31516 | HKLR | S |
| 6-Jun-16 | NE LANTAU | 2 | 15.55 | SUMMER | STANDARD31516 | HKLR | P |
| 6-Jun-16 | NE LANTAU | 3 | 0.80 | SUMMER | STANDARD31516 | HKLR | P |
| 6-Jun-16 | NE LANTAU | 2 | 10.94 | SUMMER | STANDARD31516 | HKLR | S |
| 13-Jun-16 | NW LANTAU | 3 | 28.50 | SUMMER | STANDARD31516 | HKLR | P |
| 13-Jun-16 | NW LANTAU | 4 | 5.40 | SUMMER | STANDARD31516 | HKLR | P |
| 13-Jun-16 | NW LANTAU | 3 | 4.90 | SUMMER | STANDARD31516 | HKLR | S |
| 13-Jun-16 | NW LANTAU | 4 | 4.90 | SUMMER | STANDARD31516 | HKLR | S |
| 13-Jun-16 | NE LANTAU | 2 | 14.58 | SUMMER | STANDARD31516 | HKLR | P |
| 13-Jun-16 | NE LANTAU | 3 | 5.31 | SUMMER | STANDARD31516 | HKLR | P |
| 13-Jun-16 | NE LANTAU | 2 | 6.03 | SUMMER | STANDARD31516 | HKLR | S |
| 13-Jun-16 | NE LANTAU | 3 | 5.18 | SUMMER | STANDARD31516 | HKLR | S |
| 17-Jun-16 | NW LANTAU | 2 | 20.32 | SUMMER | STANDARD31516 | HKLR | P |
| 17-Jun-16 | NW LANTAU | 3 | 18.28 | SUMMER | STANDARD31516 | HKLR | P |
| 17-Jun-16 | NW LANTAU | 2 | 3.00 | SUMMER | STANDARD31516 | HKLR | S |
| 17-Jun-16 | NW LANTAU | 3 | 5.50 | SUMMER | STANDARD31516 | HKLR | S |
| 17-Jun-16 | NE LANTAU | 2 | 11.80 | SUMMER | STANDARD31516 | HKLR | P |
| 17-Jun-16 | NE LANTAU | 3 | 5.68 | SUMMER | STANDARD31516 | HKLR | P |
| 17-Jun-16 | NE LANTAU | 2 | 3.32 | SUMMER | STANDARD31516 | HKLR | S |
| 17-Jun-16 | NE LANTAU | 3 | 2.90 | SUMMER | STANDARD31516 | HKLR | S |
| 5-Jul-16 | NW LANTAU | 2 | 4.50 | SUMMER | STANDARD31516 | HKLR | P |
| 5-Jul-16 | NW LANTAU | 3 | 29.29 | SUMMER | STANDARD31516 | HKLR | P |
| 5-Jul-16 | NW LANTAU | 4 | 6.90 | SUMMER | STANDARD31516 | HKLR | P |
| 5-Jul-16 | NW LANTAU | 2 | 2.10 | SUMMER | STANDARD31516 | HKLR | S |
| 5-Jul-16 | NW LANTAU | 3 | 7.30 | SUMMER | STANDARD31516 | HKLR | S |
| 5-Jul-16 | NW LANTAU | 4 | 3.70 | SUMMER | STANDARD31516 | HKLR | S |
| 5-Jul-16 | NE LANTAU | 2 | 2.30 | SUMMER | STANDARD31516 | HKLR | P |
| 5-Jul-16 | NE LANTAU | 3 | 13.62 | SUMMER | STANDARD31516 | HKLR | P |
| 5-Jul-16 | NE LANTAU | 4 | 0.81 | SUMMER | STANDARD31516 | HKLR | P |
| 5-Jul-16 | NE LANTAU | 2 | 4.30 | SUMMER | STANDARD31516 | HKLR | S |
| 5-Jul-16 | NE LANTAU | 3 | 5.77 | SUMMER | STANDARD31516 | HKLR | S |
| 12-Jul-16 | NW LANTAU | 1 | 4.04 | SUMMER | STANDARD31516 | HKLR | P |
| 12-Jul-16 | NW LANTAU | 2 | 27.40 | SUMMER | STANDARD31516 | HKLR | P |
| 12-Jul-16 | NW LANTAU | 1 | 2.10 | SUMMER | STANDARD31516 | HKLR | S |
| 12-Jul-16 | NW LANTAU | 2 | 6.27 | SUMMER | STANDARD31516 | HKLR | S |
| 12-Jul-16 | NE LANTAU | 2 | 19.99 | SUMMER | STANDARD31516 | HKLR | P |
| 12-Jul-16 | NE LANTAU | 2 | 11.81 | SUMMER | STANDARD31516 | HKLR | S |
| 18-Jul-16 | NW LANTAU | 2 | 4.34 | SUMMER | STANDARD31516 | HKLR | P |
| 18-Jul-16 | NW LANTAU | 3 | 29.06 | 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 |
|-----------|-----------|------|--------|--------|---------------|------|-----|
| 18-Jul-16 | NW LANTAU | 4 | 7.70 | SUMMER | STANDARD31516 | HKLR | P |
| 18-Jul-16 | NW LANTAU | 2 | 2.00 | SUMMER | STANDARD31516 | HKLR | S |
| 18-Jul-16 | NW LANTAU | 3 | 7.60 | SUMMER | STANDARD31516 | HKLR | S |
| 18-Jul-16 | NW LANTAU | 4 | 3.00 | SUMMER | STANDARD31516 | HKLR | S |
| 18-Jul-16 | NE LANTAU | 2 | 15.66 | SUMMER | STANDARD31516 | HKLR | P |
| 18-Jul-16 | NE LANTAU | 3 | 1.06 | SUMMER | STANDARD31516 | HKLR | P |
| 18-Jul-16 | NE LANTAU | 2 | 9.89 | SUMMER | STANDARD31516 | HKLR | S |
| 27-Jul-16 | NE LANTAU | 2 | 18.79 | SUMMER | STANDARD31516 | HKLR | P |
| 27-Jul-16 | NE LANTAU | 3 | 0.70 | SUMMER | STANDARD31516 | HKLR | P |
| 27-Jul-16 | NE LANTAU | 2 | 10.91 | SUMMER | STANDARD31516 | HKLR | S |
| 27-Jul-16 | NW LANTAU | 2 | 19.61 | SUMMER | STANDARD31516 | HKLR | P |
| 27-Jul-16 | NW LANTAU | 3 | 11.30 | SUMMER | STANDARD31516 | HKLR | P |
| 27-Jul-16 | NW LANTAU | 4 | 0.60 | SUMMER | STANDARD31516 | HKLR | P |
| 27-Jul-16 | NW LANTAU | 2 | 6.89 | SUMMER | STANDARD31516 | HKLR | S |
| 27-Jul-16 | NW LANTAU | 3 | 1.20 | SUMMER | STANDARD31516 | HKLR | S |
| 5-Aug-16 | NW LANTAU | 1 | 0.88 | SUMMER | STANDARD31516 | HKLR | P |
| 5-Aug-16 | NW LANTAU | 2 | 39.05 | SUMMER | STANDARD31516 | HKLR | P |
| 5-Aug-16 | NW LANTAU | 2 | 11.73 | SUMMER | STANDARD31516 | HKLR | S |
| 5-Aug-16 | NW LANTAU | 3 | 1.70 | SUMMER | STANDARD31516 | HKLR | S |
| 5-Aug-16 | NE LANTAU | 2 | 16.76 | SUMMER | STANDARD31516 | HKLR | P |
| 5-Aug-16 | NE LANTAU | 2 | 9.74 | SUMMER | STANDARD31516 | HKLR | S |
| 9-Aug-16 | NW LANTAU | 1 | 23.75 | SUMMER | STANDARD36826 | HKLR | P |
| 9-Aug-16 | NW LANTAU | 2 | 7.05 | SUMMER | STANDARD36826 | HKLR | P |
| 9-Aug-16 | NW LANTAU | 1 | 6.40 | SUMMER | STANDARD36826 | HKLR | S |
| 9-Aug-16 | NW LANTAU | 2 | 1.70 | SUMMER | STANDARD36826 | HKLR | S |
| 9-Aug-16 | NE LANTAU | 1 | 1.61 | SUMMER | STANDARD36826 | HKLR | P |
| 9-Aug-16 | NE LANTAU | 2 | 9.89 | SUMMER | STANDARD36826 | HKLR | P |
| 9-Aug-16 | NE LANTAU | 3 | 7.85 | SUMMER | STANDARD36826 | HKLR | P |
| 9-Aug-16 | NE LANTAU | 2 | 8.65 | SUMMER | STANDARD36826 | HKLR | S |
| 9-Aug-16 | NE LANTAU | 3 | 2.10 | SUMMER | STANDARD36826 | HKLR | S |
| 17-Aug-16 | NE LANTAU | 2 | 13.69 | SUMMER | STANDARD36826 | HKLR | P |
| 17-Aug-16 | NE LANTAU | 3 | 6.29 | SUMMER | STANDARD36826 | HKLR | P |
| 17-Aug-16 | NE LANTAU | 2 | 10.92 | SUMMER | STANDARD36826 | HKLR | S |
| 17-Aug-16 | NW LANTAU | 2 | 23.13 | SUMMER | STANDARD36826 | HKLR | P |
| 17-Aug-16 | NW LANTAU | 3 | 4.78 | SUMMER | STANDARD36826 | HKLR | P |
| 17-Aug-16 | NW LANTAU | 4 | 2.58 | SUMMER | STANDARD36826 | HKLR | P |
| 17-Aug-16 | NW LANTAU | 2 | 5.31 | SUMMER | STANDARD36826 | HKLR | S |
| 17-Aug-16 | NW LANTAU | 3 | 2.44 | SUMMER | STANDARD36826 | HKLR | S |
| 17-Aug-16 | NW LANTAU | 4 | 0.56 | SUMMER | STANDARD36826 | HKLR | S |
| 23-Aug-16 | NW LANTAU | 1 | 0.94 | SUMMER | STANDARD31516 | HKLR | P |
| 23-Aug-16 | NW LANTAU | 2 | 38.76 | SUMMER | STANDARD31516 | HKLR | P |
| 23-Aug-16 | NW LANTAU | 2 | 13.50 | SUMMER | STANDARD31516 | HKLR | S |
| 23-Aug-16 | NE LANTAU | 1 | 1.00 | SUMMER | STANDARD31516 | HKLR | P |
| 23-Aug-16 | NE LANTAU | 2 | 15.48 | SUMMER | STANDARD31516 | HKLR | P |
| 23-Aug-16 | NE LANTAU | 2 | 9.82 | SUMMER | STANDARD31516 | HKLR | S |

Appendix II. HKLR03 Chinese White Dolphin Sighting Database (June-August 2016)

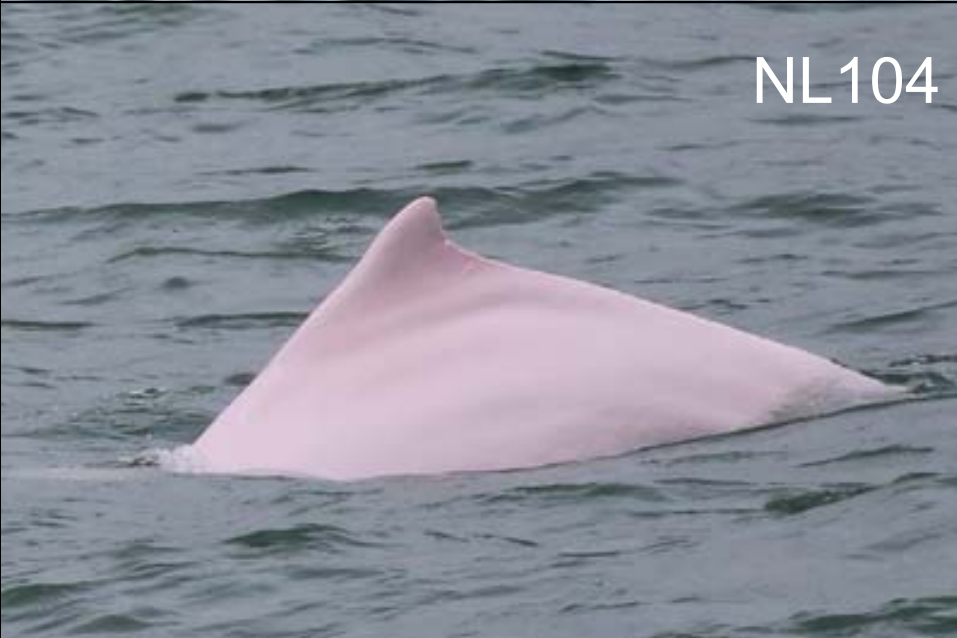
(Abbreviations: STG# = Sighting Number; HRD SZ = Dolphin Herd Size; BEAU = Beaufort Sea State; PSD = Perpendicular Distance; BOAT ASSOC. = Fishing Boat Association P/S: Sighting Made on Primary/Secondary Line)

| DATE | STG # | TIME | HRD SZ | AREA | BEAU | PSD | EFFORT | TYPE | NORTHING | EASTING | SEASON | BOAT ASSOC. | P/S |
|-----------|-------|------|--------|-----------|------|-----|--------|------|----------|---------|--------|-------------|-----|
| 6-Jun-16 | 1 | 1556 | 1 | NE LANTAU | 2 | ND | OFF | HKLR | 821150 | 818561 | SUMMER | NONE | |
| 5-Jul-16 | 1 | 1016 | 2 | NW LANTAU | 2 | 434 | ON | HKLR | 815337 | 804661 | SUMMER | NONE | P |
| 12-Jul-16 | 1 | 1335 | 1 | NW LANTAU | 2 | 531 | ON | HKLR | 825962 | 807516 | SUMMER | NONE | P |
| 12-Jul-16 | 2 | 1446 | 3 | NW LANTAU | 2 | 165 | ON | HKLR | 822433 | 805459 | SUMMER | NONE | P |
| 18-Jul-16 | 1 | 1014 | 1 | NW LANTAU | 3 | ND | OFF | HKLR | 815004 | 805073 | SUMMER | NONE | |
| 5-Aug-16 | 1 | 1049 | 11 | NW LANTAU | 2 | 95 | ON | HKLR | 822169 | 804686 | SUMMER | NONE | P |
| 5-Aug-16 | 2 | 1130 | 7 | NW LANTAU | 2 | 415 | ON | HKLR | 823742 | 804689 | SUMMER | NONE | P |
| 5-Aug-16 | 3 | 1228 | 2 | NW LANTAU | 2 | 119 | ON | HKLR | 826905 | 806457 | SUMMER | NONE | P |
| 17-Aug-16 | 1 | 1353 | 5 | NW LANTAU | 2 | 107 | ON | HKLR | 827091 | 807487 | SUMMER | NONE | P |
| 17-Aug-16 | 2 | 1422 | 1 | NW LANTAU | 2 | ND | OFF | HKLR | 827147 | 807528 | SUMMER | NONE | |

Appendix III. Individual dolphins identified during HKLR03 monitoring surveys in June-August 2016

| ID# | DATE | STG# | AREA |
|------------|-------------|-------------|-------------|
| CH34 | 12/07/16 | 2 | NW LANTAU |
| CH65 | 05/08/16 | 1 | NW LANTAU |
| NL48 | 12/07/16 | 1 | NW LANTAU |
| NL104 | 17/08/16 | 1 | NW LANTAU |
| NL136 | 12/07/16 | 2 | NW LANTAU |
| NL150 | 17/08/16 | 1 | NW LANTAU |
| NL182 | 12/07/16 | 2 | NW LANTAU |
| NL202 | 05/08/16 | 3 | NW LANTAU |
| NL255 | 05/08/16 | 1 | NW LANTAU |
| NL280 | 17/08/16 | 1 | NW LANTAU |
| NL281 | 05/08/16 | 1 | NW LANTAU |
| NL286 | 05/08/16 | 3 | NW LANTAU |
| NL293 | 18/07/16 | 1 | NW LANTAU |
| NL302 | 05/07/16 | 1 | NW LANTAU |
| NL307 | 05/07/16 | 1 | NW LANTAU |

Appendix IV. Fifteen individual dolphins that were identified during June-August 2016 under HKLR03 impact phase monitoring surveys



Appendix IV. (cont'd)

NL136



NL150



NL182



NL202



Appendix IV. (cont'd)

NL255



NL280



NL281



NL286



Appendix IV. (cont'd)

NL293



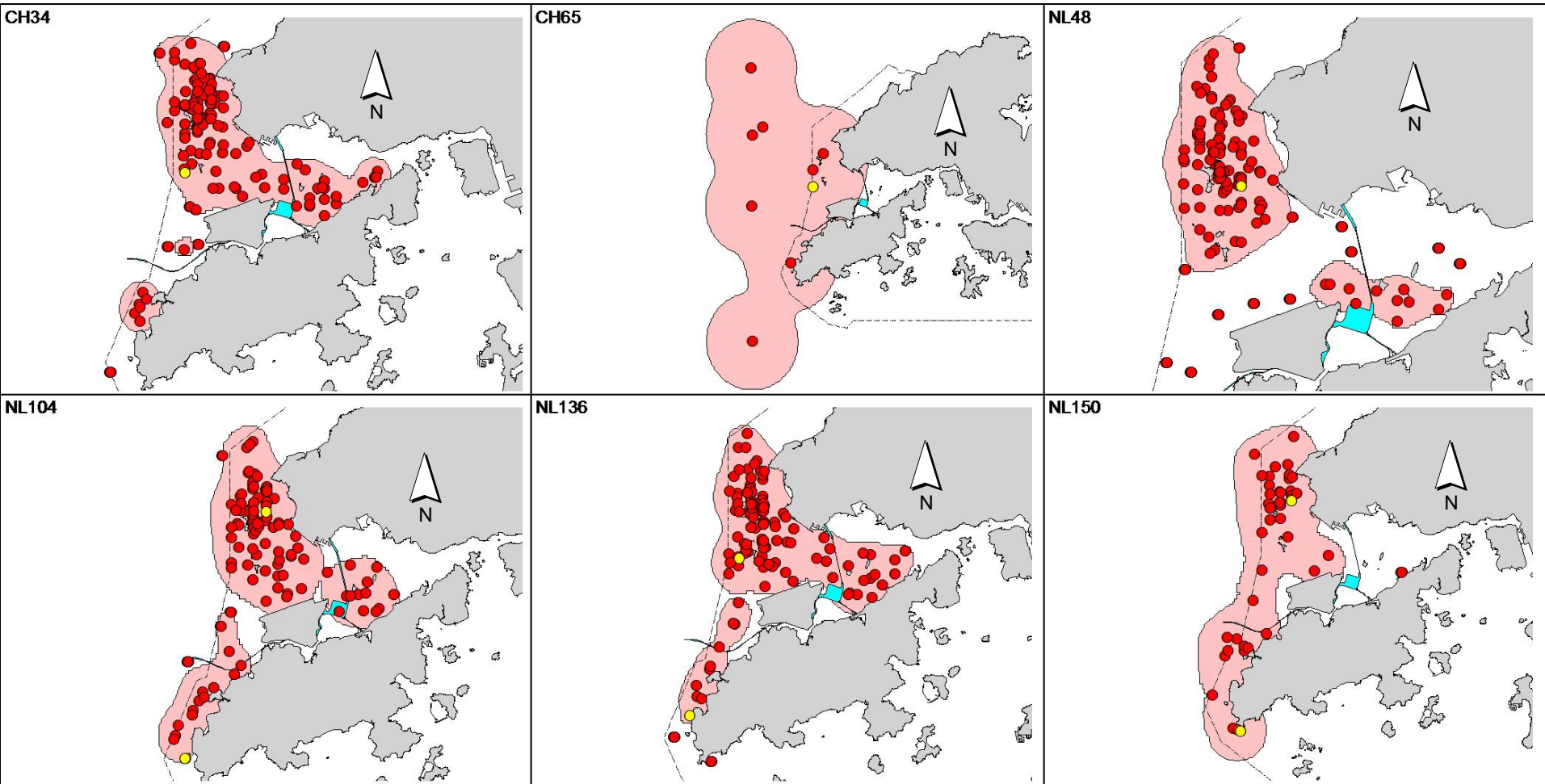
NL302



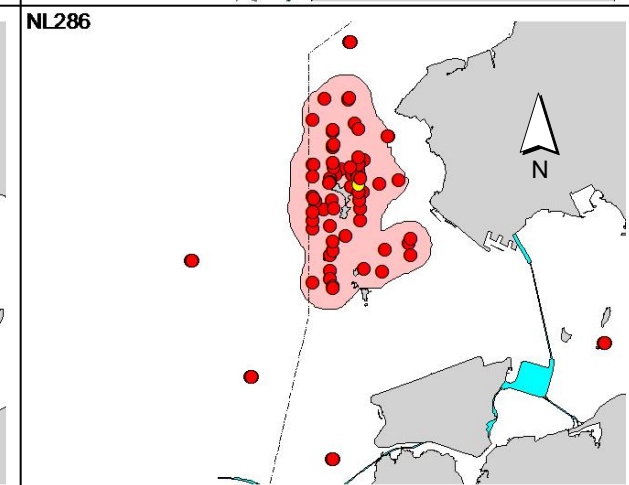
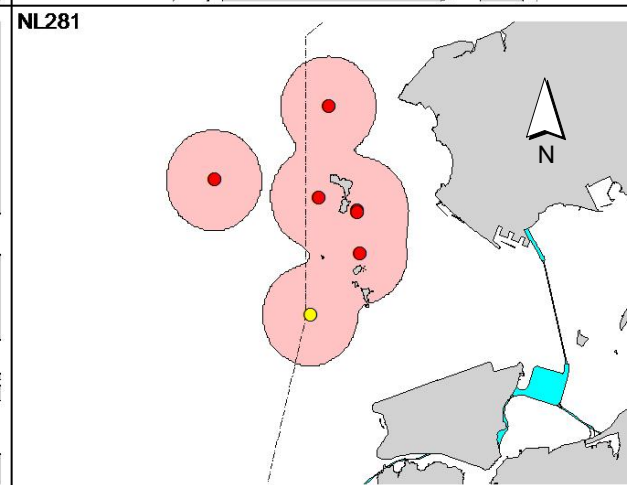
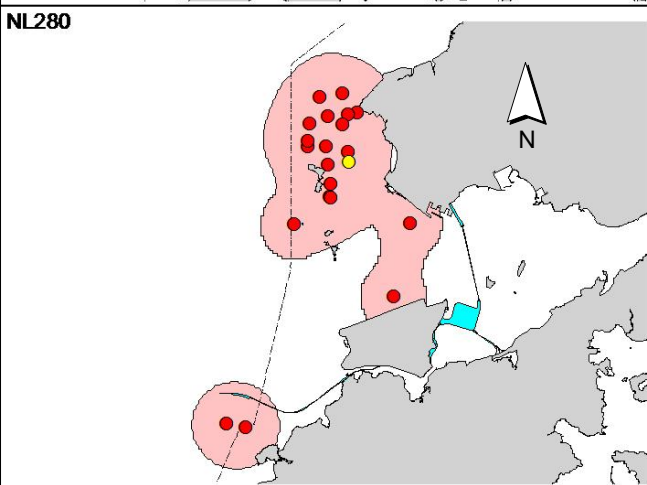
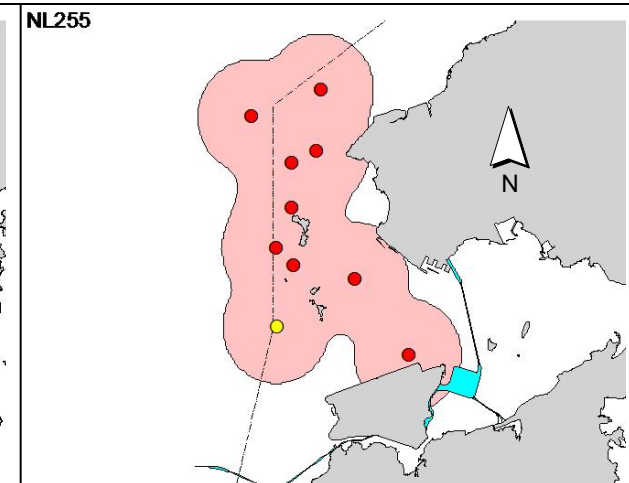
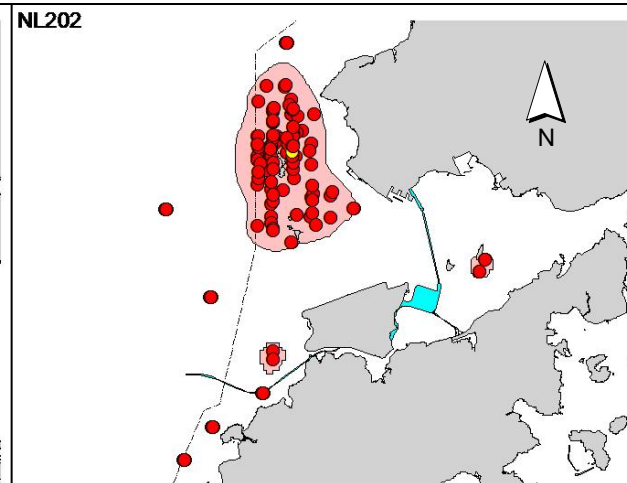
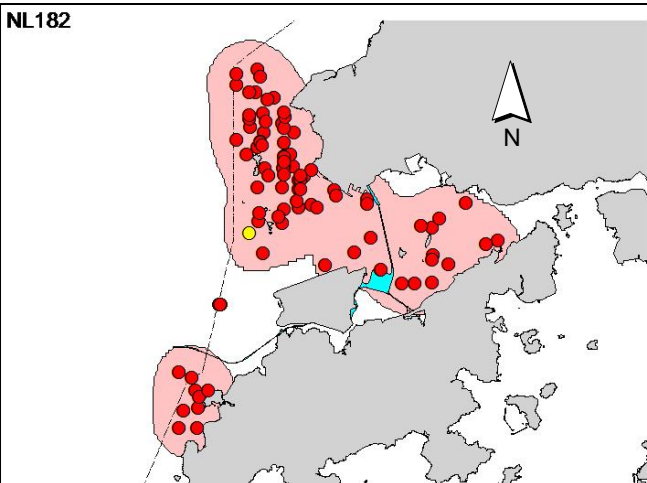
NL307



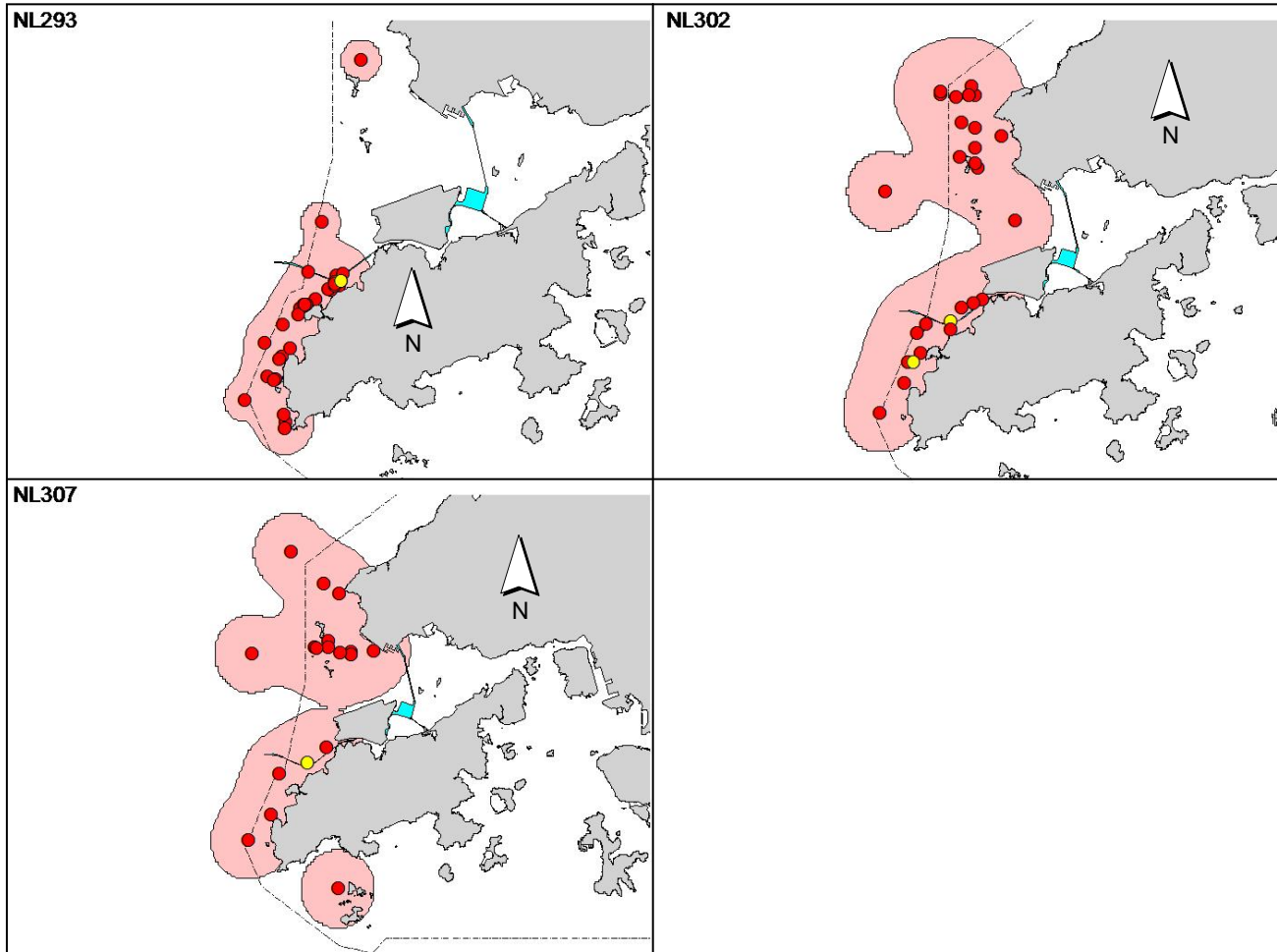
Appendix V. Ranging patterns (95% kernel ranges) of 15 individual dolphins that were sighted during HKLR03 impact phase monitoring period (note: yellow dots indicates sightings made in June-August 2016 during HZMB-related monitoring surveys)



Appendix V. (cont'd)



Appendix V. (cont'd)



Appendix H

Event and Action Plan

Event and Action Plan for Impact Air Monitoring

| | Action | | | |
|--------------------------------|--|--|---|---|
| | ET (a) | IEC (a) | SOR (a) | Contractor(s) |
| Action Level Exceedance | | | | |
| | <ol style="list-style-type: none"> 1. Identify the source. 2. Repeat measurement to confirm finding. If two consecutive measurements exceed Action Level, the exceedance is then confirmed. 3. Inform the IEC and the SOR. 4. Investigate the cause of exceedance and check Contractor's working procedures to determine possible mitigation to be implemented. 5. If the exceedance is confirmed to be Project related after investigation, increase monitoring frequency to daily. 6. Discuss with the IEC and the Contractor on remedial actions required. 7. If exceedance continues, arrange meeting with the IEC and the SOR. 8. If exceedance stops, cease additional monitoring. | <ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET. 2. Check the Contractor's working method. 3. If the exceedance is confirmed to be Project related after investigation, discuss with the ET and the Contractor on possible remedial measures. 4. Advise the SOR on the effectiveness of the proposed remedial measures. 5. Supervise implementation of remedial measures. | <ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing. 2. Notify the Contractor. 3. Ensure remedial measures properly implemented. | <ol style="list-style-type: none"> 1. Rectify any unacceptable practice 2. Amend working methods if appropriate 3. If the exceedance is confirmed to be Project related, submit proposals for remedial actions to IEC within 3 working days of notification 4. Implement the agreed proposals 5. Amend proposal if appropriate |

| | Action | | | |
|-------------------------------|--|--|--|---|
| | ET (a) | IEC (a) | SOR (a) | Contractor(s) |
| Limit Level Exceedance | | | | |
| | <ol style="list-style-type: none"> 1. Identify the source. 2. Repeat measurement to confirm finding. If two consecutive measurements exceed Limit Level, the exceedance is then confirmed. 3. Inform the IEC, the SOR, the DEP and the Contractor. 4. Investigate the cause of exceedance and check Contractor's working procedures to determine possible mitigation to be implemented. 5. If the exceedance is confirmed to be Project related after investigation, increase monitoring frequency to daily. 6. Carry out analysis of the Contractor's working procedures to determine possible mitigation to be implemented. 7. Arrange meeting with the IEC and the SOR to discuss the remedial actions to be taken. 8. Assess effectiveness of the Contractor's remedial actions and keep the IEC, the DEP and the SOR informed of the results. 9. If exceedance stops, cease additional monitoring. | <ol style="list-style-type: none"> 1. Check monitoring data submitted by the ET. 2. Check Contractor's working method. 3. If the exceedance is confirmed to be Project related after investigation, discuss with the ET and the Contractor on possible remedial measures. 4. Advise the SOR on the effectiveness of the proposed remedial measures. 5. Supervise implementation of remedial measures. | <ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing. 2. Notify the Contractor. 3. If the exceedance is confirmed to be Project related after investigation, in consultation with the IEC, agree with the Contractor on the remedial measures to be implemented. 4. Ensure remedial measures are properly implemented. 5. If exceedance continues, consider what activity of the work is responsible and instruct the Contractor to stop that activity of work until the exceedance is abated. | <ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance. 2. If the exceedance is confirmed to be Project related after investigation, submit proposals for remedial actions to IEC within 3 working days of notification. 3. Implement the agreed proposals. 4. Amend proposal if appropriate. 5. Stop the relevant activity of works as determined by the SOR until the exceedance is abated. |

Note: (a) ET - Environmental Team; IEC - Independent Environmental Checker; SOR - Supervising Officer's Representative

Event / Action Plan for Impact Dolphin Monitoring

| EVENT | ACTION | | | |
|--------------|--|---|---|--|
| | ET | IEC | SOR | Contractor |
| Action Level | <ol style="list-style-type: none"> 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. | <ol style="list-style-type: none"> 1. Check monitoring data submitted by ET and Contractor; 2. Discuss monitoring results and finding with the ET and the Contractor. | <ol style="list-style-type: none"> 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. | <ol style="list-style-type: none"> 1. Inform the SOR and confirm notification of the non-compliance in writing; 2. Discuss with the ET and the IEC and propose measures to the IEC and the SOR; 3. Implement the agreed measures. |
| Limit Level | <ol style="list-style-type: none"> 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; | <ol style="list-style-type: none"> 1. Check monitoring data submitted by ET and Contractor; 2. Discuss monitoring results and findings with the ET and the Contractor; 3. Attend the meeting to discuss with ET, SOR and | <ol style="list-style-type: none"> 1. Attend the meeting to discuss with ET, IEC and Contractor the necessity of additional dolphin monitoring and any other potential mitigation measures. 2. If SOR is satisfied with the | <ol style="list-style-type: none"> 1. Inform the SOR and confirm notification of the non-compliance in writing; 2. Attend the meeting to discuss with ET, IEC and SOR the necessity of additional dolphin monitoring and any other |

| EVENT | ACTION | | | |
|-------|--|--|---|--|
| | ET | IEC | SOR | Contractor |
| | <ol style="list-style-type: none"> 3. Identify source(s) of impact; 4. Inform the IEC, SOR and Contractor of findings; 5. Check monitoring data; 6. Repeat review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary. 7. If ET proves that the source of impact is caused by any of the construction activity by the works contract, ET to arrange a meeting to discuss with IEC, SOR and Contractor the necessity of additional dolphin monitoring and/or any other potential mitigation measures (e.g., consider to modify the perimeter silt curtain or consider to control/temporarily stop relevant construction activity etc.) and submit to IEC a proposal of additional dolphin monitoring and/or mitigation measures where necessary. | <p>Contractor the necessity of additional dolphin monitoring and any other potential mitigation measures.</p> <ol style="list-style-type: none"> 4. Review proposals for additional monitoring and any other mitigation measures submitted by ET and Contractor and advise SOR of the results and findings accordingly. 5. Supervise / Audit the implementation of additional monitoring and/or any other mitigation measures and advise SOR the results and findings accordingly. | <p>proposals for additional dolphin monitoring and/or any other mitigation measures submitted by ET and Contractor and verified by IEC, SOR to signify the agreement in writing on such proposals and any other mitigation measures.</p> <ol style="list-style-type: none"> 3. Supervise the implementation of additional monitoring and/or any other mitigation measures. | <p>potential mitigation measures.</p> <ol style="list-style-type: none"> 3. Jointly submit with ET to IEC a proposal of additional dolphin monitoring and/or any other mitigation measures when necessary. 4. Implement the agreed additional dolphin monitoring and/or any other mitigation measures. |

Note: ET – Environmental Team, IEC – Independent Environmental Checker, SOR – Supervising Officer’s Representative

Appendix I

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

Table I1 *Cumulative Statistics on Exceedances*

| Monitoring Parameters | Action/Limit Level | Total No. recorded in this reporting quarter | Total No. recorded since project commencement |
|------------------------------|---------------------------|---|--|
| 1-Hr TSP | Action | 0 | 30 |
| | Limit | 0 | 2 |
| 24-Hr TSP | Action | 0 | 5 |
| | Limit | 0 | 1 |
| Water Quality | Action | 0 | 6 |
| | Limit | 0 | 1 |
| Impact Dolphin Monitoring | Action | 0 | 9 |
| | Limit | 1 | 6 |

Table I2 *Cumulative Statistics on Complaints, Notifications of Summons and Successful Prosecutions*

| Reporting Period | Cumulative Statistics | | |
|---|------------------------------|---------------------------------|--------------------------------|
| | Complaints | Notifications of Summons | Successful Prosecutions |
| This Reporting Period (June 2016 to August 2016) | 2 | 0 | 0 |
| Total No. received since project commencement | 7 | 0 | 0 |

ENVIRONMENTAL COMPLAINT INVESTIGATION REPORT

Our Reference: 0212330_Complaint LOG_20160607_05

Basic Information of Complaints

| | |
|-----------------------------|---|
| Reference Number: | EP/RW/0000349002 |
| Date of Complaints Received | 7 June 2016 |
| Location of Complaints | Pier at 33 Ho Yeung Street, Tuen Mun |
| Nature of Complaints | Muddy water discharge |
| Complaints Received by | Environmental Protection Department (EPD) |
| Via | Not disclosed |
| Complainants | Not disclosed |

Details of Complaints

On 7 June 2016, a complaint case was received by EPD regarding muddy water discharge near the pier at 33 Ho Yeung Street, Tuen Mun. The Contractor and the Environmental Team (ET) received the complaint notification on 28 June 2016. The ET was informed that the case is categorized as complaint in nature upon the investigation, discussion and agreement between different parties (i.e. the Contractor (DBJV), SOR and ENPO).

Investigation Report

Upon receiving the case notification from EPD on 28 June 2016, the Contractor had promptly checked the works summary of June 2016.

Based on the record of the Contractor’s works summary, no wastewater generated from construction activities was recorded near the pier at 33 Ho Yeung Street, Tuen Mun on 6 June 2016. According to the construction programme provided by the Contractor, there is no construction work scheduled at 81-91 Ho Yeung Street area (See Figure 1). Only surface runoff within the site boundary will be collected and treated by the Wetsep before discharge. Routine inspections and maintenance have been carried out in weekly basis (See Annex A). Water sample had been tested and the result complied with the water discharge license.

After receiving the complaint, the contractor has checked the current drainage system near the incident area. Silt in the storm drain was removed and the drainage system was cleaned. An inspection was carried out with the Contractor and SOR to investigate the complaint case on 28 June 2016. No muddy water discharge was discovered (See Annex A).

Based on the above, the complaint case is considered to be not related to this Contract’s work and is thus invalid.

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

During construction, the Contractor is in accordance with the requirements of the relevant environmental regulations and the implementation of mitigation measures which included deploying wastewater treatment facilities on site treating wastewater to meet the conditions of WPCO license prior to discharging.

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

The Contractor shall identify work activities on the Site with large water consumption and provide an effective drainage system for collection of wastewater generated.

The Contractor shall designate staff for the operation of the wastewater treatment facilities. The designated staff shall maintain a proper daily record of plant performance for inspection by the SO or his representative. No other additional action is required.

Date of File Closed : 6 July 2016

Approved and Filed by:



(Jovy Tam, ET Leader)

Date: 6 July 2016



Annex A Photo Records taken during Site Investigation

*Note: Photos taken on 23/6/2016



Built-up sludge was removed regularly (81-91 Ho Yeung Street area)

*Note: Photos taken on 28/6/2016



No muddy water discharge was discovered at the discharge point. (81-91 Ho Yeung Street area)



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

WETSEP Checking Record
污水處理機檢查記錄

WETSEP Location 污水處理機位置: N6

Date 日期: 6月6日 to 6月12日 (2016年)

| | Monday 星期一 | Tuesday 星期二 | Wednesday 星期三 | Thursday 星期四 | Friday 星期五 | Saturday 星期六 | Sunday 星期日 |
|--|---------------|----------------|------------------|-----------------|---------------|-----------------|---------------|
| 1. WETSEP In Normal Operation? 處理機是否正常運作? | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 2. pH Value 酸鹼度 (6.0 – 9.0) | 8.3 | 8.6 | 8.1 | 8.7 | 8.2 | 7.9 | 8.5 |
| 3. Electrical Supply OK? 電力供應正常? | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 4. Outlet Abnormal? (Any Sludge? Any Colour Change? Flowrate?) 出水口有否異常? (污泥有否積聚? 顏色有否改變? 流量有否異常?) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 5. Potion Enough? 藥水是否足夠? | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| 6. Clean the Sedimentation Tank? 有否清理隔沙缸? | | | ✓ | | | ✓ | |
| 7. Clean the De-silt Basin? 有否清理蓄泥池? | | | ✓ | | | ✓ | |
| 8. Are the Cleansing Records of Sedimentation Tank/ De-silt Basin Stored Properly? 清理蓄泥池記錄是否妥善儲存? | | | ✓ | | | ✓ | |
| 9. Refill of Flocculants? pH Neutralization agent? 補充凝絮劑/酸鹼調節劑? | | | ✓ | | | ✓ | |
| 10. Others 其他情況 | | | | | | | |
| Verified by Site Foreman/Supervisor 地盤管工/監督簽署確認 | ✍ | ✍ | ✍ | ✍ | ✍ | ✍ | ✍ |

*Please tick (✓) in the box if the condition is normal. *若情況正常, 請於方格內加上剔號(✓).
cross (X) in the box if the condition is abnormal, and write down the non-conformance. 若情況不尋常, 請於方格內加上交叉(X), 並寫下不尋常狀況。

Remarks:

- (1) Please keep the record and send to environmental department in monthly basis.
備註:
(1) 請將記錄妥善保存, 並每月將記錄交回環保部。

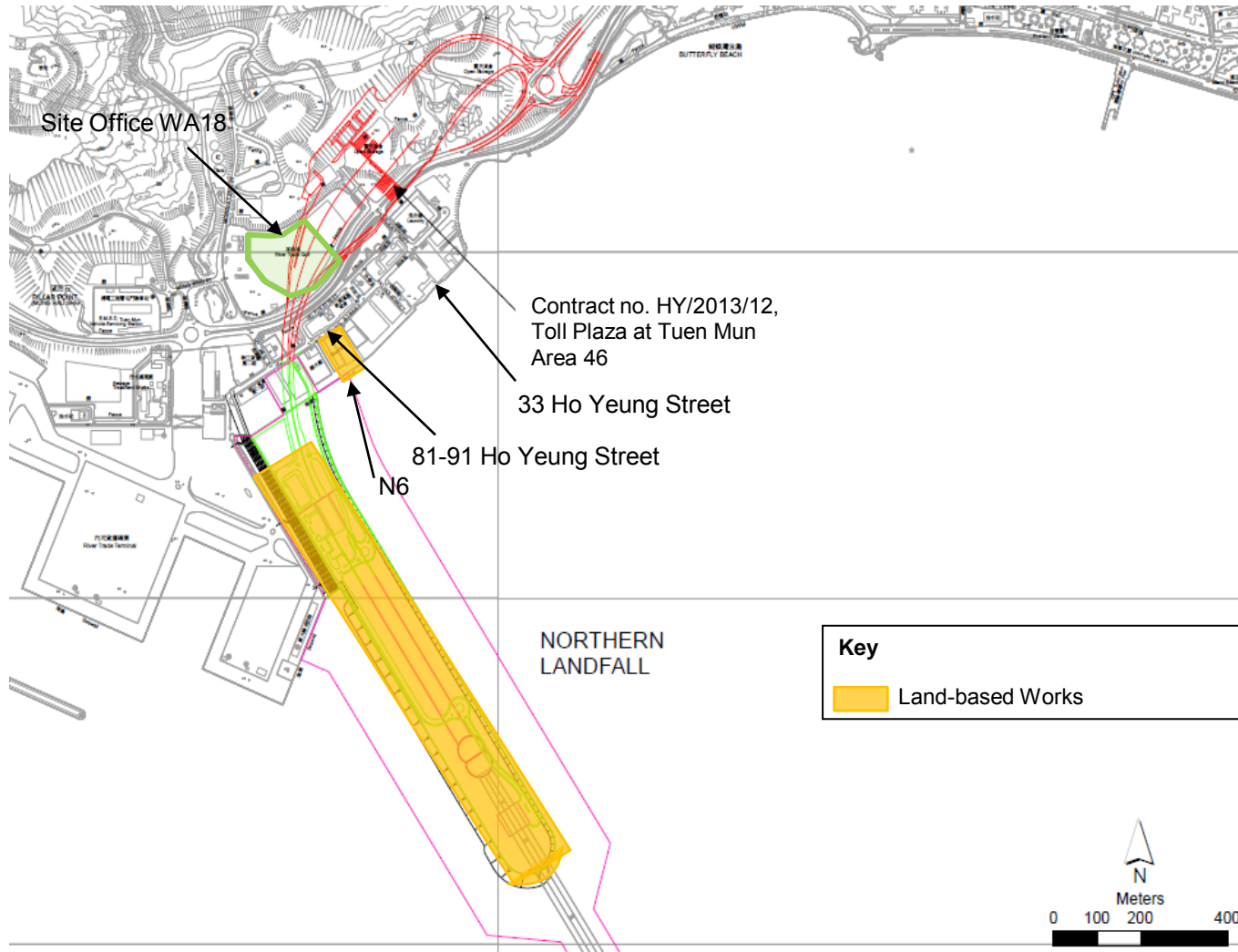


Figure 1

ENVIRONMENTAL COMPLAINT INVESTIGATION REPORT

Our Reference: 0212330_Complaint LOG_20160716_06

Basic Information of Complaints

| | |
|-----------------------------|------------------------|
| Reference Number: | Not disclosed |
| Date of Complaints Received | 16 July 2016 |
| Location of Complaints | Tuen Mun Ferry Pier |
| Nature of Complaints | Marine litter disposal |
| Complaints Received by | Not disclosed |
| Via | Not disclosed |
| Complainants | Not disclosed |

Details of Complaints

On 16 July 2016, an complaint case was received regarding marine litter disposal near Tuen Mun Ferry Pier. The Contractor and the Environmental Team (ET) received the complaint notification on 22 July 2016.

Investigation Report

Upon receiving the case notification from ENPO on 22 July 2016, the Contractor had promptly checked the works summary of July 2016.

According to the construction programme provided by the Contractor, there is no construction work scheduled near Tuen Mun Ferry Pier. In addition, since the location of Tuen Mun Ferry Pier is relatively far away from the project site, the complaint is not related to this Contract's work.

Based on the above, the complaint case is considered to be not related to this Contract.

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

The Contractor has been reminded to adhere strictly to implement all relevant mitigation measures of water quality impact recommended or specified in the EP (EP-354/2009/D), the approved EIA and the Updated EM&A Manual of this Project to avoid causing water pollution. No other additional action is required.

Date of File Closed : 12 August 2016

Approved and Filed by:



(Jovy Tam, ET Leader)

Date: 12 August 2016

Email
message

Environmental
Resources
Management

To Ramboll Environ - Hong Kong, Limited (ENPO)

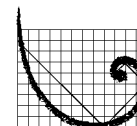
From ERM- Hong Kong, Limited

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

Subject Notification of Exceedance for Impact Dolphin
Monitoring

Date 27 February 2017

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



ERM

Dear Sir or Madam,

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

0212330_Jun2016/Aug2016_dolphin_STG&ANI_NEL&NWL

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

Regards,

A handwritten signature in black ink, appearing to read 'Jovy Tam', written in a cursive style.

Mr Jovy Tam
Environmental Team Leader

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ERM-Hong Kong, Limited

CONTRACT NO. HY/2012/08

TUEN MUN – CHEK LAP KOK LINK –
NORTHERN CONNECTION SUB-SEA TUNNEL SECTION

Impact Dolphin Monitoring
Notification of Exceedance

| | | |
|--|--|--|
| Log No. | 0212330_Jun2016/Aug2016_dolphin_STG&ANI_NEL&NWL [Total No. of Exceedances = 1 Limit Level Exceedance] | |
| Date | June to August 2016 (monitored) 25 November 2016 (results received by ERM) | |
| Monitoring Area | Northeast Lantau (NEL) and Northwest Lantau (NWL) | |
| Parameter(s) with Exceedance(s) | Quarterly encounter rate of dolphin sightings (STG) Quarterly encounter rate of total number of dolphins (ANI) | |
| Action Levels | North Lantau Social cluster | NEL: STG < 4.2 & ANI < 15.5 or NWL: STG < 6.9 & ANI < 31.3 |
| Limit Levels | | NEL: STG < 2.4 & ANI < 8.9 and NWL: STG < 3.9 & ANI < 17.9 |
| Recorded Levels | NEL | STG = 0.0 & ANI = 0.0 |
| | NWL | STG = 1.72 & ANI = 7.48 |
| | One Limit Level Exceedance was recorded in the quarterly impact dolphin monitoring at NEL and NWL between June and August 2016. The exceedance was reported in the approved <i>Thirty-fourth Monthly EM&A Report</i> dated 12 September 2016. | |
| Statistical Analyses | <p>Further to the review of the available and relevant dolphin monitoring data in the EM&A programme by this Contract, statistical analyses were conducted as follows:</p> <ul style="list-style-type: none"> A two-way ANOVA with repeated measures and unequal sample size was conducted using Period (2 levels: baseline vs impact – present quarter, June to August 2016) and Location (2 levels: NEL and NWL) as fixed factors to examine whether there were any significant differences in the average encounter rates between the baseline and present impact monitoring quarter. By setting $\alpha = 0.05$ as the significance level in the statistical tests, significant differences in STG ($p = 0.0031$) and ANI ($p = 0.0227$) were detected between Periods. A two-way ANOVA with repeated measures and unequal sample size was conducted using Cumulative Period (2 levels: baseline vs impact – cumulative quarters*, December 2012 to May 2016) and Location (2 levels: NEL and NWL) as fixed factors to examine whether there were any significant differences in the average encounter rates between the baseline and cumulative impact monitoring quarters. By setting $\alpha = 0.00005$ as the significance level in the statistical tests, significant difference in STG ($p = 0.000009$) and in ANI ($p = 0.000001$) between Cumulative Period and Location were detected. <p>*Note: The commencement date under <i>Contract No. HY/2012/08</i> is 1 November 2013.</p> | |
| Works Undertaken (in the monitoring quarter) | In the quarter between June 2016 and August 2016, no marine works was carried out in this Contract. | |

| | |
|--|--|
| Possible Reason for Action or Limit Level Exceedance(s) | <p>The potential factors that may have contributed to the observed exceedance are reviewed below:</p> <ul style="list-style-type: none"> • Blocking of CWD travelling corridor: The <i>Monitoring of Marine Mammals in Hong Kong Waters (2015 – 16)</i> ⁽¹⁾ reported that dolphin usage and traveling activities to the northern side of the airport (dolphin traveling corridor) are affected by frequent high-speed ferry traffic from Sky Pier (not related to this Contract), which is likely a major factor resulting in the decrease in dolphin abundances in North Lantau. • Marine works of the Contract: As per the findings from the EIA report (<i>Section 8.11.9</i>), the major influences on the Chinese White Dolphin (CWD) <i>Sousa chinensis</i> under this Contract are marine traffics, reclamation and dredging works. The Contractor implemented the marine traffic control in the reporting period as per the requirements in the <i>EP-354/2009/D</i> and the updated <i>EM&A Manual</i>. The reclamation and dredging works of this Contract (Phase 1) was completed in December 2014. Thus, underwater noise emission from this Contract had been relatively low in the reporting period when comparing to the previous quarters (Nov 2013 to Feb 2015). During dolphin monitoring in this quarter, no unacceptable impact on CWD due to the activities under this Contract was observed. <p>In view of the above, marine ecological mitigation measures were considered properly implemented, and thus no unacceptable impact on CWD or its habitat was associated with this Contract in this quarter from June 2016 and August 2016.</p> |
| Actions Taken/ To Be Taken | <p>A joint team meeting was held on 14 October 2016 for discussion on CWD trend, with attendance of ENPO, HyD, Representatives of Resident Site Staff (RSS), Representatives of Environmental Team (ET) for Contract No. HY/2010/02, HY2011/03, HY/2012/07 and HY/2012/08. The discussion/recommendation as recorded in the minutes of the meeting, which might be relevant to this Contract are summarized below. It was concluded that the HZMB works is one of the contributing factors affecting the dolphins. It was also concluded the contribution of impacts due to the HZMB works as a whole (or individual marine contracts) cannot be quantified or separate from the other stress factors. ENPO presented the CWD survey results in mainland waters obtained from Hong Kong-Zhuhai-Macao Bridge Authority that some CWDs that were previously more often sighted in Hong Kong waters have expanded their ranges into mainland waters, and some with reduced usage in Hong Kong waters, while they are partially accounted for the local decline. It was reminded that the ETs shall keep reviewing the implementation status of the dolphin related mitigation measures and remind the contractor to ensure the relevant measures are fully implemented. The ETs were also reminded to update the BMP boundary in the Regular Marine Travel Route Plan. The participants were requested by ENPO to collect and report the marine traffic statistics. It was recommended that the marine works of HZMB projects should be completed as soon as possible so as to reduce the overall duration of impacts and allow the dolphins population to recover as early as possible. It was also suggested that the protection measures (e.g., speed limit control) for the proposed Brothers Marine Park (BMP) shall be brought forward as soon as possible before its establishment so as to provide a better habitat for dolphin recovery.</p> |
| Remarks | <p>The results of impact dolphin monitoring, the status of implemented marine ecological mitigation measures are documented in the approved <i>Thirty Second to Thirty-Fourth Monthly EM&A Reports</i>.</p> |

(1) Hung SKY (2016). Prepared for AFCD. Available at: https://www.afcd.gov.hk/english/conservation/con_mar_chi/con_mar_chi_chi/files/Final_Report_2015_16.pdf

Appendix J

Waste Flow Table

Monthly Summary Waste Flow Table

Name of Department: HyD

Contract No. / Works Order No.: HY/2012/08

Monthly Summary Waste Flow Table for August 2016 [to be submitted not later than the 15th day of each month following reporting month] (All quantities shall be rounded off to 3 decimal places.)

| Month | Monthly Break-down of <u>Inert</u> Construction & Demolition Materials (i.e. Public Fill Materials) | | | | |
|--------------------------|---|--|-------------------------------|---------------------------------|-----------------------------------|
| | (a)=(b)+(c)+(d)+(e) Total Quantity Generated | (b) Hard Rock and Large Broken Concrete | (c) Reused in the Contract | (d) Reused in other Projects | (e) Disposed of as Public Fill |
| | (in '000 ton) | (in '000 ton) | (in '000 ton) | (in '000 ton) | (in '000 ton) |
| Sub-total | 930.268 | 0.000 | 0.000 | 0.000 | 930.268 |
| Jan-2016 | 24.068 | 0.000 | 0.000 | 0.000 | 24.068 |
| Feb-2016 | 9.229 | 0.000 | 0.000 | 0.000 | 9.229 |
| Mar-2016 | 3.501 | 0.000 | 0.000 | 0.000 | 3.501 |
| Apr-2016 | 9.175 | 0.000 | 0.000 | 0.000 | 9.175 |
| May-2016 | 2.392 | 0.000 | 0.000 | 0.000 | 2.392 |
| Jun-2016 | 5.597 | 0.000 | 0.000 | 0.000 | 5.597 |
| Half Year Sub-total | 53.962 | 0.000 | 0.000 | 0.000 | 53.962 |
| Jul-2016 | 10.063 | 0.000 | 0.000 | 0.000 | 10.063 |
| Aug-2016 | 31.621 | 0.000 | 0.000 | 0.000 | 31.621 |
| Sep-2016 | | | | | |
| Oct-2016 | | | | | |
| Nov-2016 | | | | | |
| Dec-2016 | | | | | |
| Project Total Quantities | 1025.914 | 0.000 | 0.000 | 0.000 | 1025.914 |

| Month | Actual Quantities of <u>Non-inert</u> Construction Waste Generated Monthly | | | | | | | | |
|--------------------------|--|----------|----------------------------|----------|--------------------------|----------|----------------|----------|--|
| | Metals | | Paper/ cardboard packaging | | Plastics (see Note 3) | | Chemical Waste | | Others, e.g. General Refuse disposed at Landfill |
| | (in '000kg) | | (in '000kg) | | (in '000kg) | | (in '000kg) | | (in '000ton) |
| | generated | recycled | generated | recycled | generated | recycled | generated | Disposed | generated |
| Sub-total | 0.000 | 0.000 | 2.150 | 2.150 | 6.870 | 6.870 | 1.710 | 1.710 | 2.217 |
| Jan-2016 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.113 |
| Feb-2016 | 1.850 | 1.850 | 0.000 | 0.000 | 0.000 | 0.000 | 4.740 | 4.740 | 0.102 |
| Mar-2016 | 0.000 | 0.000 | 0.200 | 0.200 | 0.000 | 0.000 | 3.000 | 3.000 | 0.111 |
| Apr-2016 | 0.000 | 0.000 | 0.200 | 0.200 | 0.000 | 0.000 | 0.000 | 0.000 | 0.198 |
| May-2016 | 0.000 | 0.000 | 0.200 | 0.200 | 0.000 | 0.000 | 0.000 | 0.000 | 0.202 |
| Jun-2016 | 0.000 | 0.000 | 0.200 | 0.200 | 0.000 | 0.000 | 0.000 | 0.000 | 0.214 |
| Half Year Sub-total | 1.850 | 1.850 | 0.800 | 0.800 | 0.000 | 0.000 | 7.740 | 7.740 | 0.940 |
| Jul-2016 | 0.000 | 0.000 | 0.200 | 0.200 | 0.000 | 0.000 | 0.000 | 0.000 | 0.292 |
| Aug-2016 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.000 | 0.323 |
| Sep-2016 | | | | | | | | | |
| Oct-2016 | | | | | | | | | |
| Nov-2016 | | | | | | | | | |
| Dec-2016 | | | | | | | | | |
| Project Total Quantities | 1.850 | 1.850 | 3.150 | 3.150 | 6.870 | 6.870 | 9.450 | 9.450 | 3.772 |

| Forecast of Total Quantities of Construction and Demolition Materials to be Generated from the Contract* | | | | |
|--|-------------------------------------|------------------------|--------------------------|----------------------------|
| Total Quantity Generated | Hard Rock and Large Broken Concrete | Reused in the Contract | Reused in other Projects | Disposed of as Public Fill |
| (in '000 ton) | (in '000 ton) | (in '000 ton) | (in '000 ton) | (in '000 ton) |
| 20.000 | 0.000 | 0.000 | 0.000 | 20.000 |

| Forecast of Total Quantities of Construction and Demolition Materials to be Generated from the Contract* | | | | |
|--|----------------------------|--------------------------|----------------|--|
| Metals | Paper/ cardboard packaging | Plastics (see Note 3) | Chemical Waste | General Refuse disposed of at Landfill |
| (in '000kg) | (in '000kg) | (in '000kg) | (in '000kg) | (in '000 ton) |
| 0.000 | 0.000 | 0.000 | 0.000 | 0.100 |

- Notes:
- (1) The performance targets are given in the **ER Appendix 8J Clause 14** and the EM & A Manual(s).
 - (2) The waste flow table shall also include C&D materials to be imported for use at the Site.
 - (3) Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material.
 - (4) The Contractor shall also submit the latest forecast of the total amount of C&D materials expected to be generated from the Works, together with a breakdown of the nature where the amount of C&D materials expected to be generated from the Works is equal to or exceeding 50,000 m³. (**ER Part 8 Clause 8.8.5 (d) (ii)** refers).