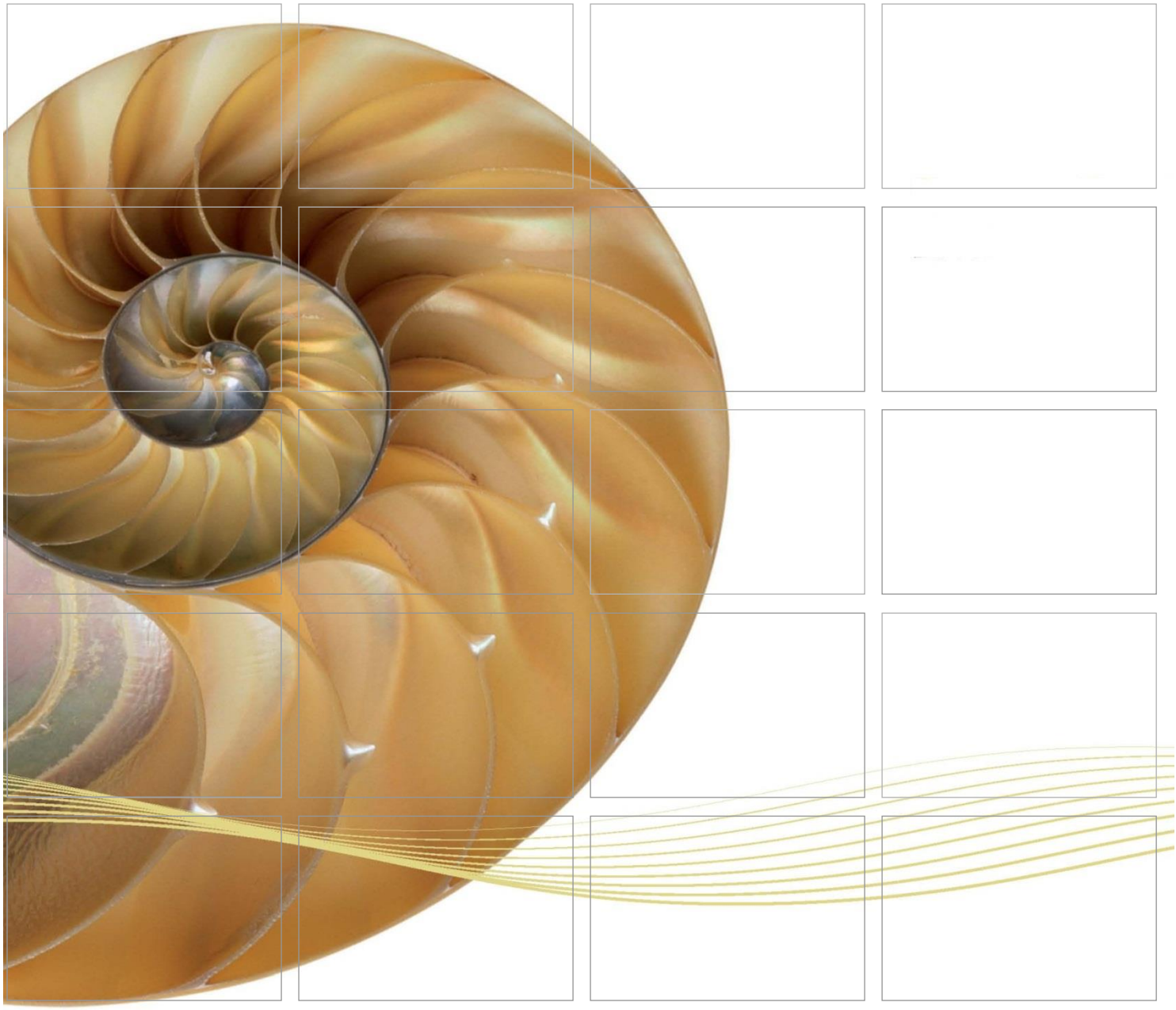
Report



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

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

27 October 2016

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

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The business of sustainability

RAMBOLL ENVIRON

Ref.: HYDHZMBEEM00_0_4715L.16 01 November 2016

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

Attention: Messrs. Edwin Ching / Andy Westmoreland

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
Tenth Quarterly EM&A Report (March 2016 – May 2016)

Reference is made to the Tenth Quarterly Environmental Monitoring and Audit (EM&A) Report (March 2016 - May 2016) (ET's ref.: "*0212330_10th Quarterly EM&A_20161027.doc*" dated 27 October 2016) certified by the ET Leader and provided to us via e-mail on 1 November 2016.

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\HYDHZMBEEM00\02_Proj_Mgt\02_Corr\HYDHZMBEEM00_0_4715L.16.docx

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

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

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

Document Code: 0212330_10th Quarterly EM&A_20161027.doc

Environmental Resources Management

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Client: DBJV	Project No: 0212330
Summary: This document presents the Tenth Quarterly EM&A Report for Tuen Mun – Chek Lap Kok Link Northern Connection Sub-sea Tunnel Section.	Date: 27 October 2016 Approved by: *Mr Craig Reid* *Partner* Certified by: *Mr Jovy Tam* *ET Leader*

Revision	Description	By	Checked	Approved	Date
	10th Quarterly EM&A Report	VAR	JT	CAR	27/10/16

Distribution

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TABLE OF CONTENTS

Under *Contract No. HY/2012/08*, Dragages – Bouygues Joint Venture (DBJV) is commissioned by the Highways Department (HyD) to undertake the design and construction of the Northern Connection Sub-sea Tunnel Section of the Tuen Mun – Chek Lap Kok Link Project (TM-CLK Link Project) while AECOM Asia Company Limited was appointed by HyD as the Supervising Officer. For implementation of the environmental monitoring and audit (EM&A) programme under the Contract, ERM-Hong Kong, Limited (ERM) has been appointed as the Environmental Team (ET) in accordance with *Environmental Permit No. EP-354/2009/A*. Ramboll 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 Tenth Quarterly EM&A report presenting the EM&A works carried out during the period from 1 March 2016 to 31 May 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;
- Construction of Cross Passage Tympanum – TBM tunnel;
- Excavation of Sub-sea Tunnel – TBM tunnel;
- Thrust Frame Removal – TBM tunnel;
- TBM Tunnel Works at Works Area – Portion N-C;
- Sub-sea Tunnel Gallery Installation – TBM tunnel;
- Slab Construction of Tunnel Protection Enhancement – TBM tunnel;
- Site preparation for Ventilation Shaft at Works Area – Portion S-C;
- Deep Band Drain Installation – Portion S-A;
- Dewatering Deep well Installation – Portion S-A; and
- 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	30 sessions
1-hour TSP Monitoring	30 sessions
Impact Dolphin Monitoring	6 sessions
Joint Environmental Site Inspection	13 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 March and May 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.

One (1) environmental complaint case regarding potential dust emission from the barge area at Southern Landfall was referred by EPD on 20 May 2016. The interim report was submitted to EPD on 24 May 2016.

No environmental summons was received in this reporting period.

Reporting Change

There was no reporting change required in the reporting period.

Upcoming Works for the Next Reporting Period

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

Land-based works

- Construction of cross passage tympanum – TBM tunnel;
- Excavation of sub-sea tunnel – TBM tunnel;
- Thrust frame removal – 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.

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 INTRODUCTION

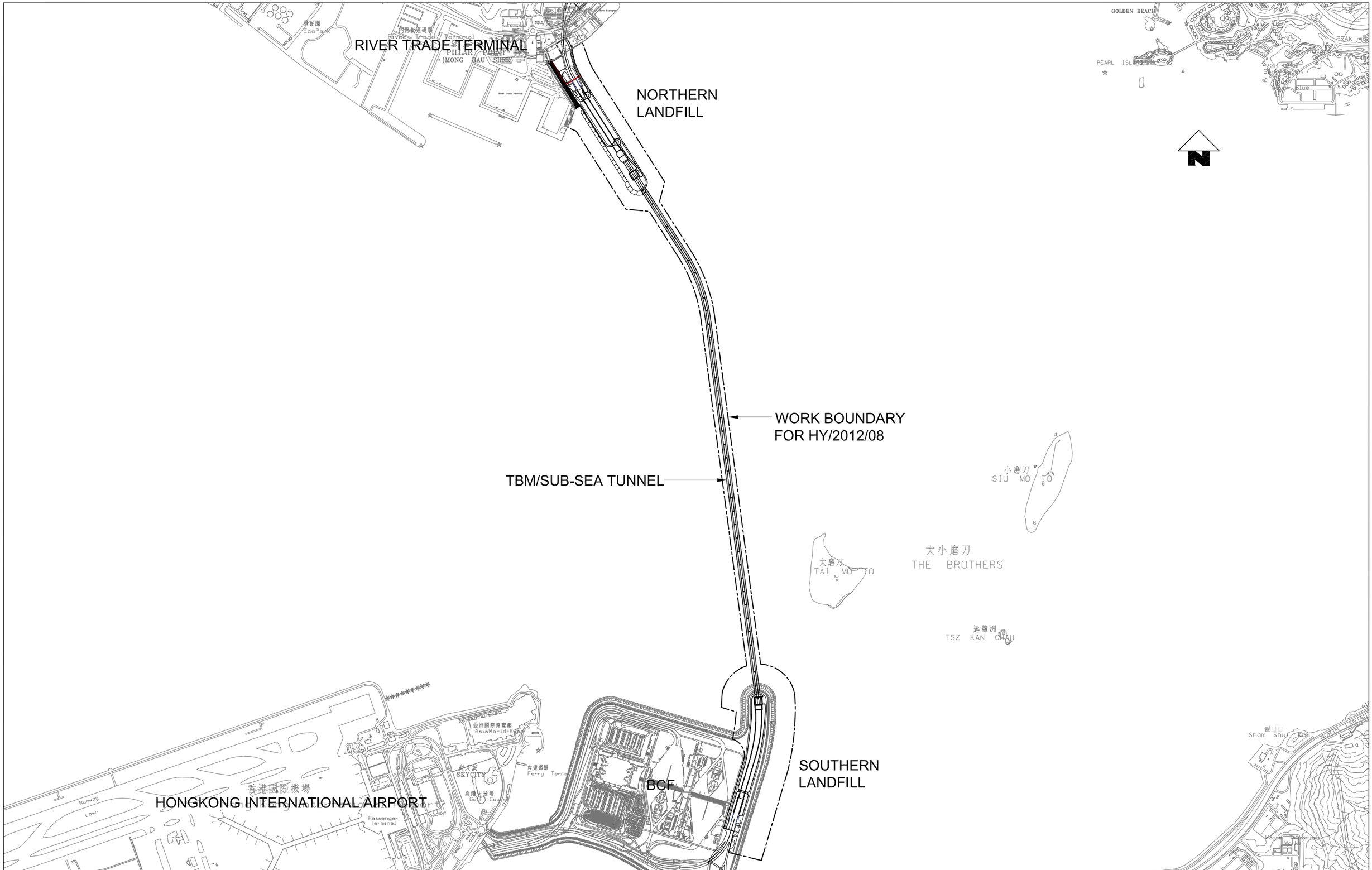
1.1 BACKGROUND

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

An Environmental Impact Assessment (EIA) of TM-CLKL (the Project) was prepared in accordance with the EIA Study Brief (No. ESB-175/2007) and the *Technical Memorandum of the Environmental Impact Assessment Process* (*EIAO-TM*). The EIA Report was submitted under the Environmental Impact Assessment Ordinance (EIAO) in August 2009. Subsequent to the approval of the EIA Report (EIAO Register Number AEIAR-146/2009), an Environmental Permit (EP-354/2009) for TM-CLKL was granted by the Director of Environmental Protection (DEP) on 4 November 2009, and EP variation (VEP) (EP-354/2009A) 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*.



Rev.	Description	Date	Checked
A	FIRST ISSUE	11SEP13	PKV

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

Main Contractor: Dragages - Bouygues Joint Venture 實嘉 - 布依格聯營

Client: 路政署 HIGHWAYS DEPARTMENT

Contractor's Designer: ARUP Ove Arup & Partners Hong Kong Limited

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

Drawing Title: **Figure 1.1**

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

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

1.2 SCOPE OF REPORT

This is the Tenth 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 March 2015 to 31 May 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	3547 2133	3465 2899
	IEC	Dr. F.C. Tsang	3547 2134	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	Ality Chan	5933 5904	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 three-month rolling construction programme is shown in *Appendix B*.

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

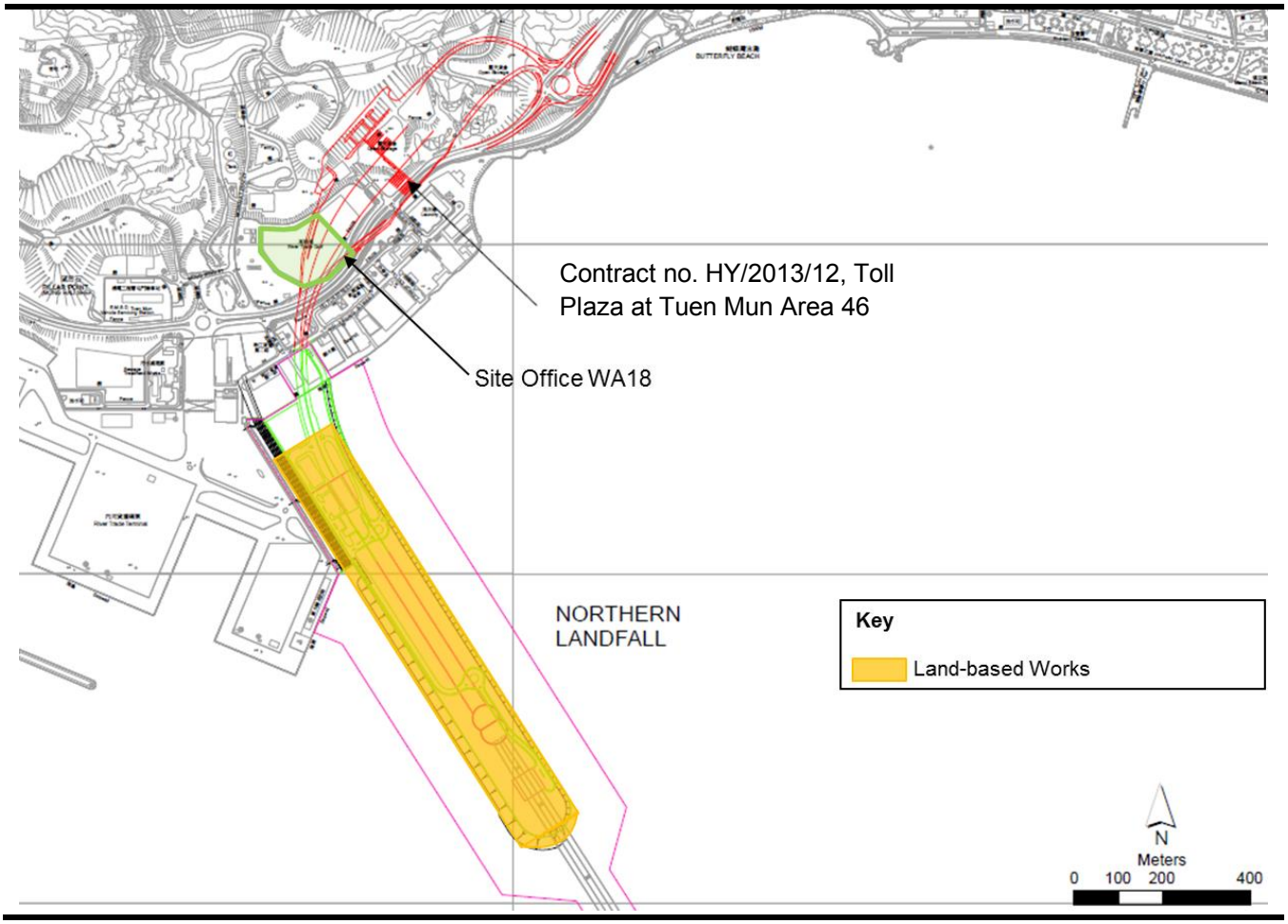
The general layout plan of the site showing the detailed works areas is shown in *Figure 1.2*. The Environmental Sensitive Receivers in the vicinity of the Project are shown in *Figure 1.3*.

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

Table 1.2 Summary of Construction Activities Undertaken during the Reporting Period

Construction Activities Undertaken
Land-based Works
Portion N-A
• Box Culvert Extension
Portion N-C
• TBM Tunnel Works
TBM tunnel
• Construction of Cross Passage Tympanum
• Excavation of Sub-sea Tunnel
• Thrust Frame Removal
• Sub-sea Tunnel Gallery Installation
• Slab Construction of Tunnel Protection Enhancement
Portion S-A
• Deep Band Drain Installation
• Dewatering Deep well Installation
• CSM Ground Treatment and Diaphragm Wall Construction
Portion S-C
• Site preparation for Ventilation Shaft at Works Area

Figure 1.2 Locations of Construction Activities – March 2016 to May 2016



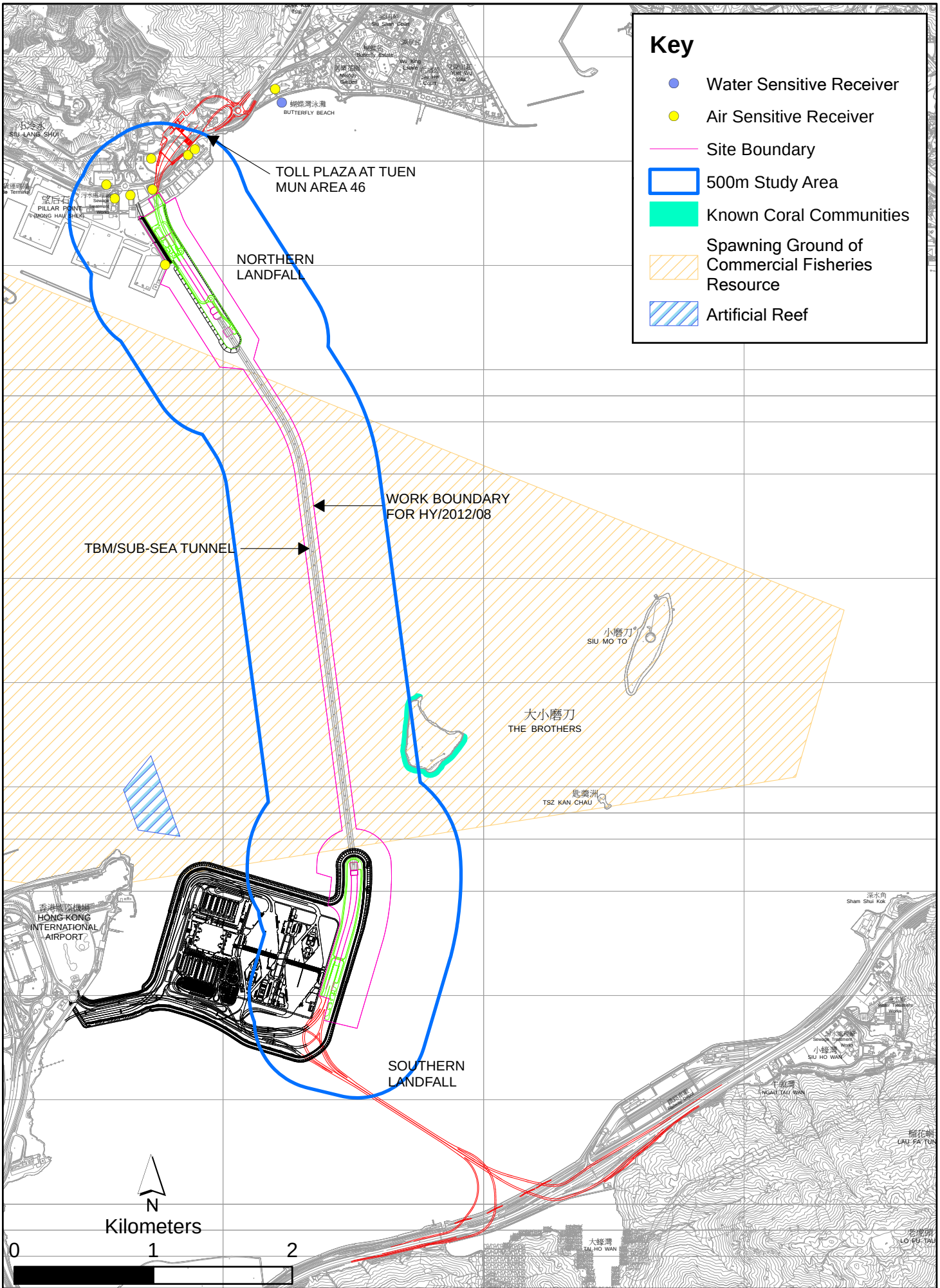


Figure 1.3 Environmental Sensitive Receivers in the vicinity of Contract No. HY/2012/08 Tuen Mun - Chek Lap Kok Link - Northern Connection Sub-Sea Tunnel Section

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Date: 15/4/2014

Environmental Resources Management

2 EM&A RESULTS

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.

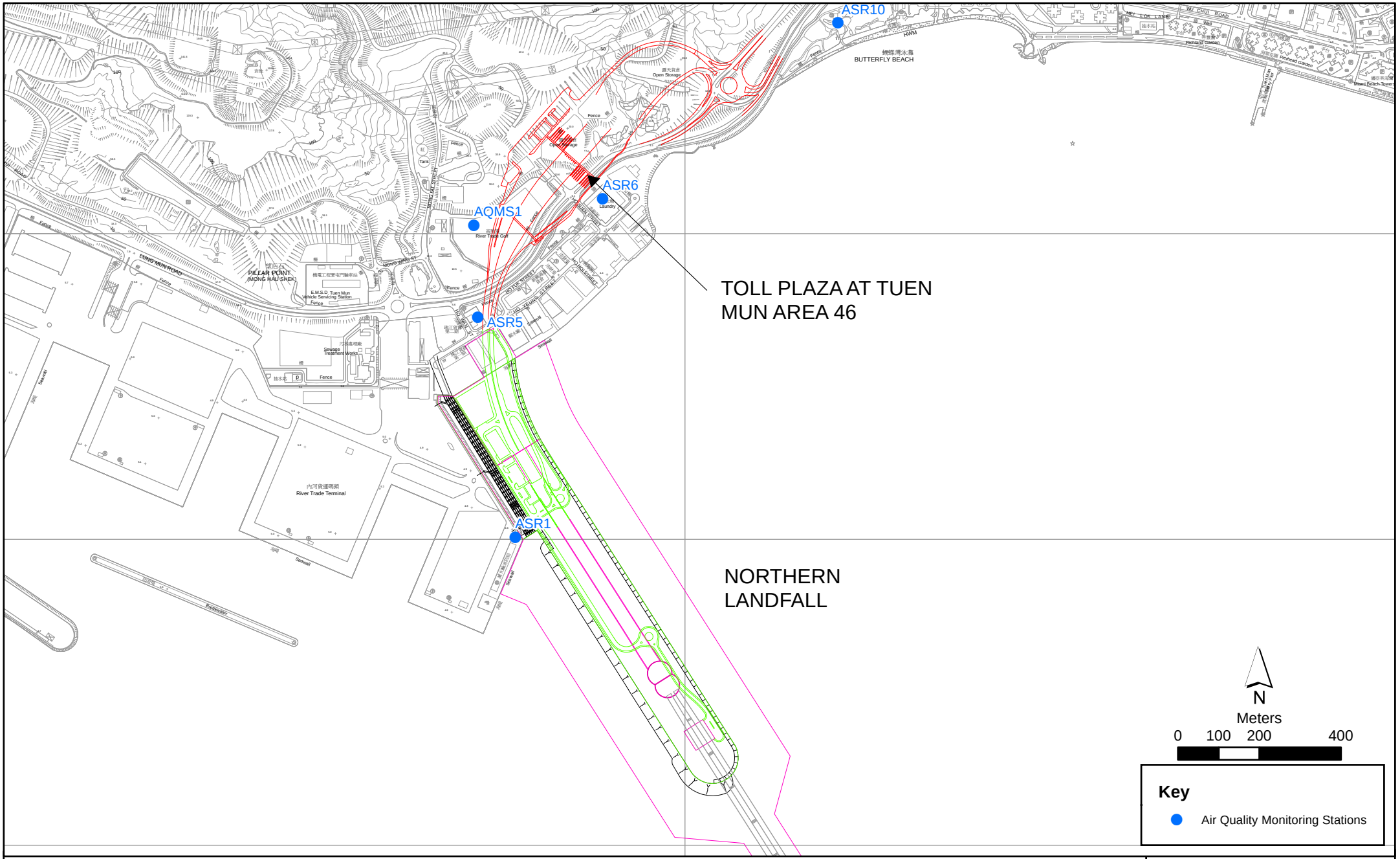

Figure 2.1

Air Quality Monitoring Stations for the Enhanced TSP Monitoring

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Date: 21/2/2014

Environmental Resources Management

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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-hour Total Suspended Particulates (1-hour TSP, μg/m³), 3 times in every 6 days • 24-hour Total Suspended Particulates (24-hour TSP, μg/m³), daily for 24-hour in every 6 days Enhanced TSP monitoring (commenced on 24 October 2014) • 1-hour Total Suspended Particulates (1-hour TSP, μg/m³), 3 times in every 3 days • 24-hour Total Suspended Particulates (24-hour TSP, μg/m³), daily for 24-hour in every 3 days	3, 6, 9, 12, 15, 18, 21, 24, 27 and 30 March 2016; 2, 5, 8, 11, 14, 17, 20, 23, 26 and 29 April 2016; and 2, 5, 8, 11, 14, 17, 20, 23, 26 and 29 May 2016
ASR5	Pillar Point Fire Station	Office		
AQMS1	Previous River Trade Golf	Bare ground		
ASR6	Butterfly Beach Laundry	Office		
ASR10	Butterfly Beach Park	Recreational uses		

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)
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 *Twenty-sixth* to *Twenty-eighth Monthly EM&A Report*.

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

Month/Year	Station	Average (μg/m³)	Range (μg/m³)	Action Level (μg/m³)	Limit Level (μg/m³)
March 2016 to May 2016	ASR 1	97	53 - 216	331	500
	ASR 5	145	54 - 284	340	500
	AQMS1	90	50 – 187	335	500
	ASR6	108	56 – 213	338	500
	ASR10	79	49 – 145	337	500

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

Month/Year	Station	Average (μg/m³)	Range (μg/m³)	Action Level (μg/m³)	Limit Level (μg/m³)
March 2016 to May 2016	ASR 1	67	49 - 118	213	260
	ASR 5	82	55 - 138	238	260
	AQMS1	63	47 – 101	213	260
	ASR6	69	50 – 114	238	260
	ASR10	57	46 – 70	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.

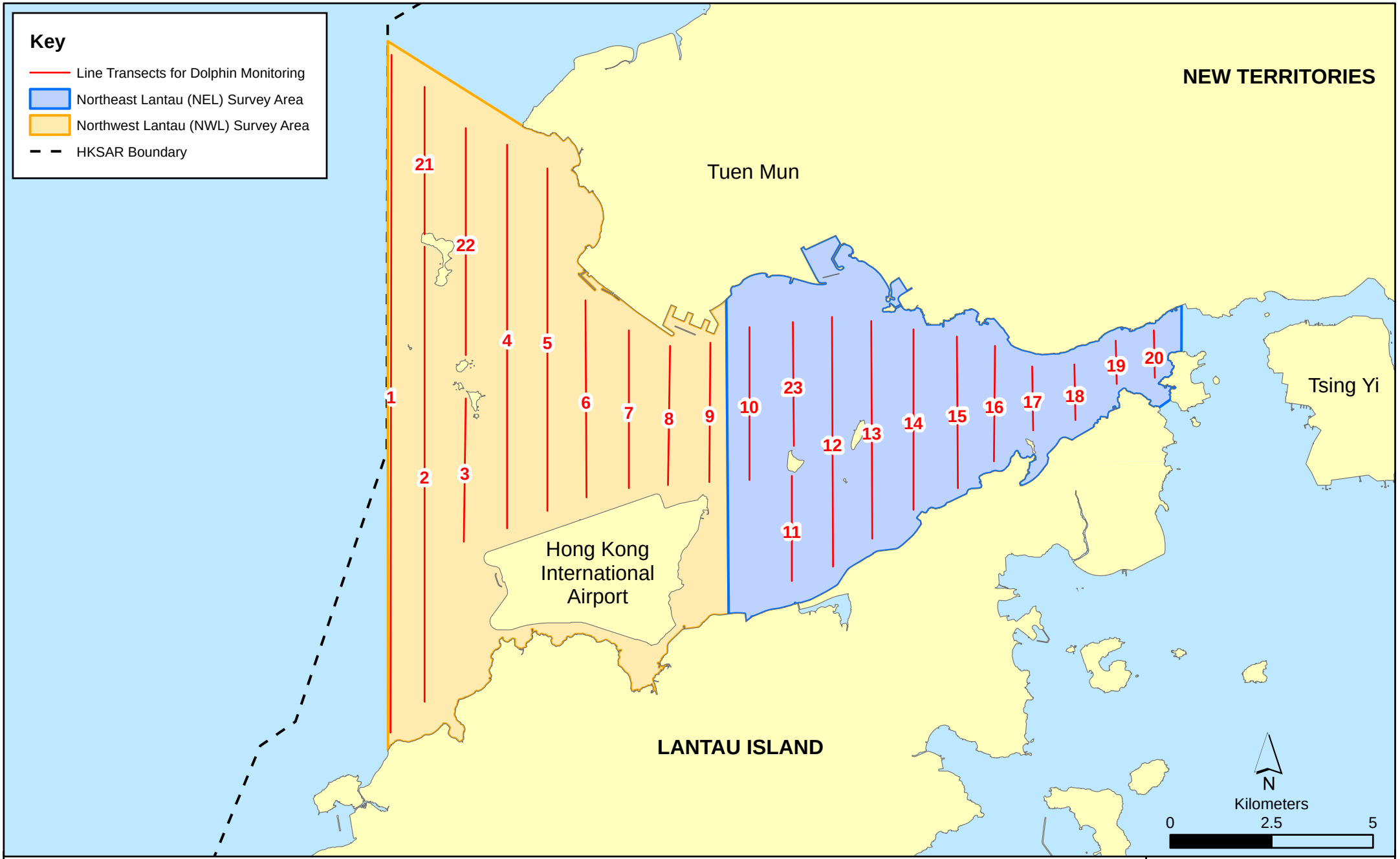

Figure 2.2

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

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Date: 29/11/2013

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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 896.56 km of survey effort was conducted, with 90.3% 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, 341.16 km and 555.40 km of survey effort were conducted from NEL and NWL survey areas, respectively. The total survey effort conducted on primary and secondary lines were 657.94 km and 238.62 km, respectively. The survey efforts are summarized in *Appendix G*.

A total of 7 groups of 22 Chinese White Dolphins sightings were recorded during the six sets of surveys in this reporting quarter. Four of the seven dolphin sightings were made during on-effort search, and three of the four on-effort dolphin sightings were made on primary lines. During this reporting quarter, all dolphin groups were sighted in NWL, while none was sighted at all 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: Mar 7th/11th	0.00	0.00
	Set 2: Mar 22nd/23rd	0.00	0.00
	Set 3: Apr 5th/12th	0.00	0.00
	Set 4: Apr 15th /19th	0.00	0.00
	Set 5: May 3rd/12th	0.00	0.00
	Set 6: May 17th/26th	0.00	0.00
NWL	Set 1: Mar 7th/11th	0.00	0.00
	Set 2: Mar 22nd/23rd	1.59	4.78
	Set 3: Apr 5th/12th	2.20	17.59
	Set 4: Apr 15th /19th	2.10	6.31
	Set 5: May 3rd/12th	0.00	0.00
	Set 6: May 17th/26th	0.00	0.00

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)	
	March 2016 - May 2016	**September - November 2011**	**March 2016 - May 2016**	**September - November 2011**
Northeast Lantau	0.0	6.00 ± 5.05	0.0	22.19 ± 26.81
Northwest Lantau	0.98 ± 1.10	9.85 ± 5.85	4.78 ± 6.85	44.66 ± 29.85

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

Group size of Chinese White Dolphins ranged from 1 - 8 individuals per group in North Lantau region during March to May 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	
	March – May 2016	**March – May 2016**
Overall	3.14 ± 2.27 (n = 7)	3.72 ± 3.13 (n = 66)
Northeast Lantau	N/A	3.18 ± 2.16 (n = 17)
Northwest Lantau	3.14 ± 2.27 (n = 7)	3.92 ± 3.40 (n = 49)

Whilst one limit level exceedance was observed for the quarterly dolphin monitoring data between March and May 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. Thirteen (13) site inspections were carried out in the reporting quarter on 2, 9, 16, 23 and 30 March 2016; 6, 13, 20 and 27 April 2016; 4, 11, 18 and 25 May 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
2 March 2016	Works Area – Portion N-B • The silt on the ground should be cleaned.. Works Area – Portion N-C • Accumulated waste in the skips should be cleared. • Oil on the ground should be cleaned.	Works Area – Portion N-B • The Contractor was reminded to clean the silt on the ground.. Works Area – Portion N-C • The Contractor was reminded to clear the accumulated waste in the skips. • The Contractor was reminded to clean the oil on the ground.
9 March 2016	Works Area - Portion N-A • Muddy water in the surface channel should be removed. Works Area - Portion S-C • Water spraying should be applied during dusty activities.	Works Area - Portion N-A • The Contractor was reminded to remove the muddy water in the surface channel. Works Area - Portion S-C • The Contractor was reminded to apply water spraying during dusty activities.
16 March 2016	Works Area – TBM Tunnel • Chemical labels and drip trays should be provided to the oil drums. • Chemical containers should be placed in drip tray. Works Area - Portion S-C • Water inside the drip tray should be cleared.	Works Area - TBM Tunnel • The Contractor was reminded to provide chemical labels and drip trays to the oil drums. • The Contractor was reminded to place the chemical containers in drip tray. Works Area - Portion S-C • The Contractor was reminded to clear the water in the drip tray.
23 March 2016	Works Area - Portion N-C • Chemical labels and drip trays should be provided to the oil drums. Works Area - Portion S-C • Water inside the drip tray should be cleared.	Works Area - Portion N-C • The Contractor was reminded to provide chemical labels and drip trays to the oil drums. Works Area - Portion S-C • The Contractor was reminded to clear the water in the drip tray.

Inspection Date	Environmental Observations	Recommendations/ Remarks
30 March 2016	Works Area – TBM Tunnel • Drip trays should be provided to the chemical containers. Works Area - Portion S-B • Chemical labels and drip trays should be provided to the oil drums.	Works Area – TBM Tunnel • The Contractor was reminded to provide drip trays to the chemical containers. Works Area - Portion S-B • The Contractor was reminded to provide chemical labels and drip trays to the oil drums.
6 April 2016	Works Area –Ventilation Shaft • Cement bags should be covered with impervious sheet to prevent dust generation. Works Area –Portion S-A (Barge Area) • Chemical labels should be provided to the oil drums.	Works Area –Ventilation Shaft • The Contractor was reminded to cover the cement bags with impervious sheet to prevent dust generation. Works Area –Portion S-A (Barge Area) • The Contractor was reminded to provide chemical labels to the oil drums.
13 April 2016	Works Area - TBM tunnel • Chemical labels should be provided to the oil drums.	Works Area - TBM tunnel • The Contractor was reminded to provide chemical labels to the oil drums.
20 April 2016	Works Area – Portion S-A • Drip trays should be provided to the oil drums.	Works Area – Portion S-A • The Contractor was reminded to provide drip trays to the oil drums.
27 April 2016	Works Area - Portion N-C • Accumulated waste in the skips should be cleared. Works Area - Ventilation Shaft • Accumulated waste in the skips should be cleared. Works Area - Portion S-A • Accumulated waste on the ground should be cleared.	Works Area - Portion N-C • The Contractor was reminded to clear the accumulated waste in the skips. Works Area - Ventilation Shaft • The Contractor was reminded to clear the accumulated waste in the skips. Works Area - Portion S-A • The Contractor was reminded to clear the accumulated waste on the ground.
4 May 2016	Works Area – Portion N-A • Sandbags should be provided along the fencing. • Accumulated sand should be removed. Works Area – Portion S-A • Drip trays should be provided to the oil drums.	Works Area – Portion N-A • The Contractor was reminded to provide sandbags along the fencing. • The Contractor was reminded to remove the accumulated sand. Works Area – Portion S-A • The Contractor was reminded to provide drip trays to the oil drums.
11 May 2016	Works Area – Portion S-A • Water spraying should be applied more frequently during dry conditions. • Water inside the drip tray should be cleared. Works Area – Portion S-B • Drip trays should be provided to the oil drums. • The rock breaker should be wrapped to prevent spread of dust.	Works Area – Portion S-A • The Contractor was reminded to apply water spraying more frequently during dry conditions. • The Contractor was reminded to clear the water inside the drip tray. Works Area – Portion S-B • The Contractor was reminded to provide drip trays to the oil drums. • The contractor was reminded to wrap the rock breaker to prevent spread of dust.

Inspection Date	Environmental Observations	Recommendations/ Remarks
18 May 2016	Works Area – Portion N-A • Sand bags should be fixed to prevent direct discharge of wastewater to the sea. Works Area – Portion S-A • Water spraying should be provided more frequently during dry conditions • Preventive measures should be implemented to minimise dust impact..	Works Area – Portion N-A • The Contractor was reminded to fix the sand bags. Works Area – Portion S-A • The Contractor was reminded to provide water spraying more frequently during dry conditions. • The contractor was reminded to implement preventive measures to minimise dust impact.
25 May 2016	Works Area – Portion N-B • Accumulated waste should be cleared. Works Area – Portion S-A • Water spraying should be provided more frequently during dry conditions. • Accumulated waste should be cleared.	Works Area – Portion N-B • The Contractor was reminded to clear the accumulated waste. Works Area – Portion S-A • The Contractor was reminded to provide water spraying more frequently during dry conditions. • The contractor was reminded to clear the accumulated waste.

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), recyclable materials and chemical wastes. 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
March 2016	3,501	0	0	111	200	3,000	0	0
April 2016	9,175	0	0	198	200	0	0	0
May 2016	2,392	0	0	202	200	0	0	0
Total	15,068	0	0	511	600	3,000	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	-
Chemical Waste Registration	5213-422-D2516-01	10 September 2013	Throughout the Contract	DBJV	Northern Landfall
Chemical Waste Registration	5213-951-D2591-01	30 April 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/17-015	7 May 2016	6 June 2016	DBJV	Southern Landfall
Construction Noise Permit	GW-RW0638-15	14 December 2015	13 June 2016	DBJV	For site WA23
Construction Noise Permit	GW-RW0474-15	29 September 2015	28 March 2016	DBJV	For Portion N6
Construction Noise Permit	GW-RW0018-16	20 January 2016	19 July 2016	DBJV	For Urmston Road in front of Pillar Point
Construction Noise Permit	GW-RS1447-15	5 January 2016	4 June 2016	DBJV	For excavation works at Southern Landfall
Construction Noise Permit	GW-RW0143-16	29 March 2016	28 September 2016	DBJV	For Portion N6
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-RS0324-16	18 April 2016	17 October 2016	DBJV	For excavation works at 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 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 limit level exceedance of impact dolphin monitoring was recorded in this reporting quarter. Following the review of monitoring data and marine works details in accordance with the procedures stipulated in the Event and Action Plan of the Updated EM&A Manual, there is no evidence showing that the sources of impact directly related to the construction works under this Contract that may have affected the dolphin usage in the NEL region. Detailed investigation findings are presented in *Appendix I*.

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*.

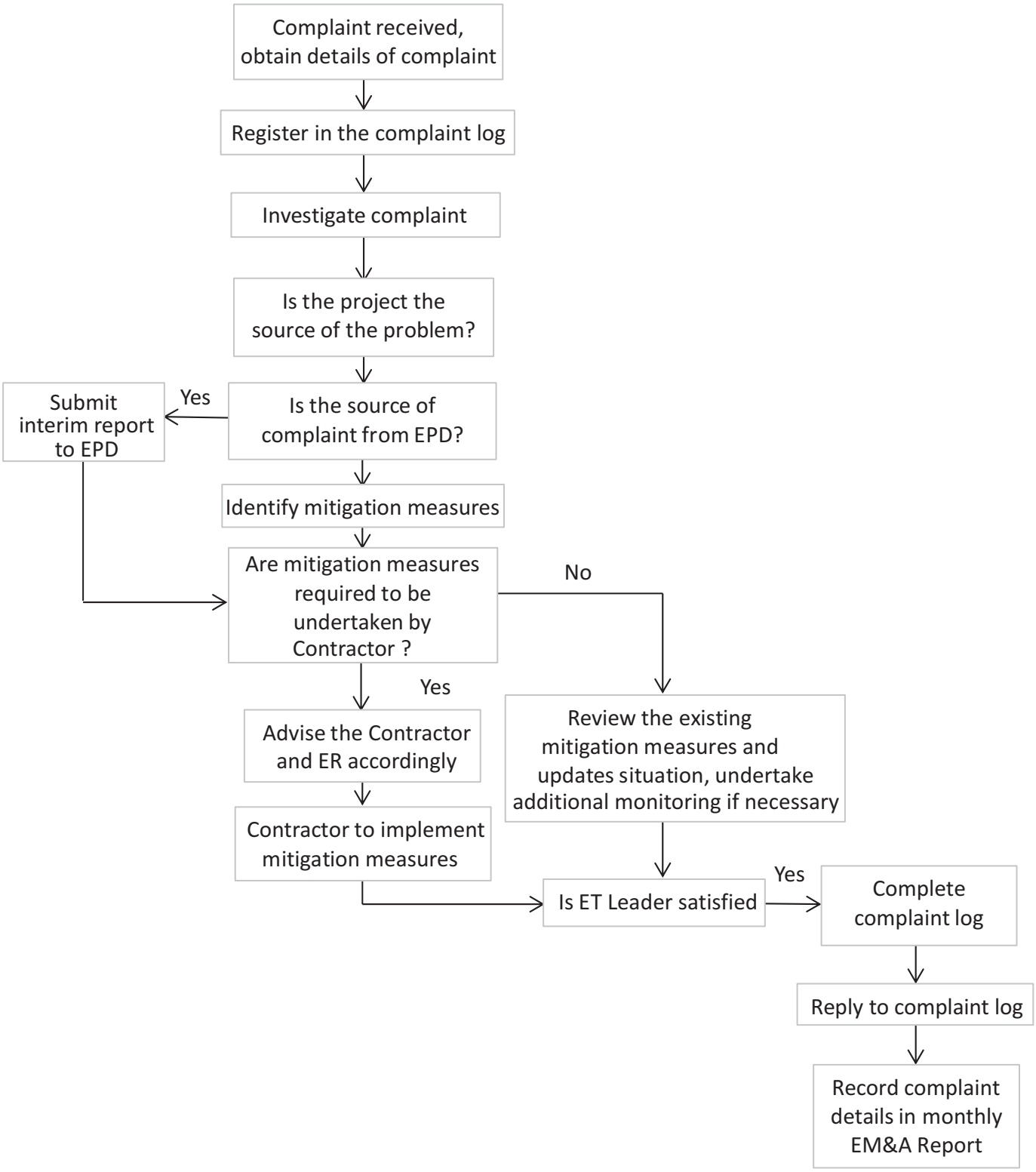

Figure 2.3 Environmental Complaint Handling Procedure

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DATE: 06/12/2013

Environmental Resources Management

ERM

No non-compliance event was recorded during the reporting period.

No environmental complaint was received in the reporting period.

No summons/ prosecution was received during 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
Land-based Works
• Construction of cross passage tympanum – TBM tunnel; • Excavation of sub-sea tunnel – TBM tunnel; • Thrust frame removal – 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.

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.

4 CONCLUSIONS

This Tenth Quarterly EM&A Report presents the findings of the EM&A activities undertaken during the period from 1 March 2016 to 31 May 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 record.

A total of 7 groups of 22 Chinese White Dolphins sightings were recorded during the six sets of surveys in this reporting quarter. Four of the seven dolphin sightings were made during on-effort search, and three of the four on-effort dolphin sightings were made on primary lines. Whilst one limit level exceedance was recorded for the quarterly dolphin monitoring data between March and May 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.

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

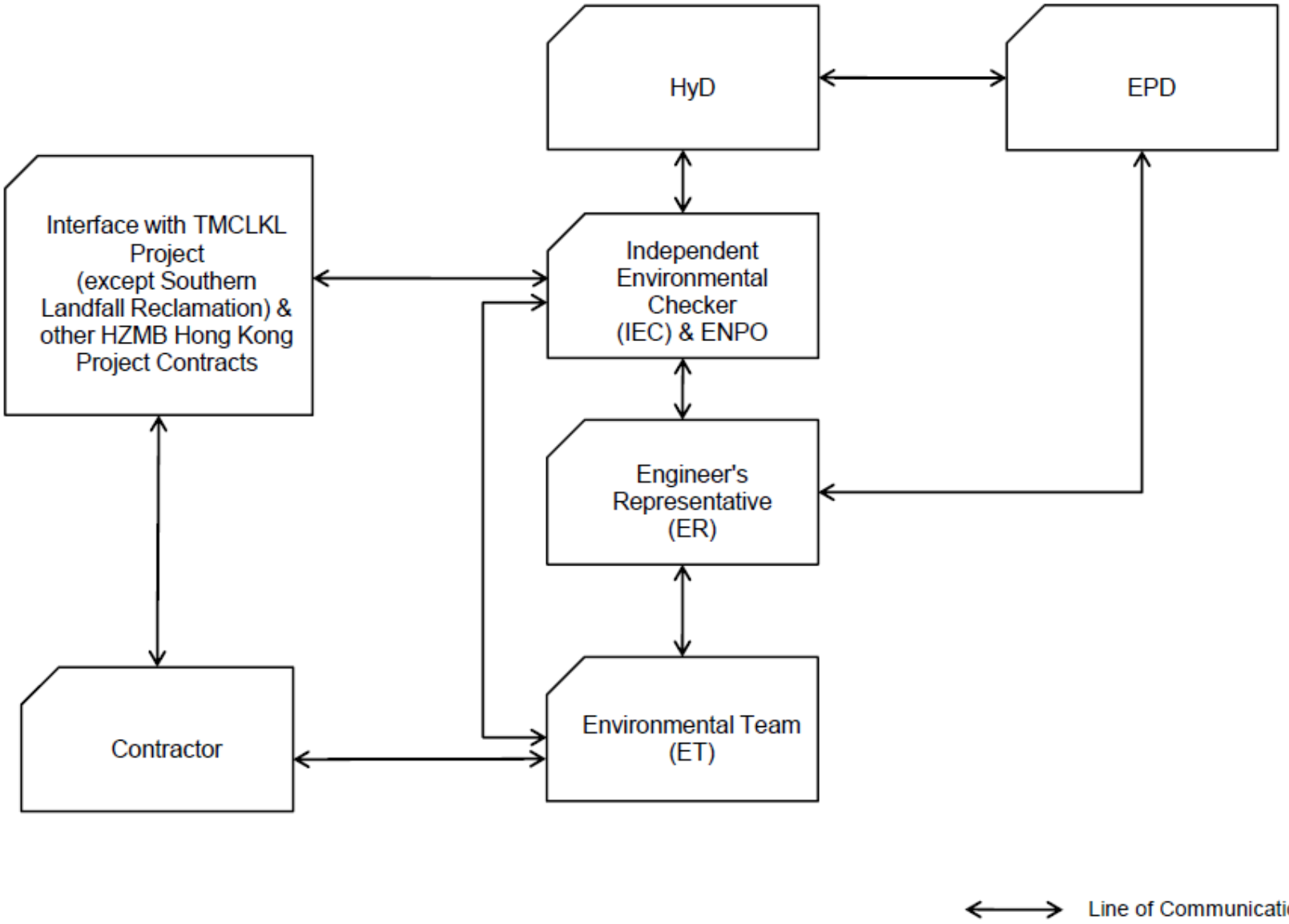
No environmental complaint was received during the reporting period.

No summons/ prosecution was received during the reporting period.

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

Appendix A

Project Organization for Environmental Works



Appendix A1

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

DATE: 06/03/2013

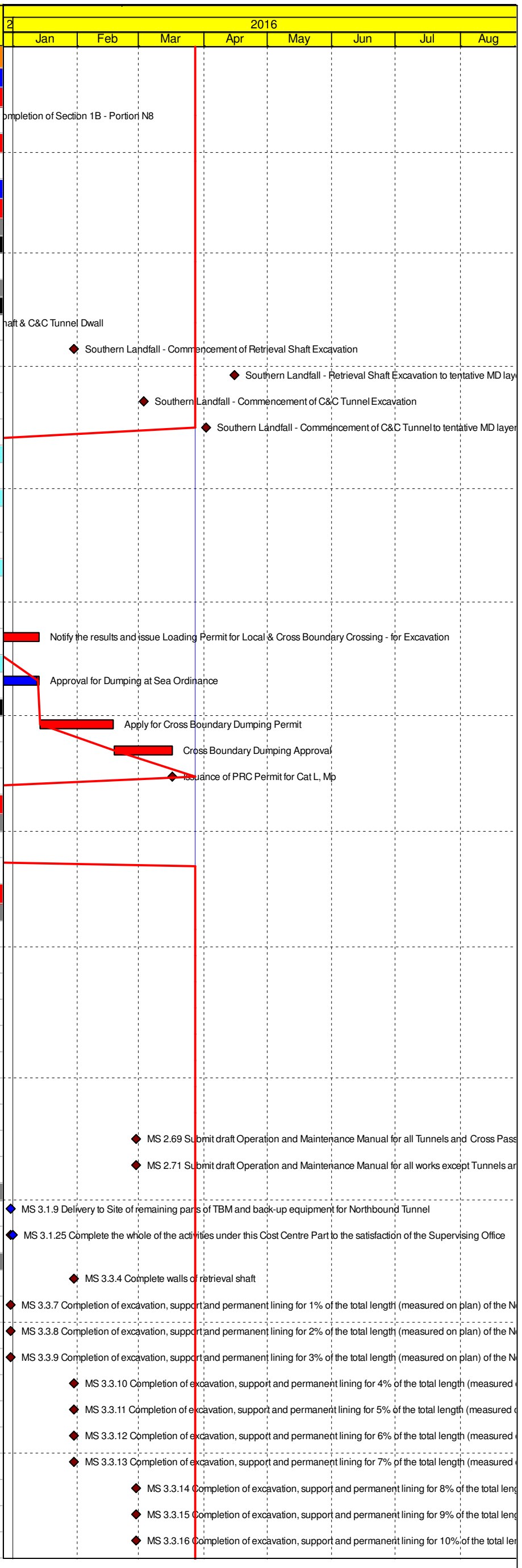
Environmental Resources Management

ERM

Appendix B

Construction Programme

Activity Name	Orig Dur	DWPF Start	DWPF Finish
TMCLK - Northern Connection Sub-Sea Tunnel Section			
Contract Dates			
Commencement and Completion Dates			
KD06 - Completion of Section 1B - Portion N8	0		03-Dec-15
Site Possession Date			
Portions: X1,(N10,11,13 & 14) - Sth Landfall	0	06-Aug-15	
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
Sediment Quality Report/Dumping Permit			
Southern Landfall			
Southern landfall - Commencement of Shaft & C&C Tunnel Dwall	0	03-Oct-15	
Southern Landfall - Commencement of Retrieval Shaft Excavation	0	30-Jan-16	
Southern Landfall - Retrieval Shaft Excavation to tentative MD layer	0	15-Apr-16	
Southern Landfall - Commencement of C&C Tunnel Excavation	0	03-Mar-16	
Southern Landfall - Commencement of C&C Tunnel to tentative MD layer	0	02-Apr-16	
Sediment Sampling & Testing Plan (SSTP) - if required			
Complete SSTP and Obtain EPD's approval	24	17-Feb-15	23-Mar-15
Sediment Quality Report (SQR) - if required			
Advance Ground Investigation works for Sediment sampling	24	24-Mar-15	24-Apr-15
Sediment Sample Testing & Report preparation	120	25-Apr-15	16-Sep-15
Dumping Permit for Load Dumping (Loading Permit) - if required			
Finalize the applivation doucment and submit to EPD - for Dwall	24	20-Jan-15	16-Feb-15
Notify the results and issue Loading Permit for Local & Cross Boundary Crossing - for Dwall	24	17-Feb-15	23-Mar-15
Notify the results and issue Loading Permit for Local & Cross Boundary Crossing - for Excavation	24	14-Dec-15	13-Jan-16
Dumping at Sea Ordinance (DASO)			
Approval for Dumping at Sea Ordinance	24	14-Dec-15	13-Jan-16
Cross Boundary Dumping Permit			
Apply for Cross Boundary Dumping Permit	24	14-Jan-16	17-Feb-16
Cross Boundary Dumping Approval	24	18-Feb-16	16-Mar-16
Issuance of PRC Permit for Cat L, Mp	0		16-Mar-16
General Design Submissions			
(G6) IFA for Tunnel GBP			
SO's Review	35	29-Apr-14	02-Jun-14
SO Approval with Condition Received	0		03-Jun-14
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
MS 2.32 Approve DDA for Approach Ramp Structures to Cut-and-cover Tunnels by the Supervising Officer	0		30-Apr-15
MS 2.44 Approve DDA for South Ventilation Building by the Supervising Officer	0		30-Jun-15
MS 2.48 Approve DDA for North Ventilation Building by the Supervising Officer	0		31-Jan-15
MS 2.51 Submit DDA for Facilities Provision for TCSS	0		29-Nov-14
MS 2.52 Approve DDA for Facilities Provision for TCSS by the Supervising Officer	0		28-Feb-15
MS 2.56 Approve DDA for Drainage, Sewerage, Waterworks and Utilities at Southern Landfall by the Supervising Officer	0		30-Apr-15
MS 2.60 Approve DDA for Drainage, Sewerage, Waterworks and Utilities at Northern Landfall by the Supervising Officer	0		31-Dec-14
MS 2.69 Submit draft Operation and Maintenance Manual for all Tunnels and Cross Passgaes	0		29-Feb-16
MS 2.71 Submit draft Operation and Maintenance Manual for all works except Tunnels and Cross Passgaes	0		29-Feb-16
Tunnel Boring Machine (TBM) and Back-up Equipment for TBM Tunnel			
MS 3.1.9 Delivery to Site of remaining parts of TBM and back-up equipment for Northbound Tunnel	0		31-Dec-15
MS 3.1.25 Complete the whole of the activities under this Cost Centre Part to the satisfaction of the Supervising Office	0		31-Dec-15
TBM Tunnel			
MS 3.3.4 Complete walls of retrieval shaft	0		30-Jan-16
MS 3.3.7 Completion of excavation, support and permanent lining for 1% of the total length (measured on plan) of the Nor	0		31-Dec-15
MS 3.3.8 Completion of excavation, support and permanent lining for 2% of the total length (measured on plan) of the Nor	0		31-Dec-15
MS 3.3.9 Completion of excavation, support and permanent lining for 3% of the total length (measured on plan) of the Nor	0		31-Dec-15
MS 3.3.10 Completion of excavation, support and permanent lining for 4% of the total length (measured on plan) of the No	0		30-Jan-16
MS 3.3.11 Completion of excavation, support and permanent lining for 5% of the total length (measured on plan) of the No	0		30-Jan-16
MS 3.3.12 Completion of excavation, support and permanent lining for 6% of the total length (measured on plan) of the No	0		30-Jan-16
MS 3.3.13 Completion of excavation, support and permanent lining for 7% of the total length (measured on plan) of the No	0		30-Jan-16
MS 3.3.14 Completion of excavation, support and permanent lining for 8% of the total length (measured on plan) of the No	0		29-Feb-16
MS 3.3.15 Completion of excavation, support and permanent lining for 9% of the total length (measured on plan) of the No	0		29-Feb-16
MS 3.3.16 Completion of excavation, support and permanent lining for 10% of the total length (measured on plan) of the N	0		29-Feb-16



Project ID: TMCLK DWPF 15W48

Data Date: 27-Mar-16

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

TMCLK - Northern Connection Sub-Sea Tunnel Section

Detailed Works Programme (Rev. F)

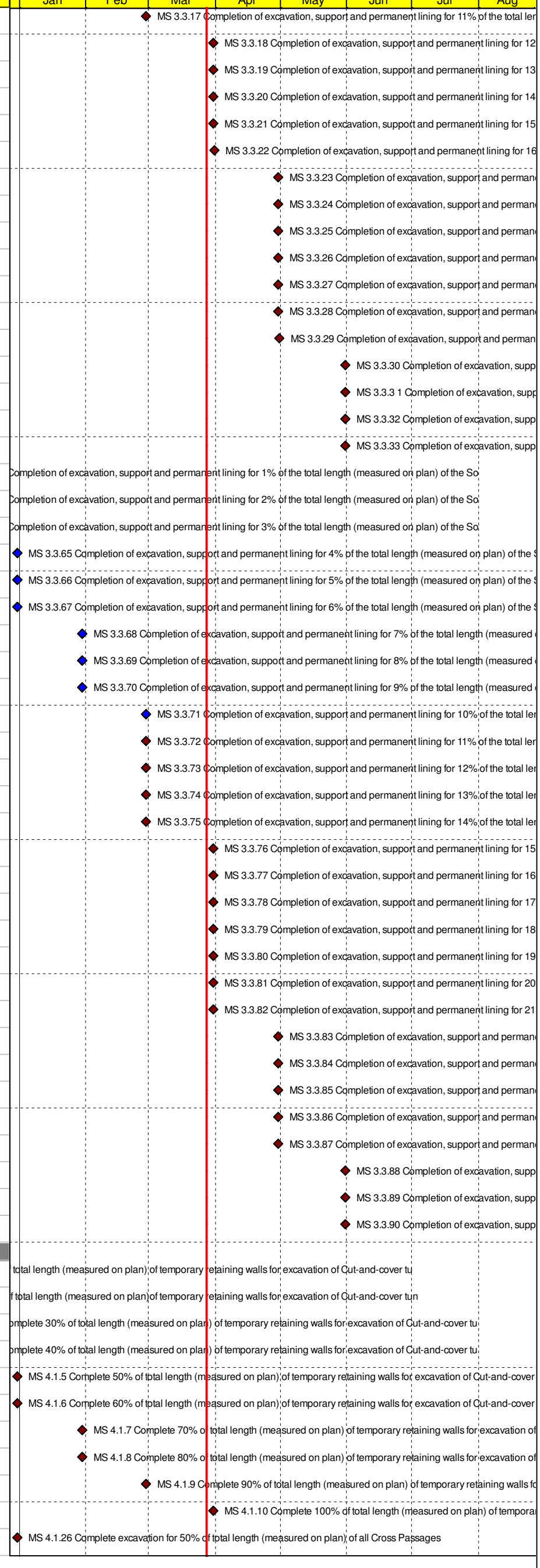
Three Months Rolling Programme

Progress as of 27-Mar-16

Dragages HongKong
A member of the Bouygues Construction group
Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

Date	Revision	Checked	Approved
12-Feb-14	TMCLK/DBJGEN/PRG/98507	WYu	SPo
08-Apr-14	TMCLK/DBJGEN/PRG/98507 Rev.B	SPa	WYu
28-Aug-14	TMCLK/DBJGEN/PRG/98507 Rev.C	CLa	WYu
10-Jun-15	TMCLK/DBJGEN/PRG/98507 Rev.F	WYu	

Activity Name	Orig Dur	DWPF Start	DWPF Finish
MS 3.3.17 Completion of excavation, support and permanent lining for 11% of the total length (measured on plan) of the N	0		29-Feb-16
MS 3.3.18 Completion of excavation, support and permanent lining for 12% of the total length (measured on plan) of the N	0		31-Mar-16
MS 3.3.19 Completion of excavation, support and permanent lining for 13% of the total length (measured on plan) of the N	0		31-Mar-16
MS 3.3.20 Completion of excavation, support and permanent lining for 14% of the total length (measured on plan) of the N	0		31-Mar-16
MS 3.3.21 Completion of excavation, support and permanent lining for 15% of the total length (measured on plan) of the N	0		31-Mar-16
MS 3.3.22 Completion of excavation, support and permanent lining for 16% of the total length (measured on plan) of the N	0		31-Mar-16
MS 3.3.23 Completion of excavation, support and permanent lining for 17% of the total length (measured on plan) of the N	0		30-Apr-16
MS 3.3.24 Completion of excavation, support and permanent lining for 18% of the total length (measured on plan) of the N	0		30-Apr-16
MS 3.3.25 Completion of excavation, support and permanent lining for 19% of the total length (measured on plan) of the N	0		30-Apr-16
MS 3.3.26 Completion of excavation, support and permanent lining for 20% of the total length (measured on plan) of the N	0		30-Apr-16
MS 3.3.27 Completion of excavation, support and permanent lining for 21% of the total length (measured on plan) of the N	0		30-Apr-16
MS 3.3.28 Completion of excavation, support and permanent lining for 22% of the total length (measured on plan) of the N	0		30-Apr-16
MS 3.3.29 Completion of excavation, support and permanent lining for 23% of the total length (measured on plan) of the N	0		30-Apr-16
MS 3.3.30 Completion of excavation, support and permanent lining for 24% of the total length (measured on plan) of the N	0		31-May-16
MS 3.3.3 1 Completion of excavation, support and permanent lining for 25% of the total length (measured on plan) of the	0		31-May-16
MS 3.3.32 Completion of excavation, support and permanent lining for 27.5% of the total length (measured on plan) of the	0		31-May-16
MS 3.3.33 Completion of excavation, support and permanent lining for 30% of the total length (measured on plan) of the N	0		31-May-16
MS 3.3.62 Completion of excavation, support and permanent lining for 1% of the total length (measured on plan) of the So	0		30-Nov-15
MS 3.3.63 Completion of excavation, support and permanent lining for 2% of the total length (measured on plan) of the So	0		30-Nov-15
MS 3.3.64 Completion of excavation, support and permanent lining for 3% of the total length (measured on plan) of the So	0		30-Nov-15
MS 3.3.65 Completion of excavation, support and permanent lining for 4% of the total length (measured on plan) of the So	0		31-Dec-15
MS 3.3.66 Completion of excavation, support and permanent lining for 5% of the total length (measured on plan) of the So	0		31-Dec-15
MS 3.3.67 Completion of excavation, support and permanent lining for 6% of the total length (measured on plan) of the So	0		31-Dec-15
MS 3.3.68 Completion of excavation, support and permanent lining for 7% of the total length (measured on plan) of the So	0		30-Jan-16
MS 3.3.69 Completion of excavation, support and permanent lining for 8% of the total length (measured on plan) of the So	0		30-Jan-16
MS 3.3.70 Completion of excavation, support and permanent lining for 9% of the total length (measured on plan) of the So	0		30-Jan-16
MS 3.3.71 Completion of excavation, support and permanent lining for 10% of the total length (measured on plan) of the S	0		29-Feb-16
MS 3.3.72 Completion of excavation, support and permanent lining for 11% of the total length (measured on plan) of the S	0		29-Feb-16
MS 3.3.73 Completion of excavation, support and permanent lining for 12% of the total length (measured on plan) of the S	0		29-Feb-16
MS 3.3.74 Completion of excavation, support and permanent lining for 13% of the total length (measured on plan) of the S	0		29-Feb-16
MS 3.3.75 Completion of excavation, support and permanent lining for 14% of the total length (measured on plan) of the S	0		29-Feb-16
MS 3.3.76 Completion of excavation, support and permanent lining for 15% of the total length (measured on plan) of the S	0		31-Mar-16
MS 3.3.77 Completion of excavation, support and permanent lining for 16% of the total length (measured on plan) of the S	0		31-Mar-16
MS 3.3.78 Completion of excavation, support and permanent lining for 17% of the total length (measured on plan) of the S	0		31-Mar-16
MS 3.3.79 Completion of excavation, support and permanent lining for 18% of the total length (measured on plan) of the S	0		31-Mar-16
MS 3.3.80 Completion of excavation, support and permanent lining for 19% of the total length (measured on plan) of the S	0		31-Mar-16
MS 3.3.81 Completion of excavation, support and permanent lining for 20% of the total length (measured on plan) of the S	0		31-Mar-16
MS 3.3.82 Completion of excavation, support and permanent lining for 21% of the total length (measured on plan) of the S	0		31-Mar-16
MS 3.3.83 Completion of excavation, support and permanent lining for 22% of the total length (measured on plan) of the S	0		30-Apr-16
MS 3.3.84 Completion of excavation, support and permanent lining for 23% of the total length (measured on plan) of the S	0		30-Apr-16
MS 3.3.85 Completion of excavation, support and permanent lining for 24% of the total length (measured on plan) of the S	0		30-Apr-16
MS 3.3.86 Completion of excavation, support and permanent lining for 25% of the total length (measured on plan) of the S	0		30-Apr-16
MS 3.3.87 Completion of excavation, support and permanent lining for 27.5% of the total length (measured on plan) of the	0		30-Apr-16
MS 3.3.88 Completion of excavation, support and permanent lining for 30% of the total length (measured on plan) of the S	0		31-May-16
MS 3.3.89 Completion of excavation, support and permanent lining for 32.5% of the total length (measured on plan) of the	0		31-May-16
MS 3.3.90 Completion of excavation, support and permanent lining for 35% of the total length (measured on plan) of the S	0		31-May-16
Cut-and-cover Tunnels at Southern Landfalls			
MS 4.1.1 Complete 10% of total length (measured on plan) of temporary retaining walls for excavation of Cut-and-cover tu	0		31-Oct-15
MS 4.1.2 Complete 20% of total length (measured on plan)of temporary retaining walls for excavation of Cut-and-cover tun	0		31-Oct-15
MS 4.1.3 Complete 30% of total length (measured on plan) of temporary retaining walls for excavation of Cut-and-cover tu	0		30-Nov-15
MS 4.1.4 Complete 40% of total length (measured on plan) of temporary retaining walls for excavation of Cut-and-cover tu	0		30-Nov-15
MS 4.1.5 Complete 50% of total length (measured on plan) of temporary retaining walls for excavation of Cut-and-cover tu	0		31-Dec-15
MS 4.1.6 Complete 60% of total length (measured on plan) of temporary retaining walls for excavation of Cut-and-cover tu	0		31-Dec-15
MS 4.1.7 Complete 70% of total length (measured on plan) of temporary retaining walls for excavation of Cut-and-cover tu	0		30-Jan-16
MS 4.1.8 Complete 80% of total length (measured on plan) of temporary retaining walls for excavation of Cut-and-cover tu	0		30-Jan-16
MS 4.1.9 Complete 90% of total length (measured on plan) of temporary retaining walls for excavation of Cut-and-cover tu	0		29-Feb-16
MS 4.1.10 Complete 100% of total length (measured on plan) of temporary retaining walls for excavation of Cut-and-cover	0		31-Mar-16
MS 4.1.26 Complete excavation for 50% of total length (measured on plan) of all Cross Passages	0		31-Dec-15



Project ID: TMCLK DWPF 15W48

Data Date: 27-Mar-16

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

TMCLK - Northern Connection Sub-Sea Tunnel Section

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Dragages HongKong 香港寶嘉
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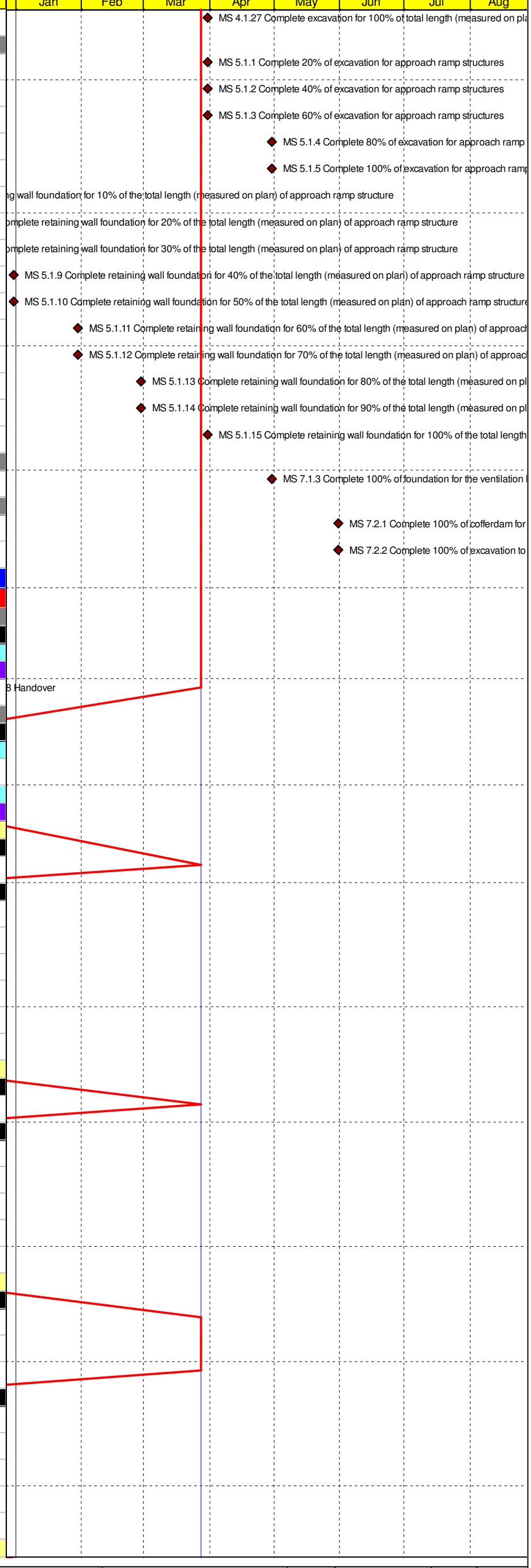
10-Jun-15	TMCLK/DBJGEN/PRG/98507 Rev.F	WYu	

Activity Name	Orig Dur	DWPF Start	DWPF Finish
MS 4.1.27 Complete excavation for 100% of total length (measured on plan) of all Cross Passages	0		31-Mar-16
Approach Ramp Structures to Cut-and-cover Tunnel at Southern Landfall			
MS 5.1.1 Complete 20% of excavation for approach ramp structures	0		31-Mar-16
MS 5.1.2 Complete 40% of excavation for approach ramp structures	0		31-Mar-16
MS 5.1.3 Complete 60% of excavation for approach ramp structures	0		31-Mar-16
MS 5.1.4 Complete 80% of excavation for approach ramp structures	0		30-Apr-16
MS 5.1.5 Complete 100% of excavation for approach ramp structures	0		30-Apr-16
MS 5.1.6 Complete retaining wall foundation for 10% of the total length (measured on plan) of approach ramp structure	0		31-Oct-15
MS 5.1.7 Complete retaining wall foundation for 20% of the total length (measured on plan) of approach ramp structure	0		30-Nov-15
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
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
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
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
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
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
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
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
South Ventilation Buildings			
MS 7.1.3 Complete 100% of foundation for the ventilation building	0		30-Apr-16
North Ventilation Buildings			
MS 7.2.1 Complete 100% of cofferdam for excavation	0		31-May-16
MS 7.2.2 Complete 100% of excavation to the formation level	0		31-May-16
Construction			
Northern Landfall			
North Reclamation (Phase 1)			
Construction			
Zone D1			
Reclamation			
Portion N8 Handover	0		03-Dec-15
Box Culvert Extension			
Construction			
Ch000-010 Culvert Outfall			
Installation of temporary bulk head	26	10-Aug-15	08-Sep-15
CH000-150 Land Section			
ELS & Structure			
Pile A43/A41 CJ to Pile A41/A39 CJ			
ELS			
Excavation to FEL	5	14-May-15	19-May-15
Box Culvert Structure			
Pile cap construction	10	27-May-15	06-Jun-15
Base slab construction including kicker	6	19-Jun-15	26-Jun-15
Removal of strut S1	4	27-Jun-15	02-Jul-15
System formworks delivery & setup	14	03-Jul-15	18-Jul-15
Walls & top slab construction	6	20-Jul-15	25-Jul-15
Removal of strut S2 & Backfilling up to required level	6	03-Aug-15	08-Aug-15
Pile A45/A43 CJ to Pile A43/A41 CJ			
ELS			
Excavation to FEL	5	20-May-15	26-May-15
Box Culvert Structure			
Pile cap construction	10	08-Jun-15	18-Jun-15
Base slab construction including kicker	6	27-Jun-15	04-Jul-15
Removal of strut S1	4	06-Jul-15	09-Jul-15
Walls & top slab construction	6	27-Jul-15	01-Aug-15
Removal of strut S2 & Backfilling up to required level	6	10-Aug-15	15-Aug-15
Pile A47/A45 CJ to Pile A45/A43 CJ			
ELS			
Excavation to 0.5m below strut S1	5	14-May-15	19-May-15
Installation of strut S1	5	20-May-15	26-May-15
Excavation to FEL	5	27-May-15	01-Jun-15
Box Culvert Structure			
Pile cap construction	10	19-Jun-15	02-Jul-15
Base slab construction including kicker	6	06-Jul-15	11-Jul-15
Removal of strut S1	4	13-Jul-15	16-Jul-15
Walls & top slab construction	6	03-Aug-15	08-Aug-15
Removal of strut S2 & Backfilling up to required level	6	17-Aug-15	22-Aug-15
Pile A49/A47 CJ to Pile A47/A45 CJ			



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Planned Bar
Planned Bar - Critical
Planned Milestone
Progress bar
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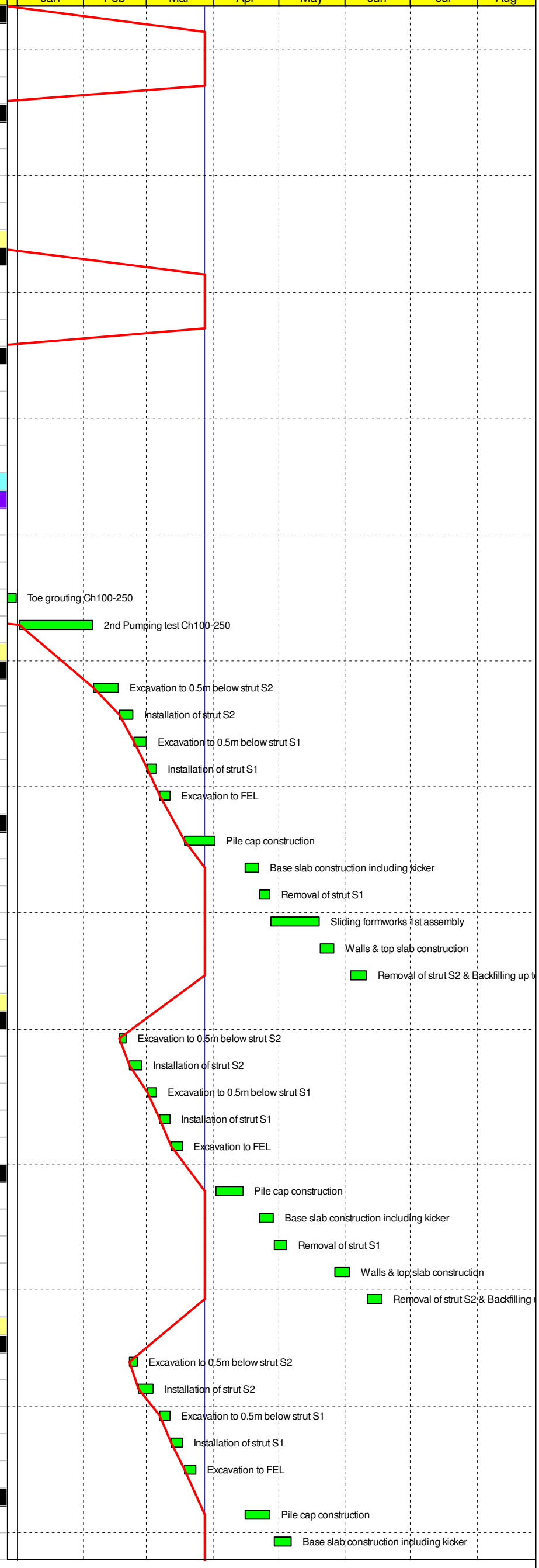
10-Jun-15	TMCLK/DBJGEN/PRG/98507 Rev.F	WYu	

Activity Name	Orig Dur	DWPF Start	DWPF Finish
ELS			
Excavation to 0.5m below strut S1	5	20-May-15	26-May-15
Installation of strut S1	5	27-May-15	01-Jun-15
Excavation to FEL	5	02-Jun-15	06-Jun-15
Box Culvert Structure			
Pile cap construction	10	03-Jul-15	14-Jul-15
Base slab construction including kicker	6	15-Jul-15	21-Jul-15
Removal of strut S1	4	22-Jul-15	25-Jul-15
Walls & top slab construction	6	10-Aug-15	15-Aug-15
Pile A52/A49 CJ to Pile A49/A47 CJ			
ELS			
Excavation to 0.5m below strut S1	5	27-May-15	01-Jun-15
Installation of strut S1	5	02-Jun-15	06-Jun-15
Excavation to FEL	5	08-Jun-15	12-Jun-15
Box Culvert Structure			
Pile cap construction	10	22-Jul-15	01-Aug-15
Base slab construction including kicker	6	03-Aug-15	08-Aug-15
Removal of strut S1	4	10-Aug-15	13-Aug-15
Walls & top slab construction	6	17-Aug-15	22-Aug-15
Ch150-250 Marine Section			
ELS & Structure			
Dewatering well installation Ch180-250	12	19-Jun-15	04-Jul-15
Dewatering well installation Ch100-180	12	06-Jul-15	18-Jul-15
1st Pumping test	18	20-Jul-15	08-Aug-15
Toe grouting Ch100-250	95	07-Sep-15	31-Dec-15
2nd Pumping test Ch100-250	29	02-Jan-16	04-Feb-16
Pile A41/A39 CJ to Pile A39/A37 CJ			
ELS			
Excavation to 0.5m below strut S2	4	05-Feb-16	16-Feb-16
Installation of strut S2	6	17-Feb-16	23-Feb-16
Excavation to 0.5m below strut S1	5	24-Feb-16	29-Feb-16
Installation of strut S1	5	01-Mar-16	05-Mar-16
Excavation to FEL	5	07-Mar-16	11-Mar-16
Box Culvert Structure			
Pile cap construction	10	18-Mar-16	01-Apr-16
Base slab construction including kicker	6	15-Apr-16	21-Apr-16
Removal of strut S1	4	22-Apr-16	26-Apr-16
Sliding formworks 1st assembly	18	27-Apr-16	19-May-16
Walls & top slab construction	6	20-May-16	26-May-16
Removal of strut S2 & Backfilling up to required level	6	03-Jun-16	10-Jun-16
Pile A39/A37 CJ to Pile A37/A35 CJ			
ELS			
Excavation to 0.5m below strut S2	4	17-Feb-16	20-Feb-16
Installation of strut S2	6	22-Feb-16	27-Feb-16
Excavation to 0.5m below strut S1	5	01-Mar-16	05-Mar-16
Installation of strut S1	5	07-Mar-16	11-Mar-16
Excavation to FEL	5	12-Mar-16	17-Mar-16
Box Culvert Structure			
Pile cap construction	10	02-Apr-16	14-Apr-16
Base slab construction including kicker	6	22-Apr-16	28-Apr-16
Removal of strut S1	4	29-Apr-16	04-May-16
Walls & top slab construction	6	27-May-16	02-Jun-16
Removal of strut S2 & Backfilling up to required level	6	11-Jun-16	17-Jun-16
Pile A37/A35 CJ to Pile A35/A33 CJ			
ELS			
Excavation to 0.5m below strut S2	4	22-Feb-16	25-Feb-16
Installation of strut S2	6	26-Feb-16	03-Mar-16
Excavation to 0.5m below strut S1	5	07-Mar-16	11-Mar-16
Installation of strut S1	5	12-Mar-16	17-Mar-16
Excavation to FEL	5	18-Mar-16	23-Mar-16
Box Culvert Structure			
Pile cap construction	10	15-Apr-16	26-Apr-16
Base slab construction including kicker	6	29-Apr-16	06-May-16



Planned Bar
Planned Bar - Critical
Planned Milestone
Progress bar
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TMCLK - Northern Connection Sub-Sea Tunnel Section

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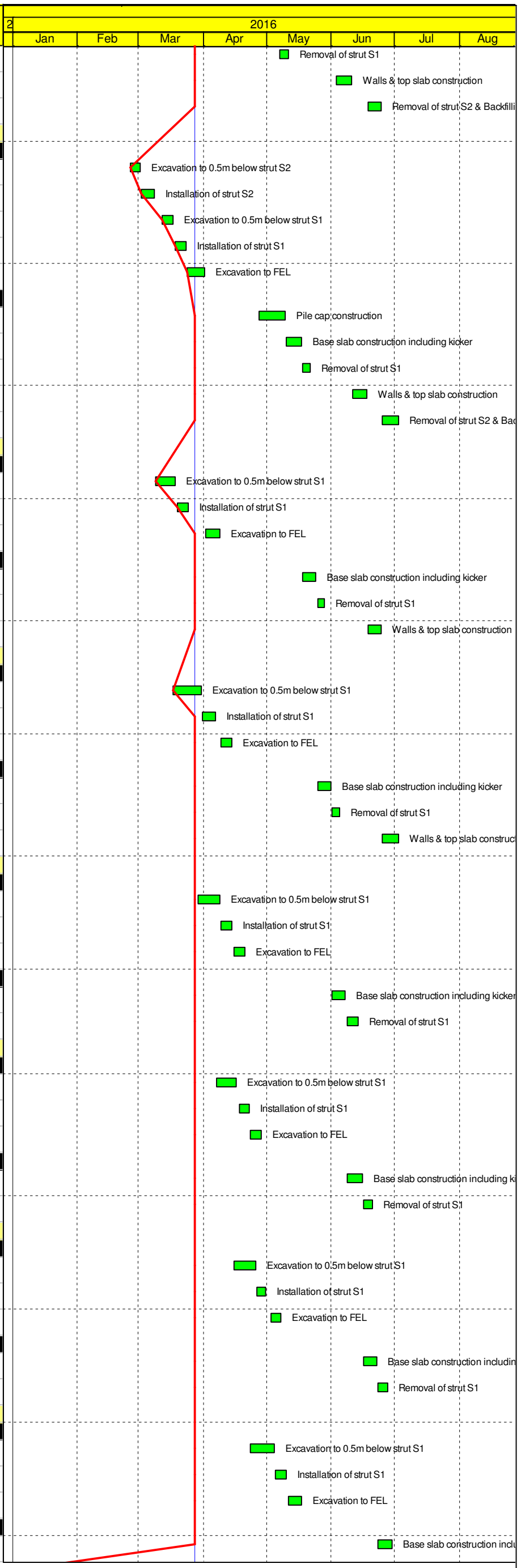
Activity Name	Orig Dur	DWPF Start	DWPF Finish
Removal of strut S1	4	07-May-16	11-May-16
Walls & top slab construction	6	03-Jun-16	10-Jun-16
Removal of strut S2 & Backfilling up to required level	6	18-Jun-16	24-Jun-16
Pile A35/A33 CJ to Pile A33/P117 CJ			
ELS			
Excavation to 0.5m below strut S2	4	26-Feb-16	01-Mar-16
Installation of strut S2	6	02-Mar-16	08-Mar-16
Excavation to 0.5m below strut S1	5	12-Mar-16	17-Mar-16
Installation of strut S1	5	18-Mar-16	23-Mar-16
Excavation to FEL	5	24-Mar-16	01-Apr-16
Box Culvert Structure			
Pile cap construction	10	27-Apr-16	09-May-16
Base slab construction including kicker	6	10-May-16	17-May-16
Removal of strut S1	4	18-May-16	21-May-16
Walls & top slab construction	6	11-Jun-16	17-Jun-16
Removal of strut S2 & Backfilling up to required level	6	25-Jun-16	02-Jul-16
Pile A33/P117 CJ to Pile P113/P109 CJ			
ELS			
Excavation to 0.5m below strut S1	9	09-Mar-16	18-Mar-16
Installation of strut S1	5	19-Mar-16	24-Mar-16
Excavation to FEL	5	02-Apr-16	08-Apr-16
Box Culvert Structure			
Base slab construction including kicker	6	18-May-16	24-May-16
Removal of strut S1	4	25-May-16	28-May-16
Walls & top slab construction	6	18-Jun-16	24-Jun-16
Pile P113/P109 CJ to Pile P105/P101 CJ			
ELS			
Excavation to 0.5m below strut S1	9	17-Mar-16	30-Mar-16
Installation of strut S1	5	31-Mar-16	06-Apr-16
Excavation to FEL	5	09-Apr-16	14-Apr-16
Box Culvert Structure			
Base slab construction including kicker	6	25-May-16	31-May-16
Removal of strut S1	4	01-Jun-16	04-Jun-16
Walls & top slab construction	6	25-Jun-16	02-Jul-16
Pile P105/P101 CJ to Pile P97/P93 CJ			
ELS			
Excavation to 0.5m below strut S1	9	29-Mar-16	08-Apr-16
Installation of strut S1	5	09-Apr-16	14-Apr-16
Excavation to FEL	5	15-Apr-16	20-Apr-16
Box Culvert Structure			
Base slab construction including kicker	6	01-Jun-16	07-Jun-16
Removal of strut S1	4	08-Jun-16	13-Jun-16
Pile P97/P93 CJ to Pile P89/P85 CJ			
ELS			
Excavation to 0.5m below strut S1	9	07-Apr-16	16-Apr-16
Installation of strut S1	5	18-Apr-16	22-Apr-16
Excavation to FEL	5	23-Apr-16	28-Apr-16
Box Culvert Structure			
Base slab construction including kicker	6	08-Jun-16	15-Jun-16
Removal of strut S1	4	16-Jun-16	20-Jun-16
Pile P89/P85 CJ to Pile P81/P77 CJ			
ELS			
Excavation to 0.5m below strut S1	9	15-Apr-16	25-Apr-16
Installation of strut S1	5	26-Apr-16	30-Apr-16
Excavation to FEL	5	03-May-16	07-May-16
Box Culvert Structure			
Base slab construction including kicker	6	16-Jun-16	22-Jun-16
Removal of strut S1	4	23-Jun-16	27-Jun-16
Pile P81/P77 CJ to Pile P73/P69 CJ			
ELS			
Excavation to 0.5m below strut S1	9	23-Apr-16	04-May-16
Installation of strut S1	5	05-May-16	10-May-16
Excavation to FEL	5	11-May-16	17-May-16
Box Culvert Structure			
Base slab construction including kicker	6	23-Jun-16	29-Jun-16



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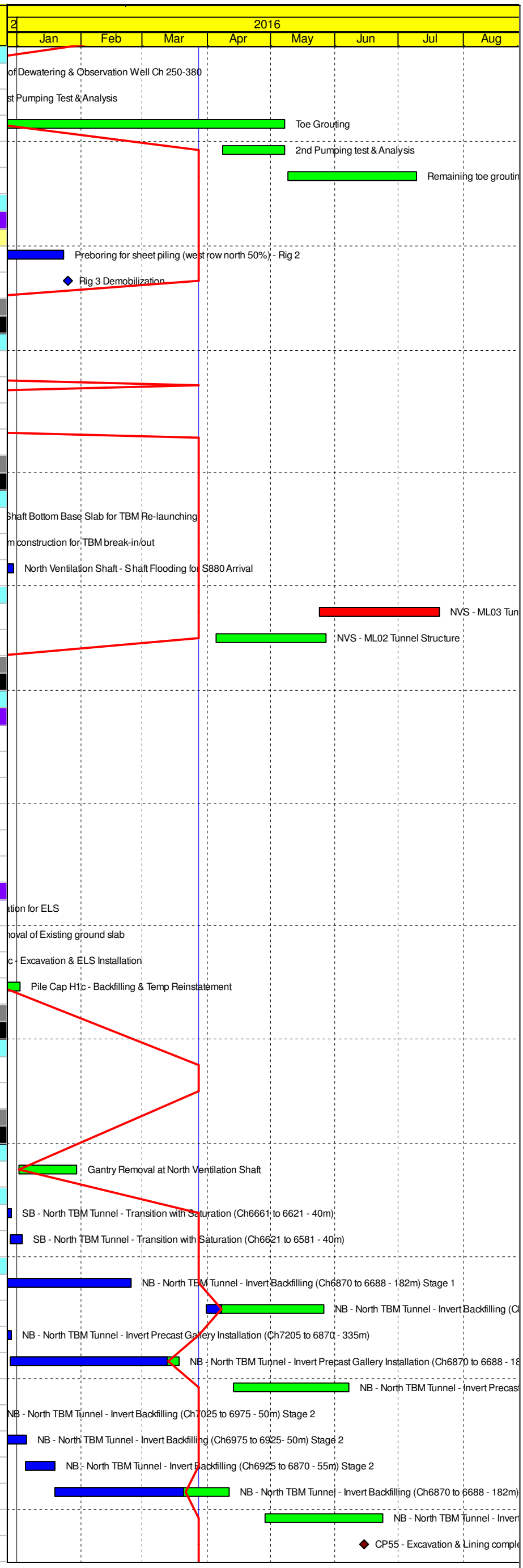
Activity Name	Orig Dur	DWPF Start	DWPF Finish
Ch250-380 Marine Section			
Installation of Dewatering & Observation Well Ch 250-380	23	04-Nov-15	30-Nov-15
1st Pumping Test & Analysis	17	01-Dec-15	19-Dec-15
Toe Grouting	106	21-Dec-15	07-May-16
2nd Pumping test & Analysis	25	08-Apr-16	07-May-16
Remaining toe grouting Ch250-380	51	09-May-16	09-Jul-16
Ch380-399 Connection Section			
Foundation & ELS			
Stage 2			
Preboring for sheet piling (west row north 50%) - Rig 2	24	24-Dec-15	23-Jan-16
Rig 3 Demobilization	0	25-Jan-16	
North Launching Shaft			
Design Submission			
(C1) DDA for North Approach Ramp Permanent Structure			
IPs Review	28	23-Oct-14	19-Nov-14
IP's No Objection Received	0		19-Nov-14
SO's Review	35	23-Oct-14	26-Nov-14
SO Approval with Condition Received	0		26-Nov-14
North Ventilation Shaft			
Construction			
North Ventilation Shaft Excavation & Base Slab			
A - Vent Shaft Bottom Base Slab for TBM Re-launching	48	08-Oct-15	04-Dec-15
A - Tympanum construction for TBM break-in/out	36	15-Oct-15	27-Nov-15
North Ventilation Shaft - Shaft Flooding for S880 Arrival	10	16-Dec-15	30-Dec-15
North Ventilation Shaft Structure			
NVS - ML03 Tunnel Structure	47	24-May-16	20-Jul-16
NVS - ML02 Tunnel Structure	44	05-Apr-16	27-May-16
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
Pile Cap G1c - Removal of Existing ground slab	6	31-Oct-14	06-Nov-14
Pile Cap G1c - Excavation & ELS Installation	12	07-Nov-14	20-Nov-14
Pile Cap G1c - Blinding Concrete	3	21-Nov-14	24-Nov-14
Pile Cap G1c - Rebar & Concreting	18	25-Nov-14	15-Dec-14
Pile Cap G1c - Backfilling & Temp Reinstatement	6	16-Dec-14	22-Dec-14
Pier H1c			
Pile Cap H1c - Preparation for ELS	6	02-Nov-15	07-Nov-15
Pile Cap H1c - Removal of Existing ground slab	6	09-Nov-15	14-Nov-15
Pile Cap H1c - Excavation & ELS Installation	12	16-Nov-15	28-Nov-15
Pile Cap H1c - Backfilling & Temp Reinstatement	6	24-Dec-15	02-Jan-16
North Surface works for TBM Tunnelling			
Design Submission			
(D1) IFA for Temp. Access to Portion N8A, N8B & N8C incl. Temp. Lighting			
SO Review (35 Days)	35	02-May-14	05-Jun-14
SO Approval with Condition Received	0		05-Jun-14
North Approach TBM Tunnelling & Cross Passage			
Construction			
Northern Landfall Surface Setup for TBM operation			
Gantry Removal at North Ventilation Shaft	24	02-Jan-16	29-Jan-16
North Approach TBM Tunnel - SB ID12.40m - S882			
SB - North TBM Tunnel - Transition with Saturation (Ch6661 to 6621 - 40m)	8	21-Dec-15	29-Dec-15
SB - North TBM Tunnel - Transition with Saturation (Ch6621 to 6581 - 40m)	5	29-Dec-15	03-Jan-16
North Approach Tunnel Internal Structure - NB			
NB - North TBM Tunnel - Invert Backfilling (Ch6870 to 6688 - 182m) Stage 1	77	06-Dec-15	24-Feb-16
NB - North TBM Tunnel - Invert Backfilling (Ch6688 to 6560 - 128m) Stage 1	54	01-Apr-16	26-May-16
NB - North TBM Tunnel - Invert Precast Gallery Installation (Ch7205 to 6870 - 335m)	96	24-Sep-15	29-Dec-15
NB - North TBM Tunnel - Invert Precast Gallery Installation (Ch6870 to 6688 - 182m)	77	29-Dec-15	18-Mar-16
NB - North TBM Tunnel - Invert Precast Gallery Installation (Ch6688 to 6560 - 128m)	54	13-Apr-16	07-Jun-16
NB - North TBM Tunnel - Invert Backfilling (Ch7025 to 6975 - 50m) Stage 2	14	08-Dec-15	22-Dec-15
NB - North TBM Tunnel - Invert Backfilling (Ch6975 to 6925- 50m) Stage 2	14	22-Dec-15	05-Jan-16
NB - North TBM Tunnel - Invert Backfilling (Ch6925 to 6870 - 55m) Stage 2	14	05-Jan-16	19-Jan-16
NB - North TBM Tunnel - Invert Backfilling (Ch6870 to 6688 - 182m) Stage 2	77	19-Jan-16	11-Apr-16
NB - North TBM Tunnel - Invert Backfilling (Ch6688 to 6560 - 128m) Stage 2	54	28-Apr-16	23-Jun-16
CP55 - Excavation & Lining completion	0		14-Jun-16



Project ID: TMCLK DWPF 15W48

Data Date: 27-Mar-16

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 27-Mar-16

Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

Date	Revision	Checked	Approved
12-Feb-14	TMCLK/DBJGEN/PRG/98507	WYu	SPo
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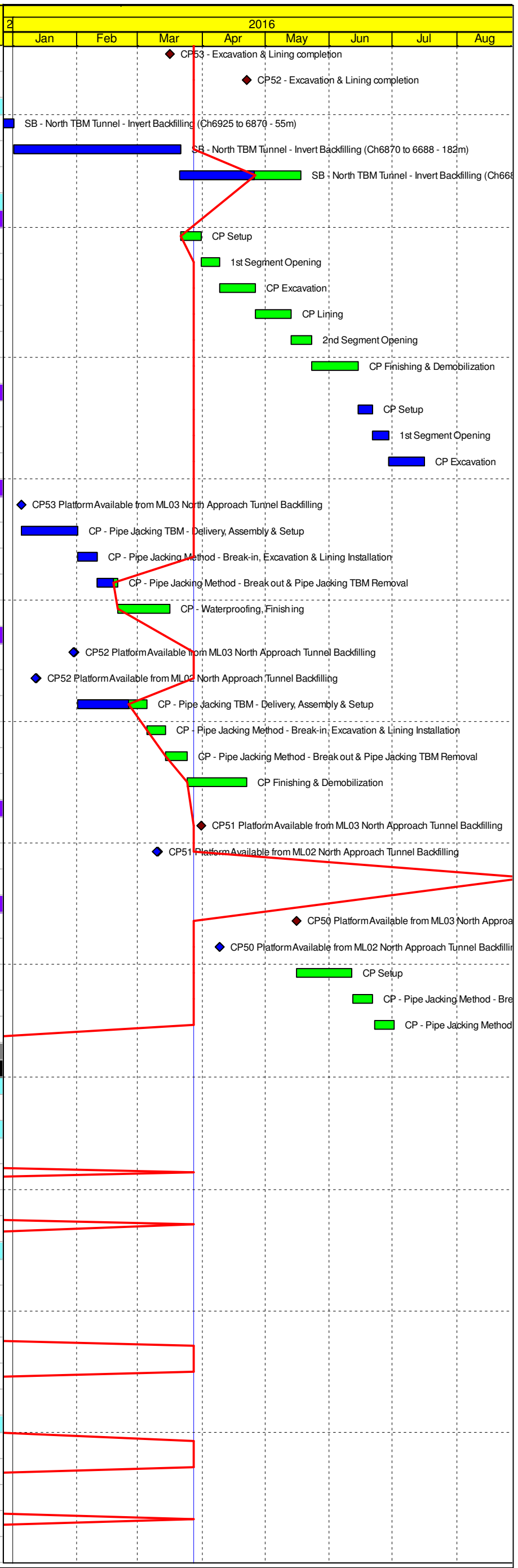
28-Aug-14	TMCLK/DBJGEN/PRG/98507 Rev.C	CLa	WYu
10-Jun-15	TMCLK/DBJGEN/PRG/98507 Rev.F	WYu	

Activity Name	Orig Dur	DWPF Start	DWPF Finish
CP53 - Excavation & Lining completion	0		16-Mar-16
CP52 - Excavation & Lining completion	0		22-Apr-16
North Approach Tunnel Internal Structure - SB			
SB - North TBM Tunnel - Invert Backfilling (Ch6925 to 6870 - 55m)	12	20-Dec-15	01-Jan-16
SB - North TBM Tunnel - Invert Backfilling (Ch6870 to 6688 - 182m)	77	01-Jan-16	21-Mar-16
SB - North TBM Tunnel - Invert Backfilling (Ch6688 to 6560 - 128m)	54	21-Mar-16	18-May-16
North Approach Cross Passage			
CP55 - Traditional Method			
CP Setup	6	21-Mar-16	31-Mar-16
1st Segment Opening	7	31-Mar-16	09-Apr-16
CP Excavation	14	09-Apr-16	26-Apr-16
CP Lining	14	26-Apr-16	13-May-16
2nd Segment Opening	7	13-May-16	23-May-16
CP Finishing & Demobilization	18	23-May-16	14-Jun-16
CP54 - Traditional Method			
CP Setup	6	14-Jun-16	21-Jun-16
1st Segment Opening	7	21-Jun-16	29-Jun-16
CP Excavation	14	29-Jun-16	16-Jul-16
CP53 - Pipe Jacking Method			
CP53 Platform Available from ML03 North Approach Tunnel Backfilling	0	05-Jan-16	
CP - Pipe Jacking TBM - Delivery, Assembly & Setup	23	05-Jan-16	01-Feb-16
CP - Pipe Jacking Method - Break-in, Excavation & Lining Installation	9	01-Feb-16	10-Feb-16
CP - Pipe Jacking Method - Break out & Pipe Jacking TBM Removal	10	10-Feb-16	20-Feb-16
CP - Waterproofing, Finishing	21	20-Feb-16	16-Mar-16
CP52 - Pipe Jacking Method			
CP52 Platform Available from ML03 North Approach Tunnel Backfilling	0	30-Jan-16	
CP52 Platform Available from ML02 North Approach Tunnel Backfilling	0	12-Jan-16	
CP - Pipe Jacking TBM - Delivery, Assembly & Setup	23	01-Feb-16	05-Mar-16
CP - Pipe Jacking Method - Break-in, Excavation & Lining Installation	9	05-Mar-16	14-Mar-16
CP - Pipe Jacking Method - Break out & Pipe Jacking TBM Removal	10	14-Mar-16	24-Mar-16
CP Finishing & Demobilization	21	24-Mar-16	22-Apr-16
CP51 - Traditional Method			
CP51 Platform Available from ML03 North Approach Tunnel Backfilling	0	31-Mar-16	
CP51 Platform Available from ML02 North Approach Tunnel Backfilling	0	10-Mar-16	
CP Setup	6	31-Aug-16	07-Sep-16
CP50 - Pipe Jacking Method			
CP50 Platform Available from ML03 North Approach Tunnel Backfilling	0	16-May-16	
CP50 Platform Available from ML02 North Approach Tunnel Backfilling	0	09-Apr-16	
CP Setup	23	16-May-16	11-Jun-16
CP - Pipe Jacking Method - Break-in, Excavation & Lining Installation	9	12-Jun-16	21-Jun-16
CP - Pipe Jacking Method - Break out & Pipe Jacking TBM Removal	10	22-Jun-16	01-Jul-16
North Ventilation Building			
Design Submission			
(A11) Submissons to Design Advisory Panel of ArchSD			
ArchSD's comment	30	10-Jun-14	09-Jul-14
(I1) DDA for North Vent.Bldgs. GBP & Arch.Submission			
IPs Review	28	21-Aug-14	17-Sep-14
IP's No Objection Received	0		17-Sep-14
SO's Review	35	21-Aug-14	24-Sep-14
SO Approval with Condition Received	0		24-Sep-14
(I1) DDA for North & South Vent.Bldg. ABWF works			
Preparation of DDA North & South ABWF	18	25-Sep-14	17-Oct-14
Review & Comment by JV	24	18-Oct-14	14-Nov-14
Designer prepare DDA	15	15-Nov-14	02-Dec-14
Formal Submission of DDA to ICE/ IPs	0		02-Dec-14
Advanced Submission to SO	0		02-Dec-14
IPs/ SO's Advance Comments/ ICE Comments	28	03-Dec-14	30-Dec-14
(I2) DDA for North Vent.Bldgs.Structural Design incl.Vent.Connections			
ICE Approval & Issue Check Cert	12	24-Dec-14	09-Jan-15
Submit ICE Check Cert to SO	6	10-Jan-15	16-Jan-15
IPs Review	28	24-Dec-14	20-Jan-15
IP's No Objection Received	0		20-Jan-15
SO's Review	35	24-Dec-14	27-Jan-15



Project ID: TMCLK DWPF 15W48

Data Date: 27-Mar-16

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 27-Mar-16

Dragages Hong Kong 香港寶嘉
A member of the Bouygues Construction group
Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營
BOUYGUES TRAVAUX PUBLICS

Date	Revision	Checked	Approved
12-Feb-14	TMCLK/DBJGEN/PRG/98507	WYu	SPo
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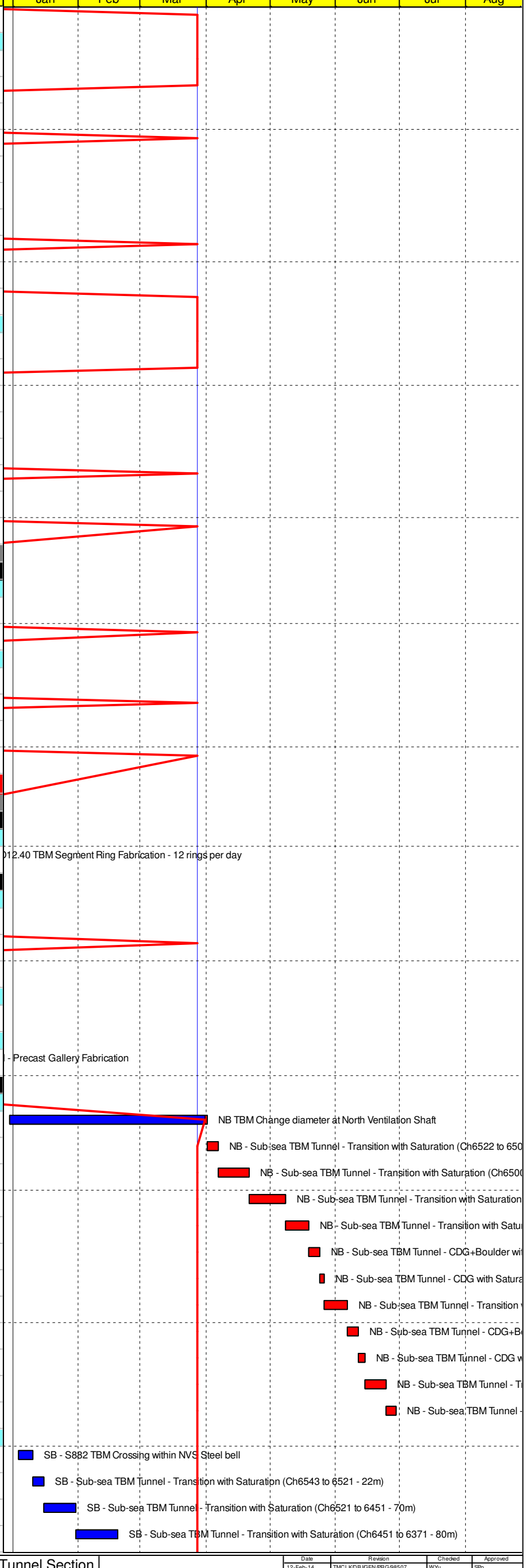
10-Jun-15	TMCLK/DBJGEN/PRG/98507 Rev.F	WYu	

Activity Name	Orig Dur	DWPF Start	DWPF Finish
SO Approval with Condition Received	0		27-Jan-15
(I3) DDA for North & South Vent.Bldgs. Service and E&M Provision			
IPs/ SO's Advance Comments/ ICE Comments	28	20-Nov-14	17-Dec-14
Comments Received	0		17-Dec-14
Designer to Reply RtC + Update Submission	21	18-Dec-14	14-Jan-15
Submit Updated DDA to SO/ ICE/ IPs	0	15-Jan-15	
ICE Approval & Issue Check Cert	12	15-Jan-15	28-Jan-15
Submit ICE Check Cert to SO	6	29-Jan-15	04-Feb-15
IPs Review	28	15-Jan-15	11-Feb-15
IP's No Objection Received	0		11-Feb-15
SO's Review	35	15-Jan-15	18-Feb-15
SO Approval with Condition Received	0		18-Feb-15
(C3) DDA for North Vent Shaft & Duct Permanent Structure			
Designer to Reply RtC + Update Submission	21	29-Oct-14	21-Nov-14
Submit Updated DDA to SO/ ICE/ IPs	0	22-Nov-14	
ICE Approval & Issue Check Cert	12	22-Nov-14	05-Dec-14
Submit ICE Check Cert to SO	6	06-Dec-14	12-Dec-14
IPs Review	28	22-Nov-14	19-Dec-14
IP's No Objection Received	0		19-Dec-14
SO's Review	35	22-Nov-14	26-Dec-14
SO Approval with Condition Received	0		27-Dec-14
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
SO Approval with Condition Received	0		14-Jan-15
(C2) DDA for Sewerage, Drainage, Waterworks & Utility works for North Landfall			
IPs Review	28	08-Nov-14	05-Dec-14
IP's No Objection Received	0		05-Dec-14
SO's Review	35	08-Nov-14	12-Dec-14
SO Approval with Condition Received	0		12-Dec-14
Sub-sea Tunnel			
Sub-sea TBM Tunnelling			
Major Procurement			
Precast Semgnet 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
Design Submission			
(B6) Risk Assessment of Submarine Cable - Tunnelling Works			
CLP Review (4 weeks)	28	17-Mar-15	13-Apr-15
CLP Comment Received	0		13-Apr-15
SO's Condition Approval	35	12-Mar-15	15-Apr-15
(G1) DDA for TBM Tunnel Lining Structural Design - Sub-sea tunnel			
Sub-sea TBM Tunnel Segment - Fabrication	265	06-Oct-14	29-Aug-15
(G3) DDA for TBM Tunnel Internal Structures (Sub-sea)			
Sub-sea Tunnel - Precast Gallery Fabrication	244	22-Jan-15	21-Nov-15
Construction			
Sub-sea TBM Tunnel - NB ID12.2m - S881			
NB TBM Change diameter at North Ventilation Shaft	87	30-Dec-15	01-Apr-16
NB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6522 to 6500 - 22m)	5	01-Apr-16	06-Apr-16
NB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6500 to 6430 - 70m)	15	06-Apr-16	21-Apr-16
NB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6430 to 6350 - 80m)	17	21-Apr-16	08-May-16
NB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6350 to 6300 - 50m)	10	08-May-16	19-May-16
NB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch6300 to 6260 - 40m)	5	19-May-16	24-May-16
NB - Sub-sea TBM Tunnel - CDG with Saturation (Ch6260 to 6240 - 20m)	2	24-May-16	26-May-16
NB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6240 to 6175 - 65m)	11	26-May-16	06-Jun-16
NB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch6175 to 6135 - 40m)	5	06-Jun-16	11-Jun-16
NB - Sub-sea TBM Tunnel - CDG with Saturation (Ch6135 to 6100 - 35m)	3	11-Jun-16	14-Jun-16
NB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6100 to 6050 - 50m)	9	14-Jun-16	24-Jun-16
NB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch6050 to 6010 - 40m)	5	24-Jun-16	29-Jun-16
Sub-sea TBM Tunnel - SB ID12.2m - S882			
SB - S882 TBM Crossing within NVS Steel bell	7	03-Jan-16	10-Jan-16
SB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6543 to 6521 - 22m)	5	10-Jan-16	15-Jan-16
SB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6521 to 6451 - 70m)	15	15-Jan-16	30-Jan-16
SB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6451 to 6371 - 80m)	17	30-Jan-16	19-Feb-16



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Data Date: 27-Mar-16

Planned Bar
Planned Bar - Critical
Planned Milestone
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TMCLK - Northern Connection Sub-Sea Tunnel Section

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Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

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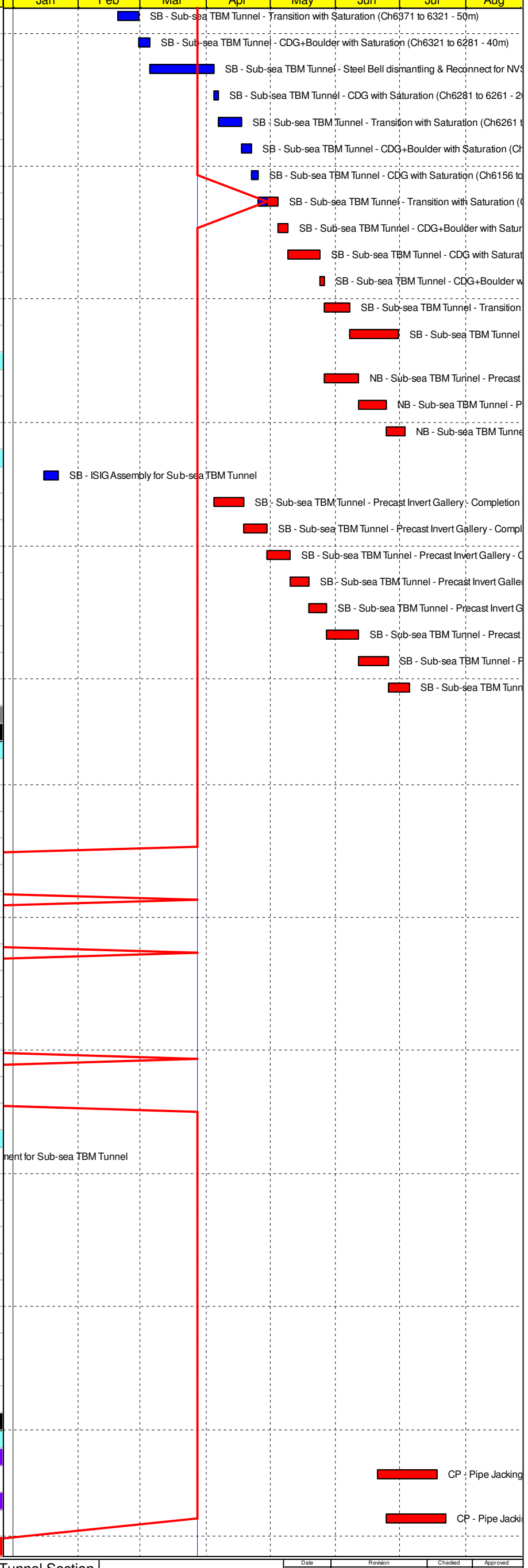
28-Aug-14	TMCLK/DBJGEN/PRG/98507 Rev.C	CLa	WYu
10-Jun-15	TMCLK/DBJGEN/PRG/98507 Rev.F	WYu	

Activity Name	Orig Dur	DWPF Start	DWPF Finish
SB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6371 to 6321 - 50m)	10	19-Feb-16	29-Feb-16
SB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch6321 to 6281 - 40m)	5	29-Feb-16	05-Mar-16
SB - Sub-sea TBM Tunnel - Steel Bell dismantling & Reconnect for NVS supply	27	05-Mar-16	04-Apr-16
SB - Sub-sea TBM Tunnel - CDG with Saturation (Ch6281 to 6261 - 20m)	2	04-Apr-16	06-Apr-16
SB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6261 to 6196 - 65m)	11	06-Apr-16	17-Apr-16
SB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch6196 to 6156 - 40m)	5	17-Apr-16	22-Apr-16
SB - Sub-sea TBM Tunnel - CDG with Saturation (Ch6156 to 6121 - 35m)	3	22-Apr-16	25-Apr-16
SB - Sub-sea TBM Tunnel - Transition with Saturation (Ch6121 to 6071 - 50m)	9	25-Apr-16	04-May-16
SB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch6071 to 6031 - 40m)	5	04-May-16	09-May-16
SB - Sub-sea TBM Tunnel - CDG with Saturation (Ch6031 to 5851 - 180m)	14	09-May-16	24-May-16
SB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch5851 to 5831 - 20m)	2	24-May-16	26-May-16
SB - Sub-sea TBM Tunnel - Transition with Saturation (Ch5831 to 5761 - 70m)	12	26-May-16	07-Jun-16
SB - Sub-sea TBM Tunnel - CDG+Boulder with Saturation (Ch5761 to 5571 - 190m)	22	07-Jun-16	30-Jun-16
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
NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP47	12	11-Jun-16	24-Jun-16
NB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP46	9	24-Jun-16	03-Jul-16
Sub-sea TBM Tunnel - SB - Precast Invert Gallery			
SB - ISIG Assembly for Sub-sea TBM Tunnel	7	15-Jan-16	22-Jan-16
SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP48	14	04-Apr-16	18-Apr-16
SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP47	11	18-Apr-16	29-Apr-16
SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP46	11	29-Apr-16	10-May-16
SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP45	8	10-May-16	19-May-16
SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP44	8	19-May-16	27-May-16
SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP43	15	27-May-16	11-Jun-16
SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP42	13	11-Jun-16	25-Jun-16
SB - Sub-sea TBM Tunnel - Precast Invert Gallery - Completion to CP41	10	25-Jun-16	05-Jul-16
Sub-sea Tunnel Cross Passage & Internal Structure			
Design Submission			
(G4) DDA for Cross Passage - Permanent works - incl. Geotechnical Assessment - Sub-sea tunnel			
Review & Comment by JV	6	01-Dec-14	06-Dec-14
Designer prepare DDA	12	08-Dec-14	20-Dec-14
Formal Submission of DDA to ICE/ IPs	0		20-Dec-14
Advanced Submission to SO	0		20-Dec-14
IPs/ SO's Advance Comments/ ICE Comments	28	21-Dec-14	17-Jan-15
Comments Received	0		17-Jan-15
Designer to Reply RtC + Update Submission	21	19-Jan-15	11-Feb-15
Submit Updated DDA to SO/ ICE/ IPs	0	12-Feb-15	
ICE Approval & Issue Check Cert	12	12-Feb-15	04-Mar-15
Submit ICE Check Cert to SO	6	05-Mar-15	11-Mar-15
IPs Review	28	12-Feb-15	11-Mar-15
IP's No Objection Received	0		11-Mar-15
SO's Review	35	12-Feb-15	18-Mar-15
SO Approval with Condition Received	0		18-Mar-15
ETWB TCW No 15/2005 - Cross Passage Ground Treatment for Sub-sea TBM Tunnel			
1st Submission to GEO - ETWB TCW No 15/2005 - Cross Passage Ground Treatment for Sub-sea TBM Tunnel	0		13-Jul-15
1st Submission GEO Review	28	14-Jul-15	10-Aug-15
Received GEO Comment	0		10-Aug-15
Prepare Response to Comment	12	11-Aug-15	24-Aug-15
2nd Submission to GEO	0		24-Aug-15
2nd GEO Review	28	25-Aug-15	21-Sep-15
Received 2nd GEO Comment	0		21-Sep-15
Prepare Respond to 2nd Comment	12	22-Sep-15	07-Oct-15
3rd Submission to GEO	0		07-Oct-15
3rd GEO Review	28	08-Oct-15	04-Nov-15
Construction			
Sub-sea Tunnel Cross Passage			
CP48 - ML03 - Ch6489			
CP - Pipe Jacking Method - Setup & Assembly	23	20-Jun-16	18-Jul-16
CP47 - ML03 - Ch6390			
CP - Pipe Jacking Method - Setup & Assembly	23	24-Jun-16	22-Jul-16
Southern Landfall			



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Planned Bar - Critical
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TMCLK - Northern Connection Sub-Sea Tunnel Section

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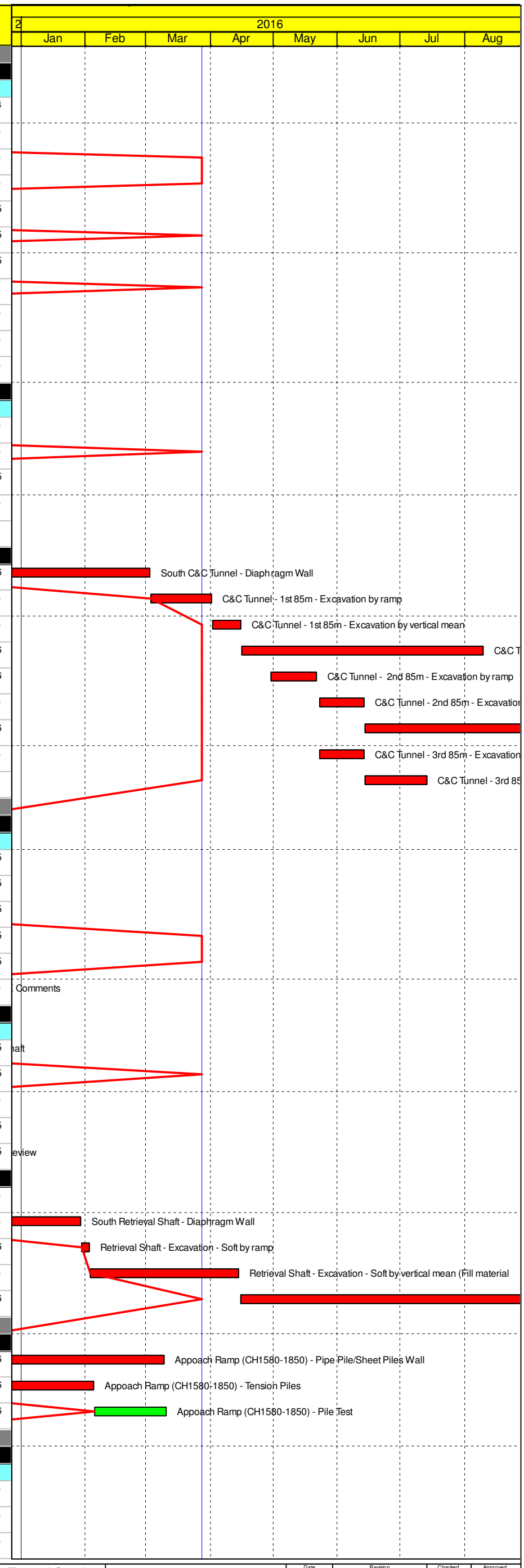
10-Jun-15	TMCLK/DBJGEN/PRG/98507 Rev.F	WYu	

Activity Name	Orig Dur	DWPF Start	DWPF Finish
South Cut & Cover Tunnel			
Design Submission			
(E2) DDA for South C&C Box & Approach Ramp			
Review & Comment by JV	18	09-Dec-14	31-Dec-14
Designer prepare DDA	10	02-Jan-15	13-Jan-15
Formal Submission of DDA to ICE/ IPs	0		13-Jan-15
Advanced Submission to SO	0		13-Jan-15
IPs/ SO's Advance Comments/ ICE Comments	28	14-Jan-15	10-Feb-15
Comments Received	0		10-Feb-15
Designer to Reply RtC + Update Submission	21	11-Feb-15	13-Mar-15
Submit Updated DDA to SO/ ICE/ IPs	0	14-Mar-15	
ICE Approval & Issue Check Cert	18	14-Mar-15	08-Apr-15
IPs Review	28	14-Mar-15	10-Apr-15
SO's Review	35	14-Mar-15	17-Apr-15
Method Statement Submission			
Method Statement of Construction Methodology of C&C Tunnels			
Preparation Method Statement for C&C Tunnels	25	28-Mar-15	30-Apr-15
Submit Method Statement to SO	0		30-Apr-15
SO Reviews & Comments	28	01-May-15	28-May-15
Re-submission	18	29-May-15	18-Jun-15
SO's Review	28	19-Jun-15	16-Jul-15
Construction			
South C&C Tunnel - Diaphragm Wall	120	03-Oct-15	02-Mar-16
C&C Tunnel - 1st 85m - Excavation by ramp	23	03-Mar-16	01-Apr-16
C&C Tunnel - 1st 85m - Excavation by vertical mean	11	02-Apr-16	15-Apr-16
C&C Tunnel - 1st 85m - Tunnel Structure	95	16-Apr-16	09-Aug-16
C&C Tunnel - 2nd 85m - Excavation by ramp	17	30-Apr-16	21-May-16
C&C Tunnel - 2nd 85m - Excavation by vertical mean	18	23-May-16	13-Jun-16
C&C Tunnel - 2nd 85m - Tunnel Structure	83	14-Jun-16	20-Sep-16
C&C Tunnel - 3rd 85m - Excavation by ramp	18	23-May-16	13-Jun-16
C&C Tunnel - 3rd 85m - Excavation by vertical mean	25	14-Jun-16	13-Jul-16
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
Review & Comment by JV	18	17-Aug-15	05-Sep-15
Designer prepare IFA	10	07-Sep-15	17-Sep-15
Formal Submission of IFA to ICE/ IPs	0		17-Sep-15
Advanced Submission to SO	0		17-Sep-15
IPs/ SO's Advance Comments/ ICE Comments	28	18-Sep-15	15-Oct-15
Method Statement Submission			
Method Statement of Construction Methodology of Retrieval Shaft			
Preparation Method Statement for Retrieval Shaft	25	24-Aug-15	21-Sep-15
Submit Method Statement to SO	0		21-Sep-15
SO Reviews & Comments	28	22-Sep-15	19-Oct-15
Re-submission	18	20-Oct-15	10-Nov-15
SO's Review	28	11-Nov-15	08-Dec-15
Construction			
South Landfall GI Works/DW Setting Up	48	06-Aug-15	02-Oct-15
South Retrieval Shaft - Diaphragm Wall	98	03-Oct-15	29-Jan-16
Retrieval Shaft - Excavation - Soft by ramp	3	30-Jan-16	02-Feb-16
Retrieval Shaft - Excavation - Soft by vertical mean (Fill material	52	03-Feb-16	14-Apr-16
Retrieval Shaft - Excavation - Soft (other than Fill)	140	15-Apr-16	30-Sep-16
South Approach Ramp			
Construction			
Appoach Ramp (CH1580-1850) - Pipe Pile/Sheet Piles Wall	126	03-Oct-15	09-Mar-16
Appoach Ramp (CH1580-1850) - Tension Piles	103	03-Oct-15	04-Feb-16
Appoach Ramp (CH1580-1850) - Pile Test	24	05-Feb-16	10-Mar-16
South Ventilation Building			
Design Submission			
(I1) DDA for South Vent.Bldg. GBP & Arch.Submission			
ICE Approval & Issue Check Cert	18	22-Dec-14	14-Jan-15
Submit ICE Check Cert to SO	6	15-Jan-15	21-Jan-15
IPs Review	28	22-Dec-14	18-Jan-15



Planned Bar
Planned Bar - Critical
Planned Milestone
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TMCLK - Northern Connection Sub-Sea Tunnel Section

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Dragages - Bouygues Joint Venture 寶嘉 - 布依格聯營

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12-Feb-14	TMCLK/DBJGEN/PRG/98507	WYu	SPo
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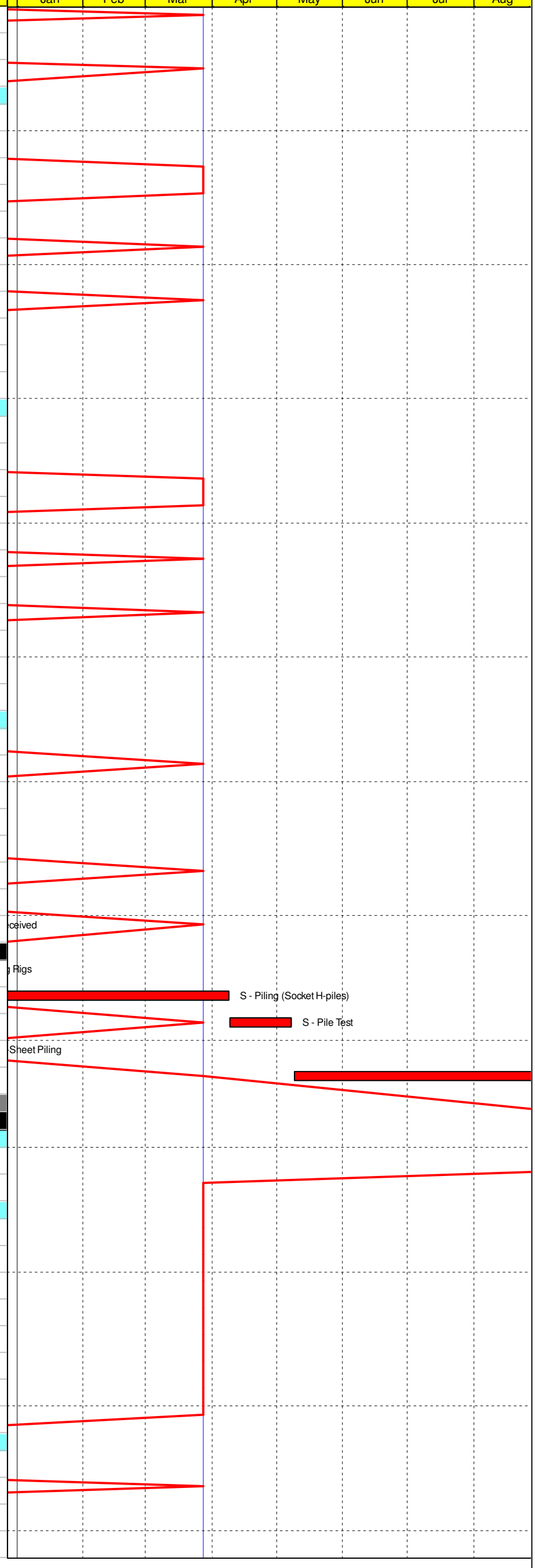
28-Aug-14	TMCLK/DBJGEN/PRG/98507 Rev.C	CLa	WYu
10-Jun-15	TMCLK/DBJGEN/PRG/98507 Rev.F	WYu	

Activity Name	Orig Dur	DWPF Start	DWPF Finish
IP's No Objection Received	0		18-Jan-15
SO's Review	35	22-Dec-14	25-Jan-15
SO Approval with Condition Received	0		26-Jan-15
(I2) DDA for South Vent.Bldg. Foundation Design			
Review & Comment by JV	18	27-Apr-15	18-May-15
Designer prepare DDA	10	19-May-15	30-May-15
Formal Submission of DDA to ICE/ IPs	0		30-May-15
Advanced Submission to SO	0		30-May-15
IPs/ SO's Advance Comments/ ICE Comments	28	31-May-15	27-Jun-15
Comments Received	0		27-Jun-15
Designer to Reply RtC + Update Submission	21	29-Jun-15	23-Jul-15
Submit Updated DDA to SO/ ICE/ IPs	0	24-Jul-15	
ICE Approval & Issue Check Cert	18	24-Jul-15	13-Aug-15
IPs Review	28	24-Jul-15	20-Aug-15
SO's Review	35	24-Jul-15	27-Aug-15
(I2) DDA for South Vent.Bldg.Structural Design incl.Vent.Connections			
Review & Comment by JV	18	18-Feb-15	17-Mar-15
Designer prepare DDA	10	18-Mar-15	28-Mar-15
Formal Submission of DDA to ICE/ IPs	0		28-Mar-15
Advanced Submission to SO	0		28-Mar-15
IPs/ SO's Advance Comments/ ICE Comments	28	29-Mar-15	25-Apr-15
Comments Received	0		25-Apr-15
Designer to Reply RtC + Update Submission	21	27-Apr-15	21-May-15
Submit Updated DDA to SO/ ICE/ IPs	0	22-May-15	
ICE Approval & Issue Check Cert	18	22-May-15	12-Jun-15
IPs Review	28	22-May-15	18-Jun-15
SO's Review	35	22-May-15	25-Jun-15
(J1) DDA Temp.works for Construction of Sth.Vent.Bldg.			
Designer to Reply RtC + Update Submission	21	24-Aug-15	16-Sep-15
Submit Updated DDA to SO/ ICE/ IPs	0	17-Sep-15	
ICE Approval & Issue Check Cert	12	17-Sep-15	02-Oct-15
Submit ICE Check Cert to SO	6	03-Oct-15	09-Oct-15
IPs Review	28	17-Sep-15	14-Oct-15
IP's No Objection Received	0		14-Oct-15
SO's Review	35	17-Sep-15	21-Oct-15
SO Approval with Condition Received	0		22-Oct-15
Construction			
Mobilization & Setting Up Piling Rigs	64	06-Aug-15	22-Oct-15
S - Piling (Socket H-piles)	132	23-Oct-15	08-Apr-16
S - Pile Test	24	09-Apr-16	07-May-16
S -Sheet Piling	48	23-Oct-15	17-Dec-15
S- Excavation	100	09-May-16	05-Sep-16
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
SO Approval with Condition Received	0		06-Apr-17
(E1) DDA - Southern Landfall Seawall Modification			
Preparation of DDA Modification of Seawall at Sth Landfall	18	07-Apr-17	02-May-17
Review & Comment by JV	18	04-May-17	24-May-17
Designer prepare DDA	10	25-May-17	06-Jun-17
Formal Submission of DDA to ICE/ IPs	0		06-Jun-17
Advanced Submission to SO	0		06-Jun-17
IPs/ SO's Advance Comments/ ICE Comments	28	07-Jun-17	04-Jul-17
Comments Received	0		04-Jul-17
Designer to Reply RtC + Update Submission	21	05-Jul-17	28-Jul-17
(E3) DDA for Sewerage, Drainage, Waterworks & Utility works for South Landfall			
Designer to Reply RtC + Update Submission	21	02-Feb-15	04-Mar-15
Submit Updated DDA to SO/ ICE/ IPs	0	05-Mar-15	
ICE Approval & Issue Check Cert	12	05-Mar-15	18-Mar-15
Submit ICE Check Cert to SO	6	19-Mar-15	25-Mar-15



Project ID: TMCLK DWPF 15W48

Data Date: 27-Mar-16

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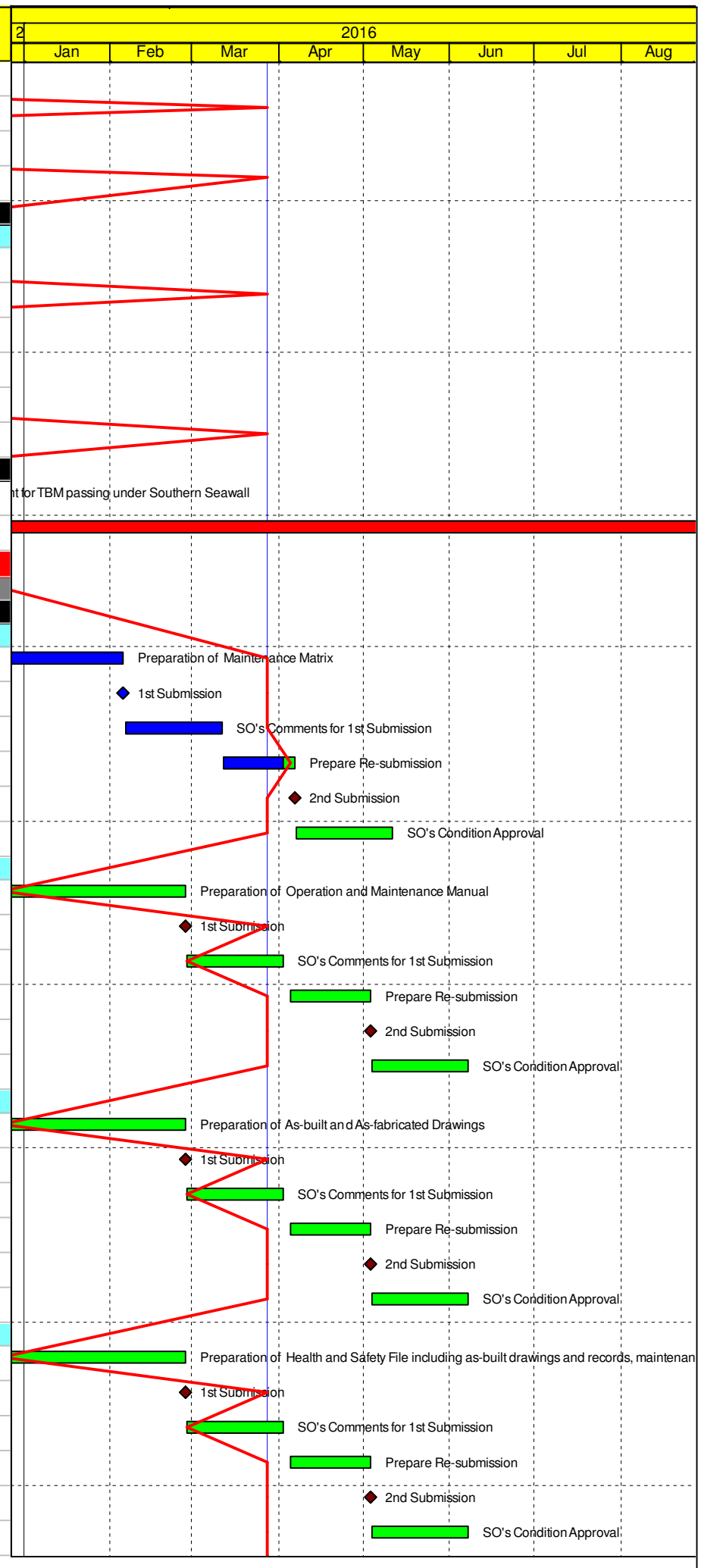
10-Jun-15	TMCLK/DBJGEN/PRG/98507 Rev.F	WYu	

Activity Name	Orig Dur	DWPF Start	DWPF Finish
IPs Review	28	05-Mar-15	01-Apr-15
IP's No Objection Received	0		01-Apr-15
SO's Review	35	05-Mar-15	08-Apr-15
SO Approval with Condition Received	0		08-Apr-15
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
Submit Method Statement to SO	0		29-Jul-15
SO Reviews & Comments	28	30-Jul-15	26-Aug-15
Re-submission	6	27-Aug-15	02-Sep-15
SO's Review	28	03-Sep-15	30-Sep-15
SO's Approval	0		30-Sep-15
Construction			
Temporary Platform for Ground Treatment for TBM passing under Southern Seawall	48	06-Aug-15	02-Oct-15
Grouting Treatment for TBM passing under Southern Seawall	339	03-Oct-15	25-Nov-16
Testing & Commissioning/Inspection & Handover			
Final Inspection & Handover			
Design Submission			
(A12) Maintenance Matrix			
Preparation of Maintenance Matrix	35	24-Dec-15	05-Feb-16
1st Submission	0		05-Feb-16
SO's Comments for 1st Submission	35	06-Feb-16	11-Mar-16
Prepare Re-submission	18	12-Mar-16	06-Apr-16
2nd Submission	0		06-Apr-16
SO's Condition Approval	35	07-Apr-16	11-May-16
(A13) Operation & Maintenance Manual			
Preparation of Operation and Maintenance Manual	48	24-Dec-15	27-Feb-16
1st Submission	0		27-Feb-16
SO's Comments for 1st Submission	35	28-Feb-16	02-Apr-16
Prepare Re-submission	24	05-Apr-16	03-May-16
2nd Submission	0		03-May-16
SO's Condition Approval	35	04-May-16	07-Jun-16
(A14) As-built & As-fabricated Drawings			
Preparation of As-built and As-fabricated Drawings	48	24-Dec-15	27-Feb-16
1st Submission	0		27-Feb-16
SO's Comments for 1st Submission	35	28-Feb-16	02-Apr-16
Prepare Re-submission	24	05-Apr-16	03-May-16
2nd Submission	0		03-May-16
SO's Condition Approval	35	04-May-16	07-Jun-16
(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, operation and mai	48	24-Dec-15	27-Feb-16
1st Submission	0		27-Feb-16
SO's Comments for 1st Submission	35	28-Feb-16	02-Apr-16
Prepare Re-submission	24	05-Apr-16	03-May-16
2nd Submission	0		03-May-16
SO's Condition Approval	35	04-May-16	07-Jun-16



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10-Jun-15	TMCLK/DBJGEN/PRG/98507 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

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
4.8.1	3.8	Materials having the potential to create dust shall not be loaded to a level higher than the side and tail boards, and shall be covered by a clean tarpaulin. The tarpaulin shall be properly secured and shall extend at least 300mm over the edges of the side and tail boards.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		<>
4.8.1	3.8	No earth, mud, debris, dust and the like shall be deposited on public roads. Wheel washing facility shall be usable prior to any earthworks excavation activity on the site.	All site exits / throughout construction period	Contractor	TMEIA Avoid dust		Y		✓
4.8.1	3.8	Areas of exposed soil shall be minimised to areas in which works have been completed shall be restored as soon as is	All exposed surfaces / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		✓
4.8.1	3.8	All stockpiles of aggregate or spoil shall be enclosed or covered and water applied in dry or windy condition.	All areas / throughout construction period	Contractor	TMEIA Avoid dust generation		Y		<>
4.11	Section 3	EM&A in the form of 1 hour and 24 hour dust monitoring and site audit.	All representative existing ASRs / throughout construction period	Contractor	EM&A Manual		Y		✓
WATER QUALITY									
Marine Works (Sequence A)									
6.1 Figure 6.2a Appendix D6a	Annex A	Construction of seawalls to be advanced by at least 200m before the main reclamation dredging and filling can commence. The protection by advanced seawall is a dynamic process depending on the progress of the construction activities and the stage when such protection could be realised is illustrated in Figure 6.2a and detailed in Appendix D6a. The part of the works where such measures can be undertaken for the majority of the time includes the following locations: - TM-CLKL northern reclamation;	All areas/ prior to dredging and backfilling works	Contractor	TM-EIAO		Y		✓
6.1	-	a maximum of 50% public fill to be used for all seawall filling below +2.5mPD for TM-CLKL southern and northern landfalls.	TM-CLKL seawall filling	Contractor	TM-EIAO		Y		✓

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

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

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
					Guidelines. DASO permit conditions.				
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 conditions.		Y		N/A
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		Y		✓

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						D	C	O	
					conditions.				
6.1	5.2	Silt curtain shall have proved effectiveness from the producer and shall be fully maintained throughout the works by the contractor.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	The daily maximum production rates shall not exceed those assumed in the water quality assessment.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	The dredging and filling works shall be scheduled to spread the works evenly over a working day.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
Land Works									
6.1	-	Wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Sewage effluent and discharges from on- site kitchen facilities shall be directed to Government sewer in accordance with the requirements of the WPCO or collected for disposal offsite. The use of soakaways shall be avoided.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Storm drainage shall be directed to storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels, earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
6.1	-	Silt removal facilities, channels and manholes shall be maintained and any deposited silt and grit shall be removed regularly, including specifically at the onset of and after each rainstorm.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
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		✓

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						D	C	O	
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		✓
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

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						D	C	O	
6.1	-	The Contractor shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		<>
6.1	-	Waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance.	All areas/ throughout construction period	Contractor	TM-EIAO Waste Disposal Ordinance		Y		✓
6.1	-	All fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.	All areas/ throughout construction period	Contractor	TM-EIAO		Y		✓
6.1	-	Roadside gullies to trap silt and grit shall be provided prior to discharging the stormwater into the marine environment. The sumps will be maintained and cleaned at regular intervals.	Roadside/design and operation	Design Consultant/ Contractor	TM-EIAO	Y		Y	✓
6.1	Section 5	All construction works shall be subject to routine audit to ensure implementation of all EIA recommendations and good working practice.	All areas/ throughout construction period	Contractor	EM&A Manual		Y		✓
Water Quality Monitoring									
6.1	Section 5	Water quality monitoring shall be undertaken for suspended solids, turbidity, and dissolved oxygen. Nutrients and metal parameters shall also be measured for Mf sediment operations (only HKBCF and HKLR required handling of Mf sediment) during baseline, backfilling and post construction period. One year operation phase water quality monitoring at designated stations.	Designated monitoring stations as defined in EM&A Manual, Section 5/ Before, through-out marine construction period, post construction and monthly operational phase water quality monitoring for a year.	Contractor	EM&A Manual		Y	Y	✓
ECOLOGY									

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

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

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
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		✓
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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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	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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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		<>

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

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

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
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		✓

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

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

EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
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; *f* Sufficiently covered to prevent rainfall	All areas / throughout construction period	Contractor	TMEIA		Y		<>

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EIA Reference	EM&A Manual Reference	Environmental Protection Measures	Location/ Timing	Implementation Agent	Relevant Standard or Requirement	Implementation Stages			Status *
						D	C	O	
		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

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 μg/m³	ASR1 = 213 ASR5 = 238 AQMS1 = 213 ASR6 = 238 ASR10 = 214	260
1 Hour TSP Level in μg /m³	ASR1 = 331 ASR5 = 340 AQMS1 = 335 ASR6 = 338 ASR10 = 337	500

Table D2 Action and Limit Levels for 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 - March 2016

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

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

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

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

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

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

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

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
1-May	public holiday 2-May	3-May	4-May	5-May	6-May	7-May
	1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM		
8-May	9-May	10-May	11-May	12-May	13-May	public holiday 14-May
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
15-May	16-May	17-May	18-May	19-May	20-May	21-May
		1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM	
22-May	23-May	24-May	25-May	26-May	27-May	28-May
	1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM			1-hour TSP - 3 times 24-hour TSP - 1 time Impact AQM		
29-May	30-May	31-May				
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 - March 2016

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

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

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

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

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

Appendix F

Impact Air Quality Monitoring Results

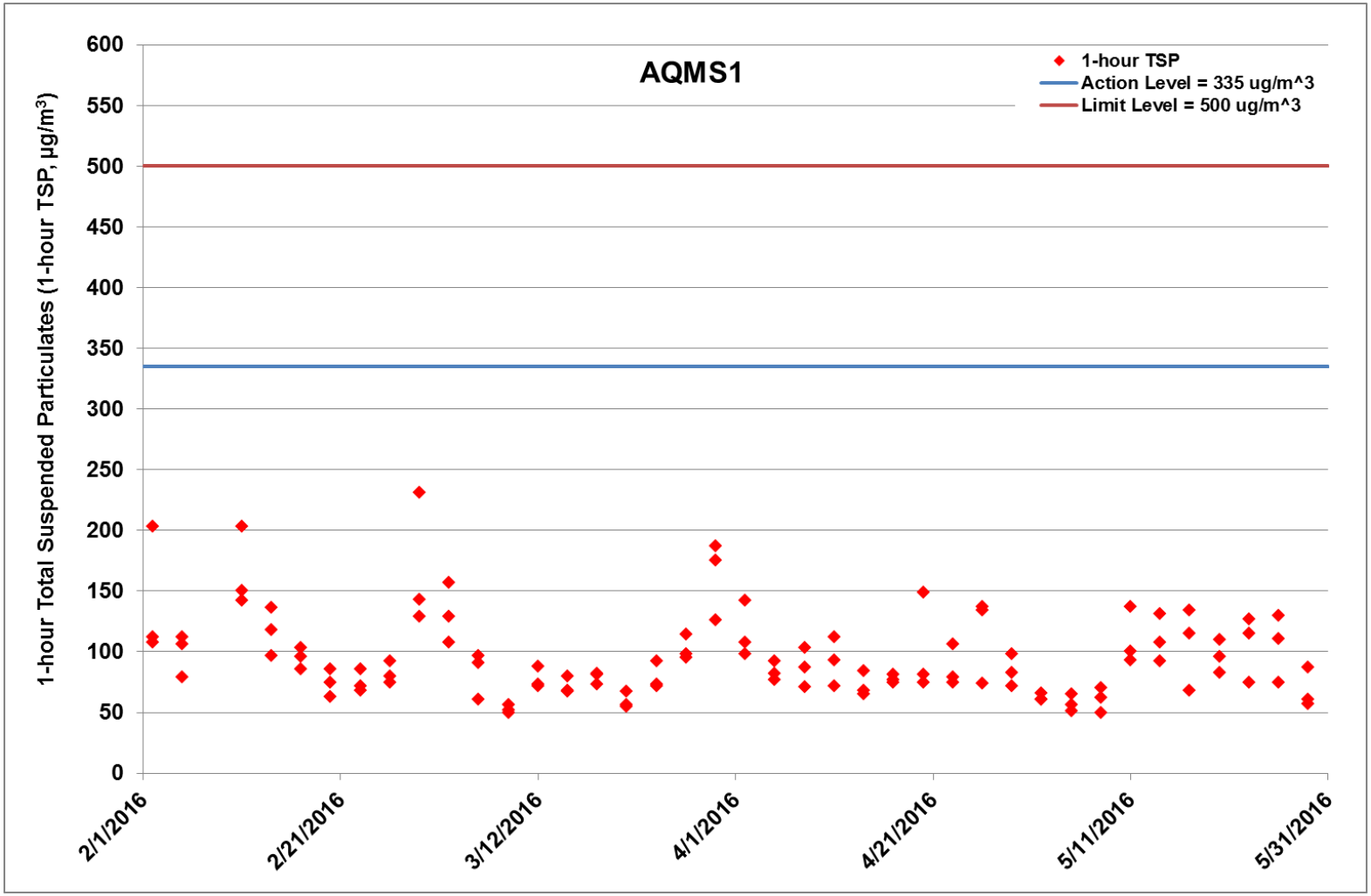

Figure F.1 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at AQMS1 between 1 February 2016 and 31 May 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/4/2016 – 31/5/2016) and Box Culvert Extension (1/2/2016 – 31/5/2016). *Ref: 0212330_Impact AQM graphs_ May 2016_REV a.xlsx*

ERM

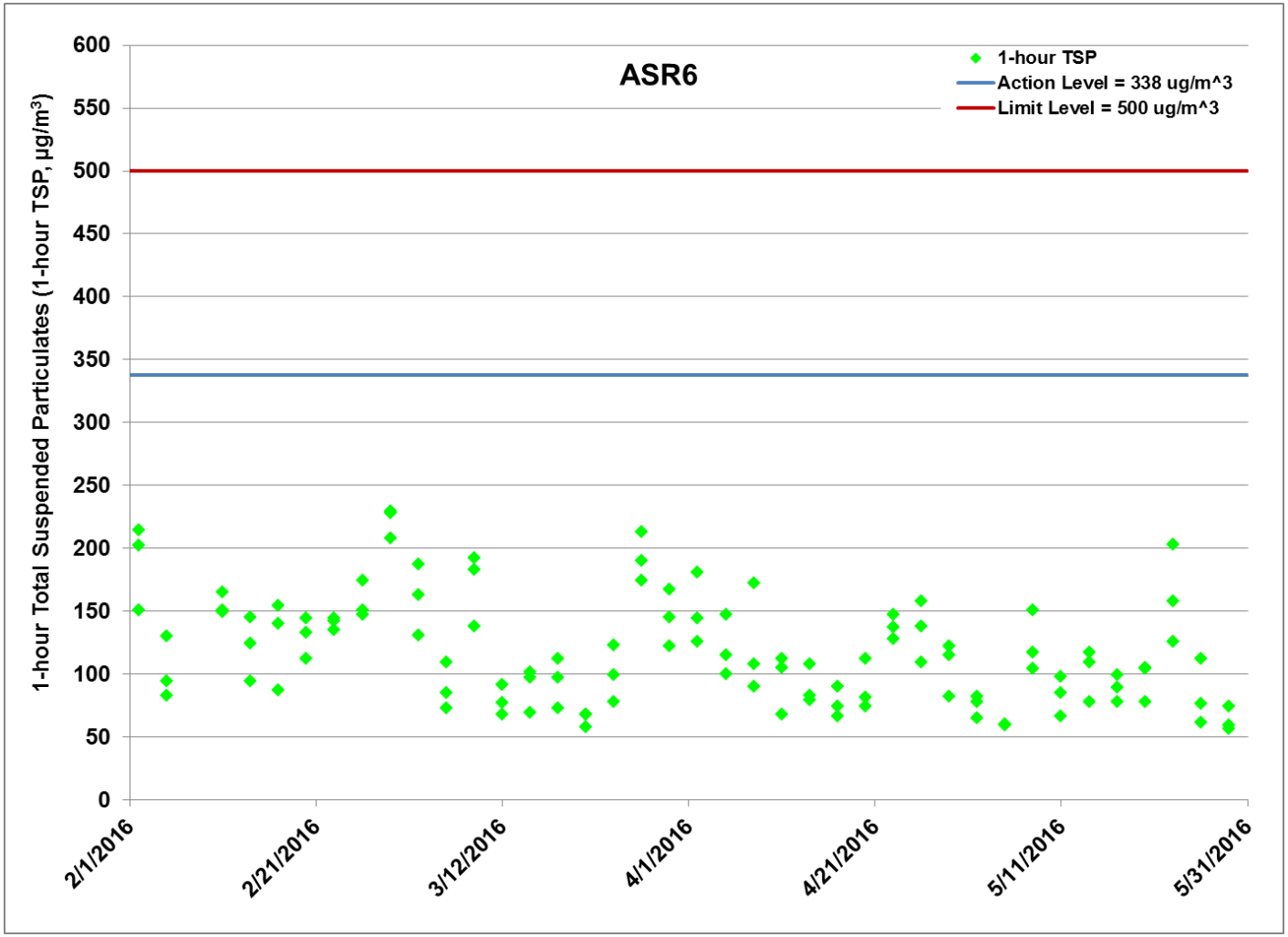

Figure F.2 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR6 between 1 February 2016 and 31 May 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/4/2016 – 31/5/2016) and Box Culvert Extension (1/2/2016 – 31/5/2016). *Ref: 0212330_Impact AQM graphs_ May 2016_REV a.xlsx*

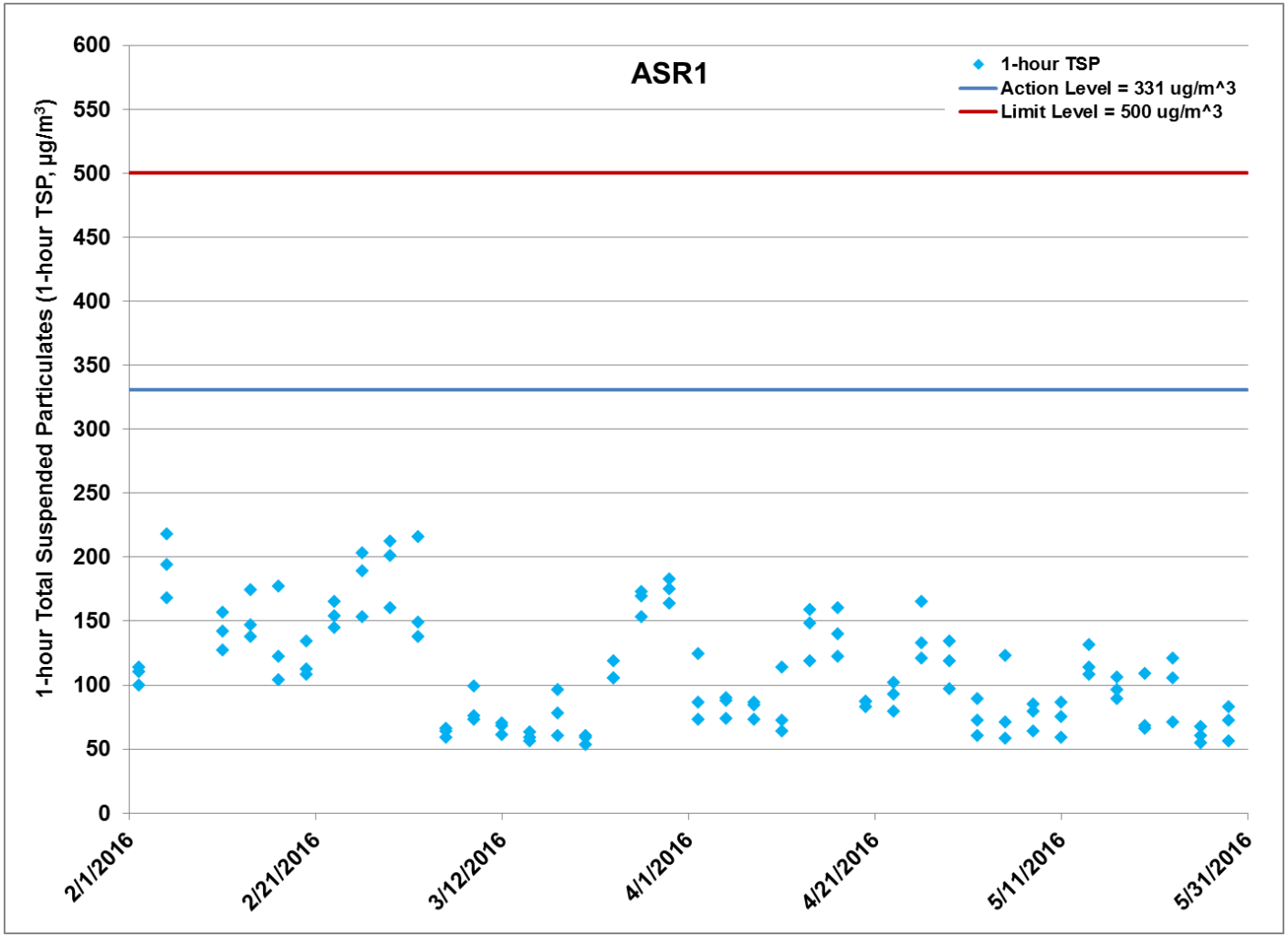

Figure F.3 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR1 between 1 February 2016 and 31 May 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/4/2016 – 31/5/2016) and Box Culvert Extension (1/2/2016 – 31/5/2016). *Ref: 0212330_Impact AQM graphs_ May 2016_REV a.xlsx*

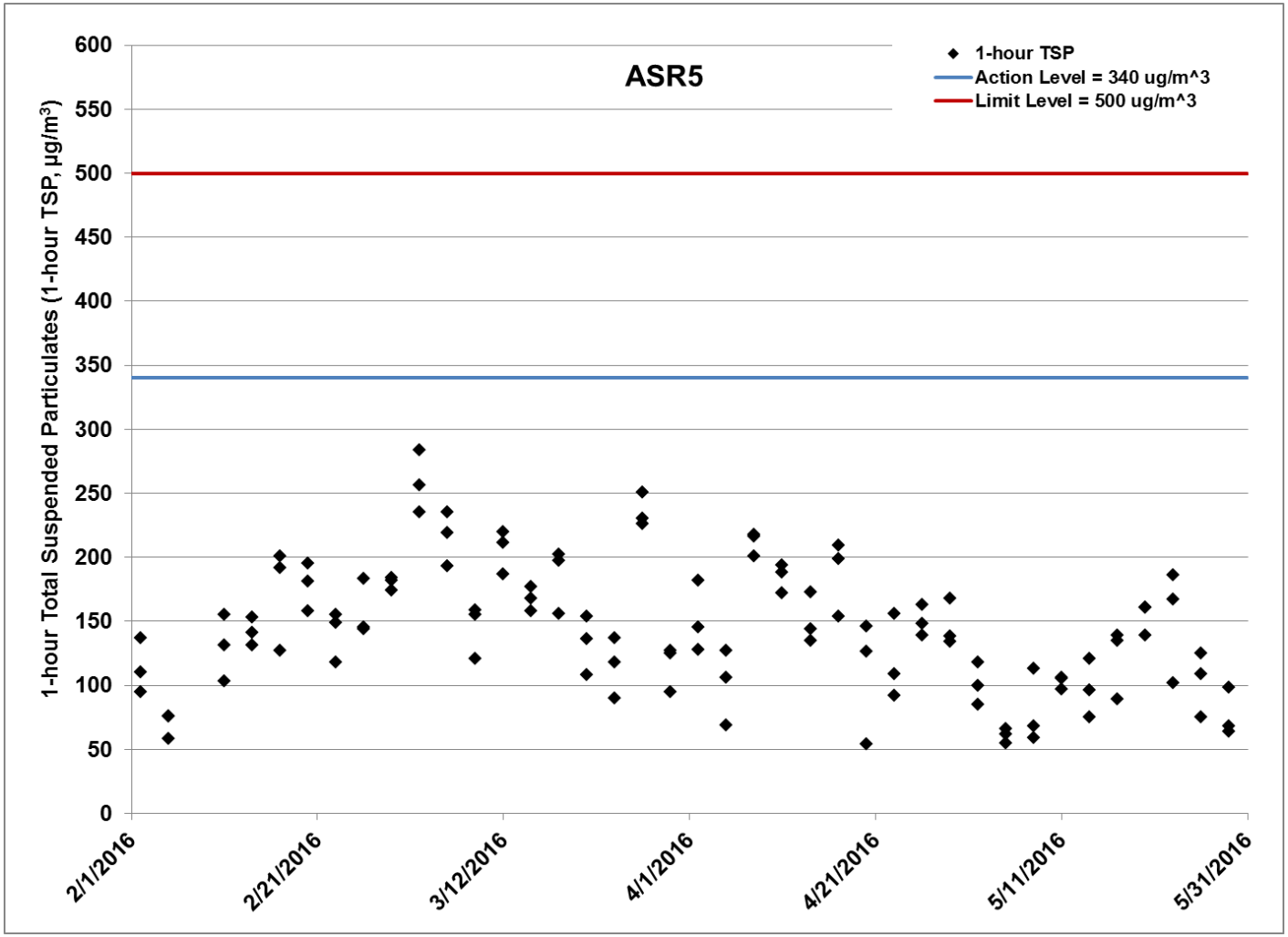

Figure F.4 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR5 between 1 February 2016 and 31 May 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/4/2016 – 31/5/2016) and Box Culvert Extension (1/2/2016 – 31/5/2016). *Ref: 0212330_Impact AQM graphs_ May 2016_REV a.xlsx*

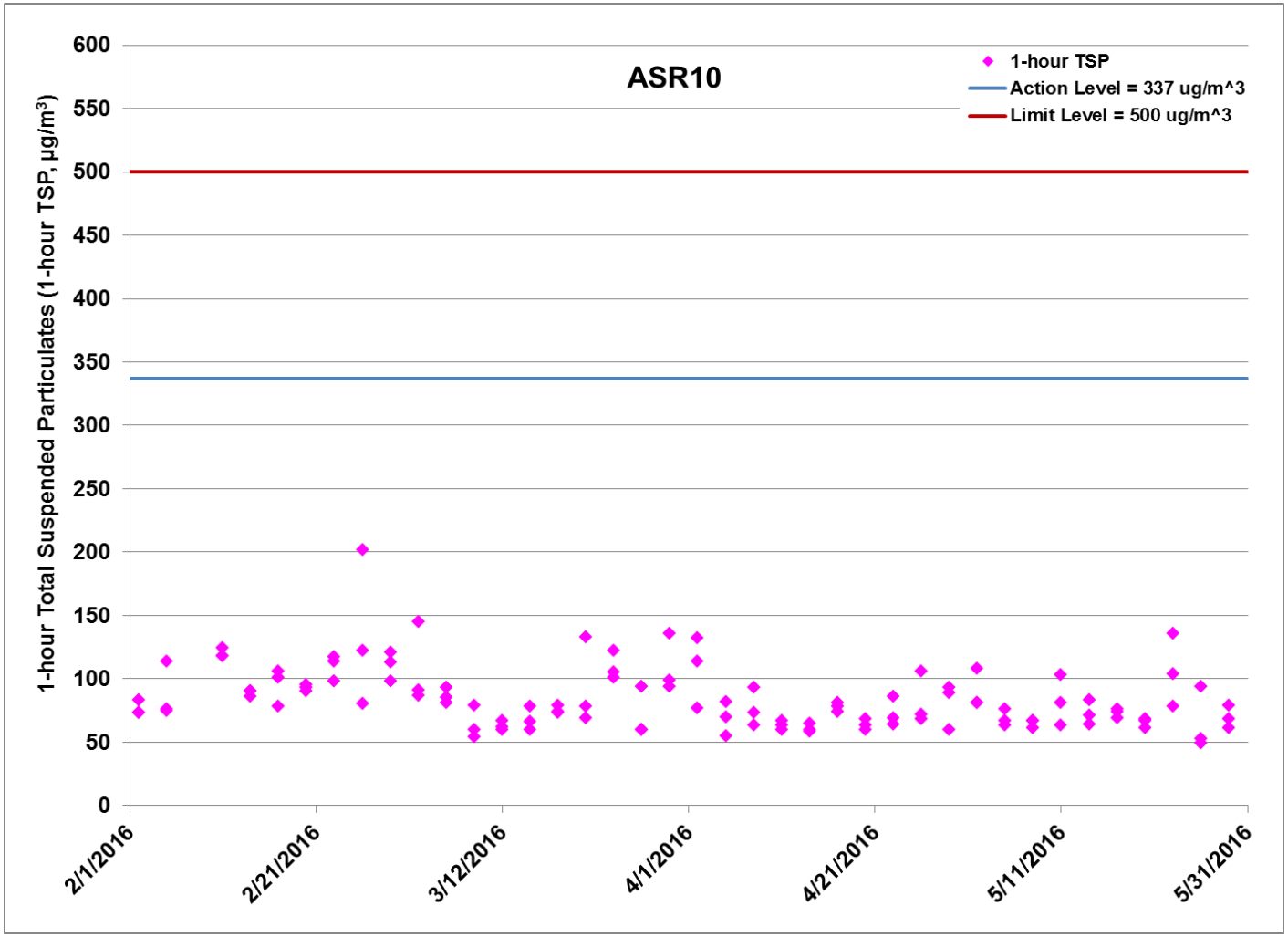

Figure F.5 Impact Monitoring – 1-hour Total Suspended Particulates (µg/m³) at ASR10 between 1 February 2016 and 31 May 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/4/2016 – 31/5/2016) and Box Culvert Extension (1/2/2016 – 31/5/2016). *Ref: 0212330_Impact AQM graphs_ May 2016_REV a.xlsx*

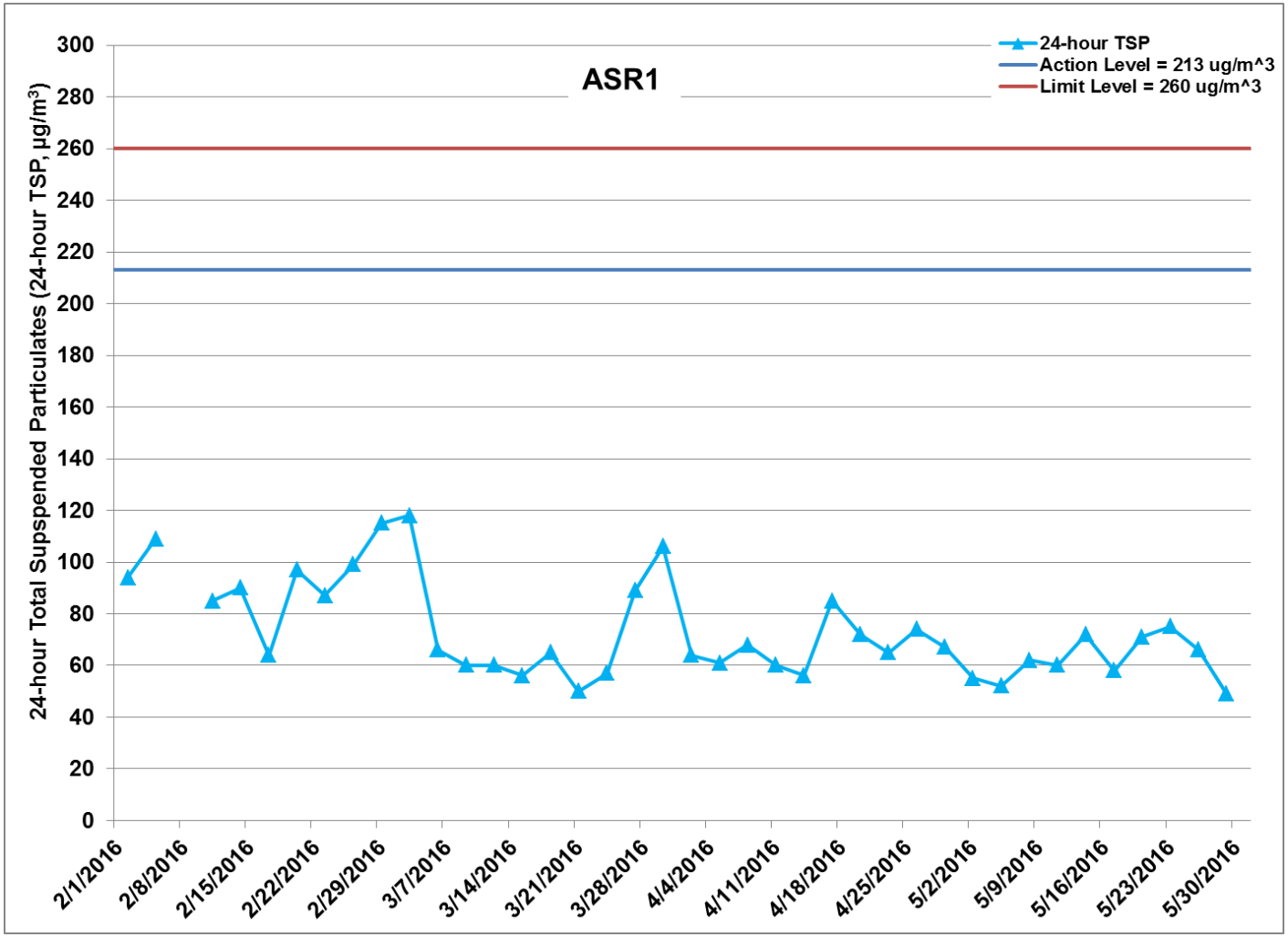

Figure F.6 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR1 between 1 February 2016 and 31 May 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/4/2016 – 31/5/2016) and Box Culvert Extension (1/2/2016 – 31/5/2016). *Ref: 0212330_Impact AQM graphs_ May 2016_REV a.xlsx*

ERM

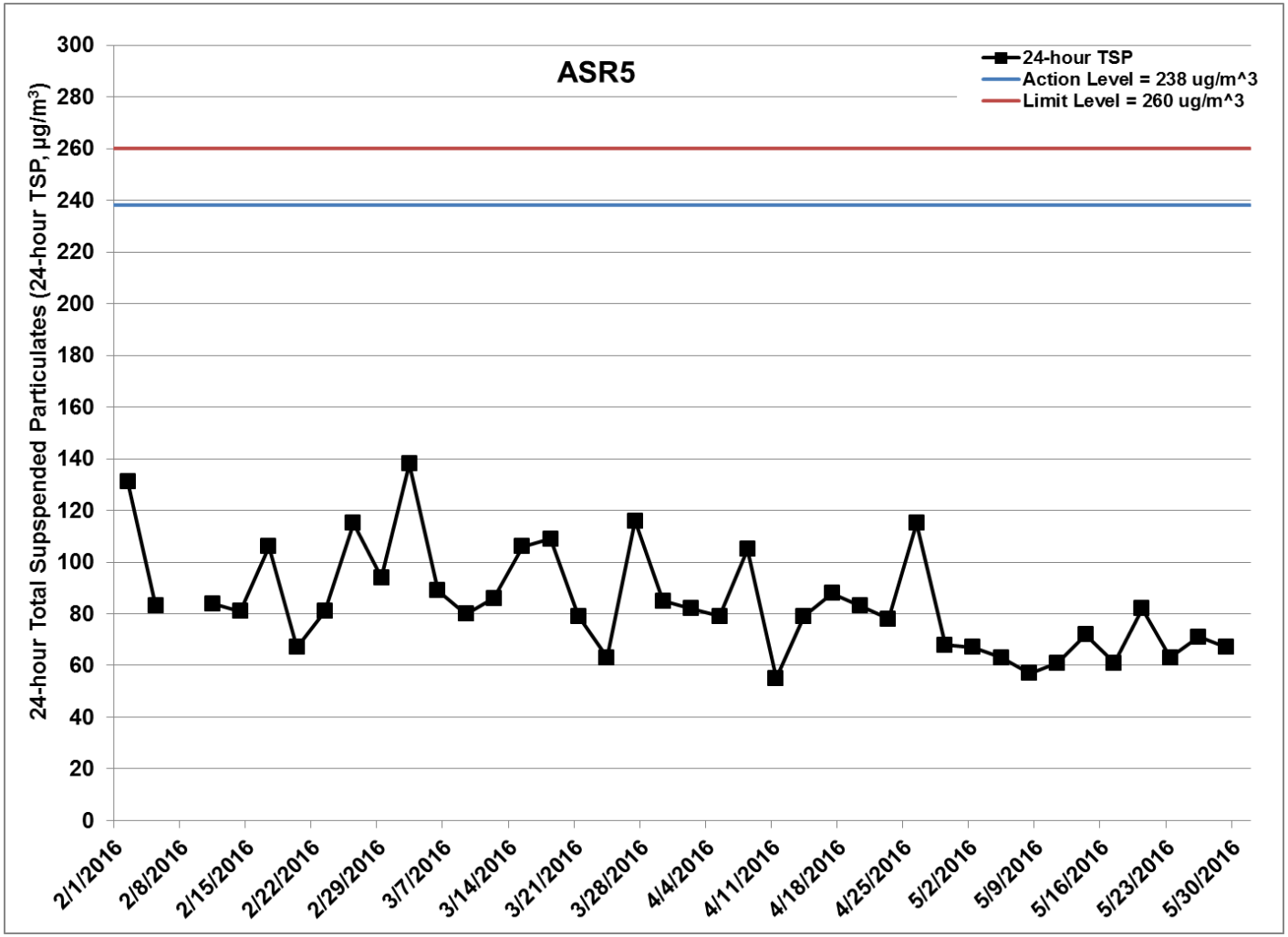

Figure F.7 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR5 between 1 February 2016 and 31 May 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/4/2016 – 31/5/2016) and Box Culvert Extension (1/2/2016 – 31/5/2016). *Ref: 0212330_Impact AQM graphs_ May 2016_REV a.xlsx*

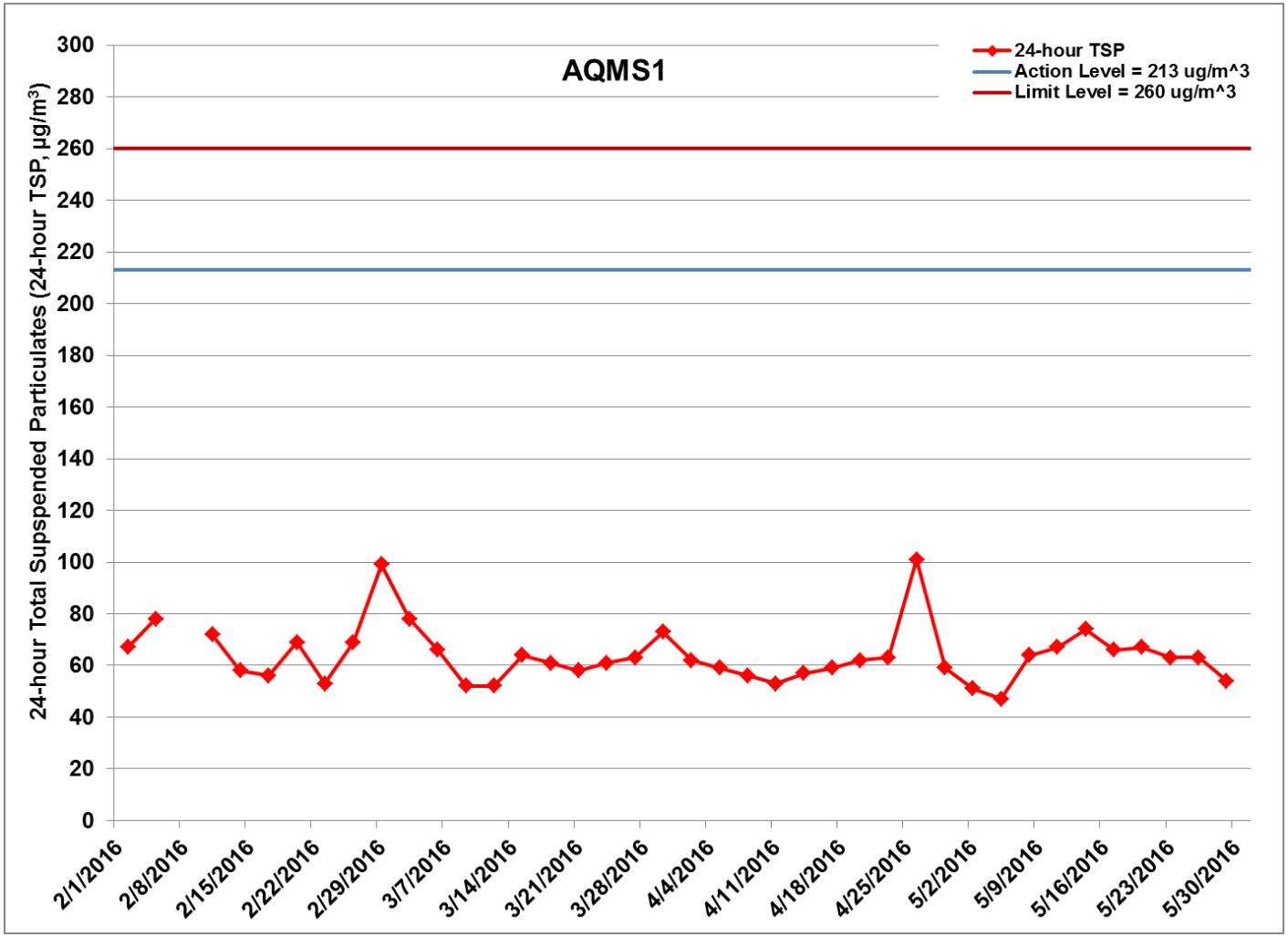

Figure F.8 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at AQMS1 between 1 February 2016 and 31 May 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/4/2016 – 31/5/2016) and Box Culvert Extension (1/2/2016 – 31/5/2016). *Ref: 0212330_Impact AQM graphs_ May 2016_REV a.xlsx*

ERM

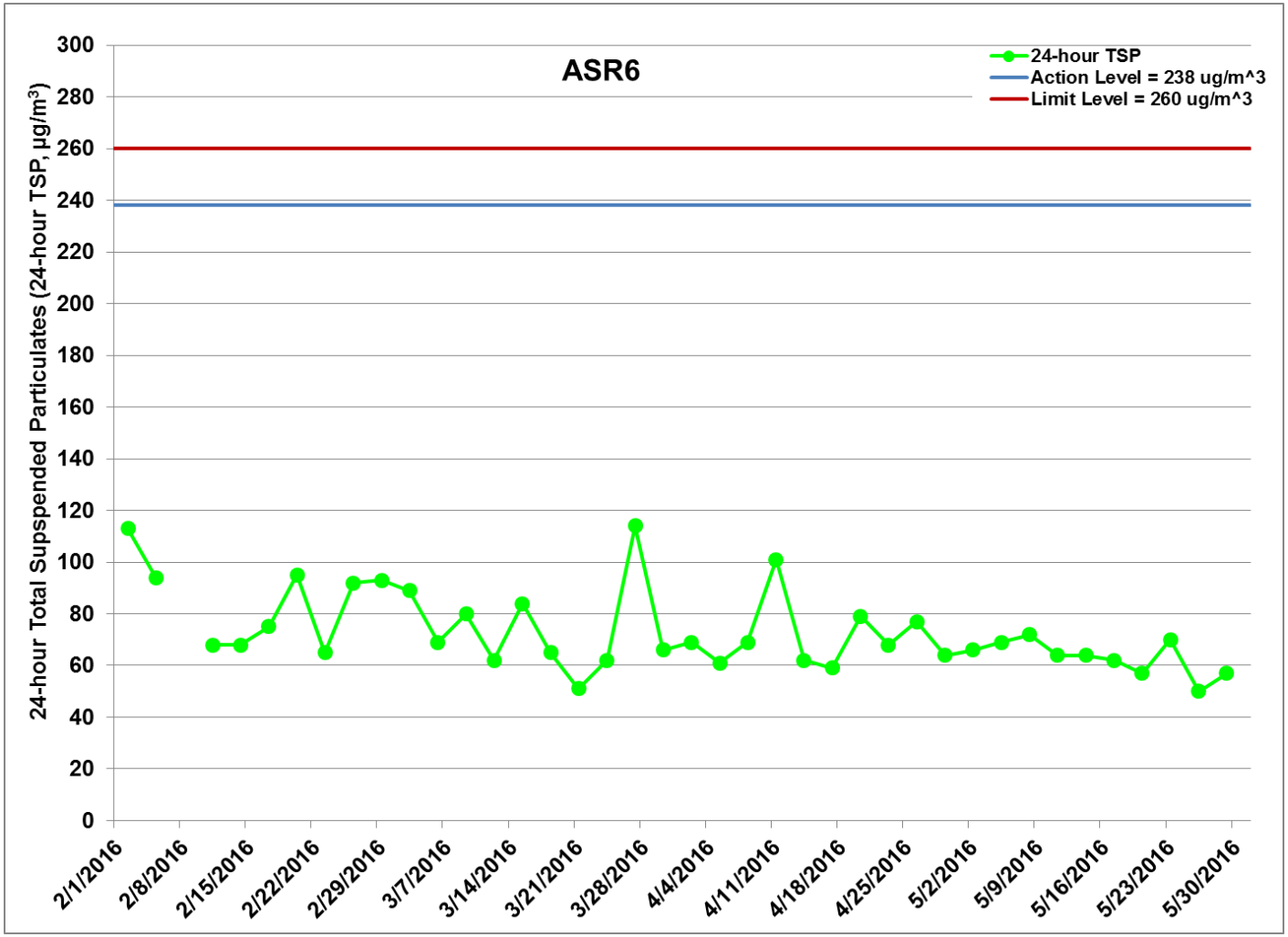

Figure F.9 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR6 between 1 February 2016 and 31 May 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/4/2016 – 31/5/2016) and Box Culvert Extension (1/2/2016 – 31/5/2016). *Ref: 0212330_Impact AQM graphs_ May 2016_REV a.xlsx*

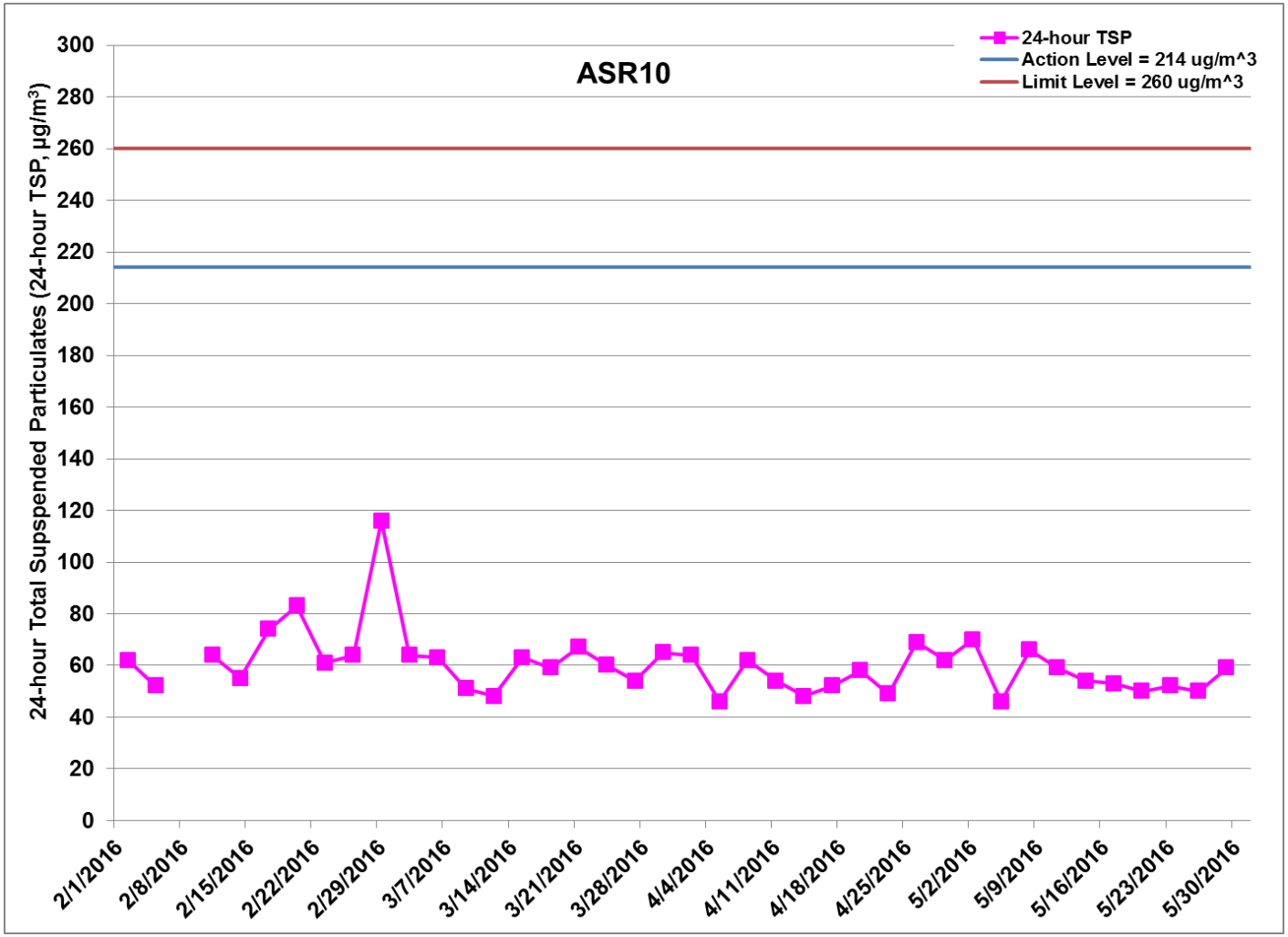

Figure F.10 Impact Monitoring – 24-hour Total Suspended Particulates (µg/m³) at ASR10 between 1 February 2016 and 31 May 2016 during impact monitoring period. The weather conditions during the monitoring period varied from sunny to cloudy. Major land-based construction activities included: CSM Ground Treatment and Diaphragm Wall Construction (1/4/2016 – 31/5/2016) and Box Culvert Extension (1/2/2016 – 31/5/2016). *Ref: 0212330_Impact AQM graphs_ May 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

10th Quarterly Progress Report (March-May 2016)
submitted to Dragages – Bouygues Joint Venture & ERM Hong Kong Ltd.

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

8 July 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 tenth 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 March to May 2016, utilizing the survey data collected by HKLR03 project.

2. Monitoring Methodology

2.1. Vessel-based Line-transect Survey

2.1.1. According to the requirement of the updated EM&A manual, dolphin monitoring programme should cover all transect lines in NEL and NWL survey areas (see Figure 1) twice per month throughout the entire construction period. The co-ordinates of all transect lines 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-km^2 grids among NWL and NEL survey areas on GIS. Sighting densities (number of on-effort sightings per km^2) and dolphin densities (total number of dolphins from on-effort sightings per km^2) were then calculated for each 1 km by 1 km grid with the aid of GIS. Sighting density grids and dolphin density grids were then further normalized with the amount of survey effort conducted within each grid. The total amount of survey effort spent on each grid was calculated by examining the survey coverage on each line-transect survey to determine how many times the grid was surveyed during the study period. For example, when the survey boat traversed through a specific grid 50 times, 50 units of survey effort were counted for that grid. With the amount of survey effort calculated for each grid, the sighting density and dolphin density of each grid were then normalized (i.e. divided by the unit of survey effort).

The newly-derived unit for sighting density was termed SPSE, representing the number of

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

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

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

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 March to May 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 896.56 km of survey effort was collected, with 90.3% 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, 341.16 km and 555.40 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 657.94 km, while the effort on secondary lines was 238.62 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 March to May 2016, a total of seven groups of 22 Chinese White Dolphins were sighted. Four of the seven dolphin sightings were made during on-effort search, while three of the four on-effort dolphin sightings were made on primary lines. In this quarterly period, all dolphin groups were sighted in NWL, while none was sighted at all in NEL. A summary table of the dolphin sightings is shown in Appendix II.

3.2. Distribution

3.2.1. Distribution of dolphin sightings made during the HKLR03 monitoring surveys from March to May 2016 is shown in Figure 1. Dolphin sightings made in the present quarter were mostly located to the north of Lung Kwu Chau, while one sighting each was made to the southwest of Lung Kwu Chau and at the northeast corner of the airport platform respectively (Figure 1). Notably, four of the five sightings located to the north of Lung Kwu Chau were all made on the same survey day.

3.2.2. Notably, none of the dolphin sightings was made near the TM-CLKL alignment, HKLR09 alignment or HKLR03 reclamation site. On the other hand, one dolphin group was sighted near the HKBCF reclamation site (Figure 1).

3.2.3. Sighting distribution of dolphins during the present impact phase monitoring period (March to May 2016) was drastically different from the one during the baseline monitoring period (September to November 2011). In the present quarter, dolphins have disappeared from the NEL region, which was in stark contrast to their frequent occurrence around the Brothers Islands, near Shum Shui Kok and in the vicinity of HKBCF reclamation site during the baseline period (Figure 1). The nearly complete abandonment of NEL region by the dolphins has been consistently recorded in the past three years 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 the present impact phase periods. During the present impact monitoring period, much fewer dolphins occurred in this survey area (mostly near Lung Kwu 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 spring months in 2013-16 (Figure 2). Among the four spring periods, dolphins were regularly sighted throughout the North Lantau region in 2013, but their usage there have been significantly reduced 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 March to May 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 (7 & 11 Mar 2016)	0.00	0.00
	Set 2 (22 & 23 Mar 2016)	0.00	0.00
	Set 3 (5 & 12 Apr 2016)	0.00	0.00
	Set 4 (15 & 19 Apr 2016)	0.00	0.00
	Set 5 (3 & 12 May 2016)	0.00	0.00
	Set 6 (17 & 26 May 2016)	0.00	0.00
Northwest Lantau	Set 1 (7 & 11 Mar 2016)	0.00	0.00
	Set 2 (22 & 23 Mar 2016)	1.59	4.78
	Set 3 (5 & 12 Apr 2016)	2.20	17.59
	Set 4 (15 & 19 Apr 2016)	2.10	6.31
	Set 5 (3 & 12 May 2016)	0.00	0.00
	Set 6 (17 & 26 May 2016)	0.00	0.00

Table 3. Comparison of average dolphin encounter rates from impact monitoring period (March – May 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)	
	March – May 2016	September - November 2011	March – May 2016	September - November 2011
Northeast Lantau	0.0	6.00 ± 5.05	0.0	22.19 ± 26.81
Northwest Lantau	0.98 ± 1.10	9.85 ± 5.85	4.78 ± 6.85	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 0.83 sightings and 3.54 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 sighting being made, and such extremely low occurrence of dolphins in NEL have been consistently recorded in the past thirteen 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 been exceptionally low when compared to the baseline period (Table 4). Dolphins have been virtually absent from NEL waters since January 2014, with only two groups of five 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 spring 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

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 90.1% and 89.3% 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 spring months were highlighted in blue; ± denotes the standard deviation of the average encounter rates)

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

3.3.5. During the same spring quarters, the dolphin encounter rates in NWL during the spring months of 2015 and 2016 were much lower than the ones recorded in spring months of 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 (2015), 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 (fourteenth quarter of the impact phase being assessed), the p-values for the differences in average dolphin encounter rates of STG and ANI were 0.0019 and 0.0173 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 fourteen quarters of the impact phase being assessed), the p-values for the differences in average dolphin encounter rates of STG and ANI were 0.000019 and 0.000005 respectively. Even if the alpha value is set at 0.00005, 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 2015).

3.3.11. To ensure the continuous usage of North Lantau waters by the dolphins, every possible measure should be implemented by the contractors and relevant authorities of HZMB-related works to minimize all disturbances to the dolphins.

3.4. Group size

3.4.1. Group size of Chinese White Dolphins ranged from one to eight individuals per group in North Lantau region during March to May 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 March to May 2016 was slightly lower than the ones recorded during the three-month baseline period (Table 6). All except one dolphin groups were composed of 1-3 individuals only, while only one group was moderately large with eight individuals.

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

	Average Dolphin Group Size	
	March – May 2016	**September – November 2011**
Overall	3.14 ± 2.27 (n = 7)	3.72 ± 3.13 (n = 66)
Northeast Lantau	N/A	3.18 ± 2.16 (n = 17)
Northwest Lantau	3.14 ± 2.27 (n = 7)	3.92 ± 3.40 (n = 49)

3.4.3. Distribution of the lone larger dolphin group (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 spring months of 2016, the only larger dolphin group was sighted to the southwest of Lung Kwu Chau (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 March to May 2016, the only area being utilized by Chinese White Dolphins was to the north and southwest of Lung Kwu Chau (Figures 4a and 4b). All grids near TMCLKL/HKLR09 alignments as well as HKLR03/HKBCF reclamation sites did not record any presence of dolphins at all during on-effort search in the present quarterly period (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 area with moderate to high dolphin densities was restricted to the waters near Lung Kwu Chau during the present impact phase period (Figure 5).

3.6. Mother-calf pairs

3.6.1. During the present quarterly period, 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 present quarter 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 seven dolphin groups were engaged in feeding activity, while none of them was engaged in socializing, traveling or milling/resting activity during the three-month study period.

3.7.2. The percentage of sightings associated with feeding activities (14.3%) was similar to the one recorded during the baseline period (11.6%). However, it should be noted the sample sizes on total numbers of dolphin sightings during the present quarter (seven 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 feeding activity was sighted to the north of Lung Kwu Chau 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 seven 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 March to May 2016, over 800 digital photographs of Chinese White Dolphins were taken during the impact phase monitoring surveys for the photo-identification work.

3.8.2. In total, 16 individuals sighted 18 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. The majority of identified individuals were sighted only once during the three-month period, with the exception of two individuals (NL48 and NL285) being sighted twice in the present quarter.

3.8.4. Notably, two of these 16 individuals (NL123 and NL320) were also sighted in West Lantau waters during the HKLR09 monitoring surveys from March to May 2016.

3.9. Individual range use

3.9.1. Ranging patterns of the 16 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, two individuals (NL123 and NL320) consistently utilized both North Lantau waters in the past have extended their range use to WL 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).

4. Conclusion

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

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

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

5. References

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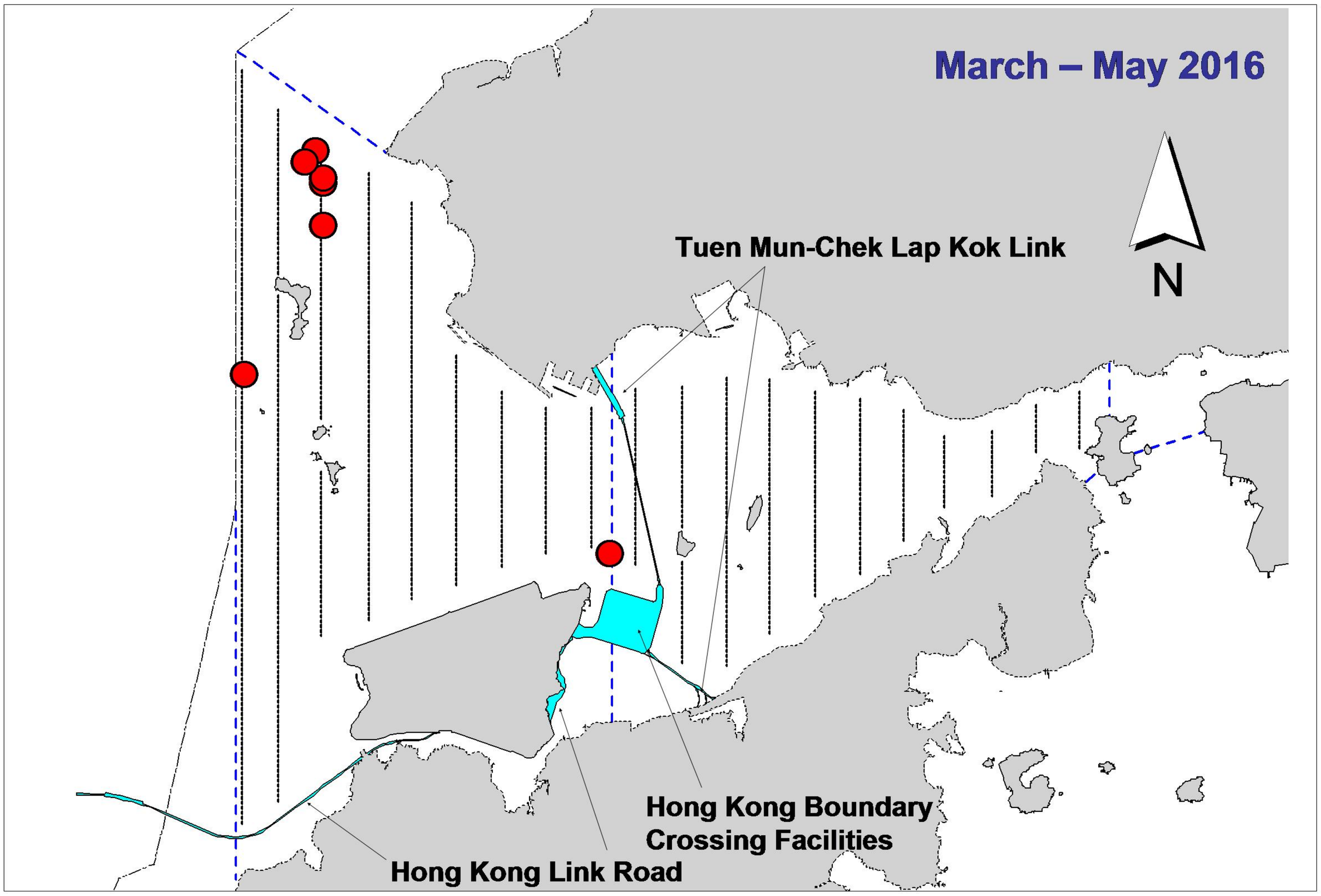


Figure 1. Distribution of Chinese white dolphin sighting in Northwest and Northeast Lantau during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

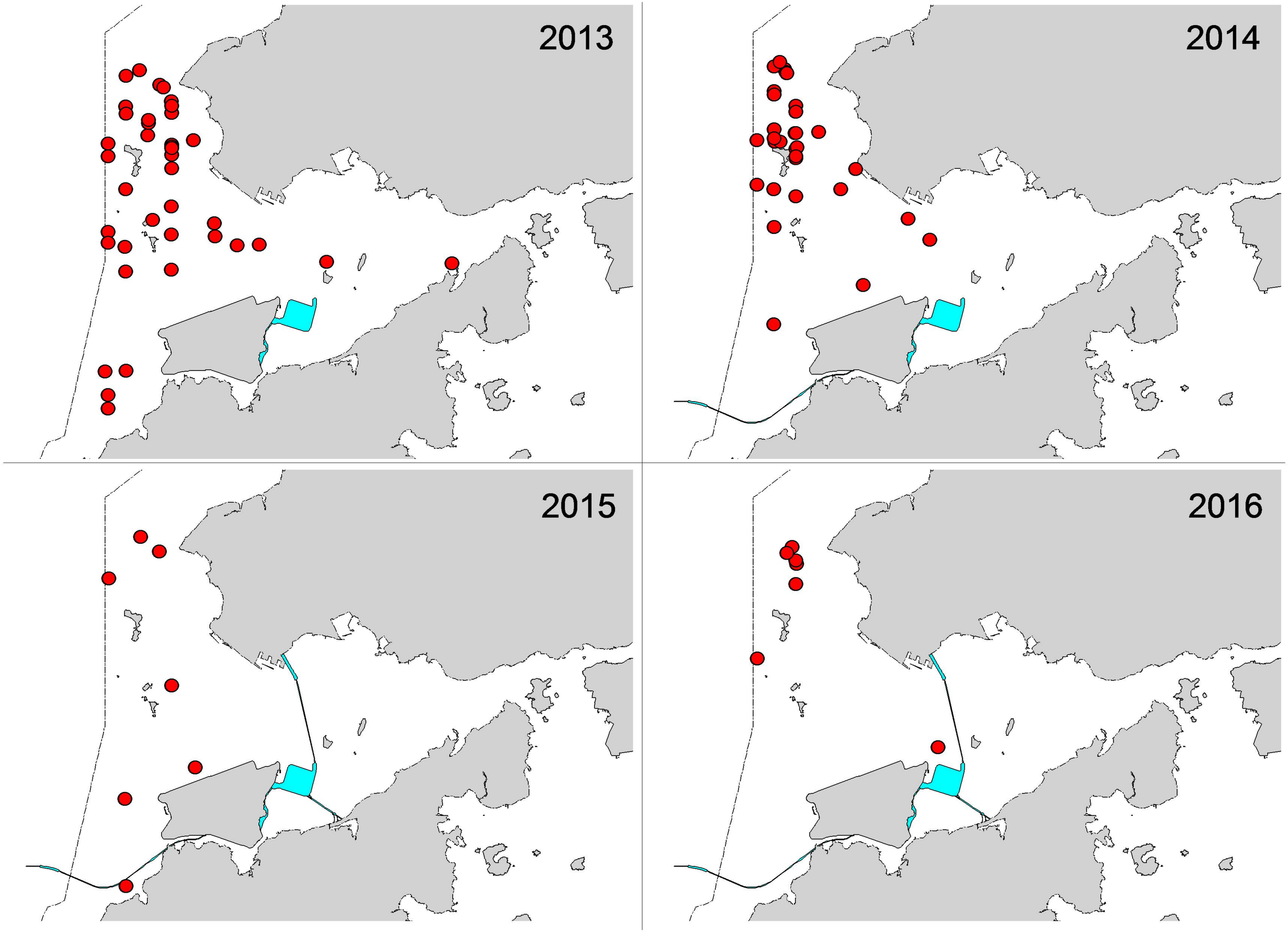


Figure 2. Distribution of Chinese white dolphin sightings in Northwest and Northeast Lantau during the same spring quarters (March-May) of HKLR03 impact phase in 2013-16

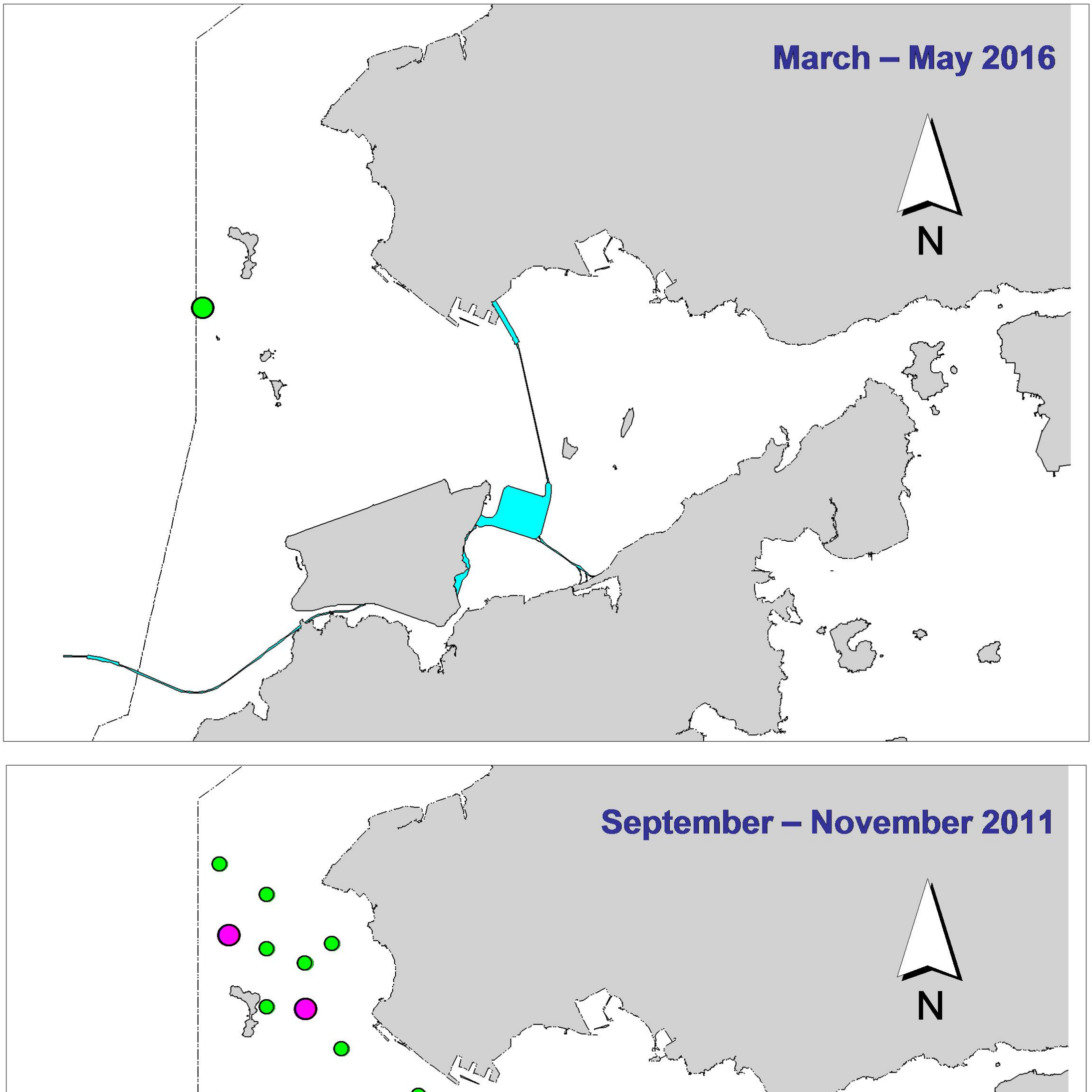


Figure 3. Distribution of Chinese white dolphins with larger group sizes during HKLR03 impact phase (top) and baseline monitoring surveys (bottom) (green dots: group sizes of 5 or more; purple dots: group sizes of 10 or more)

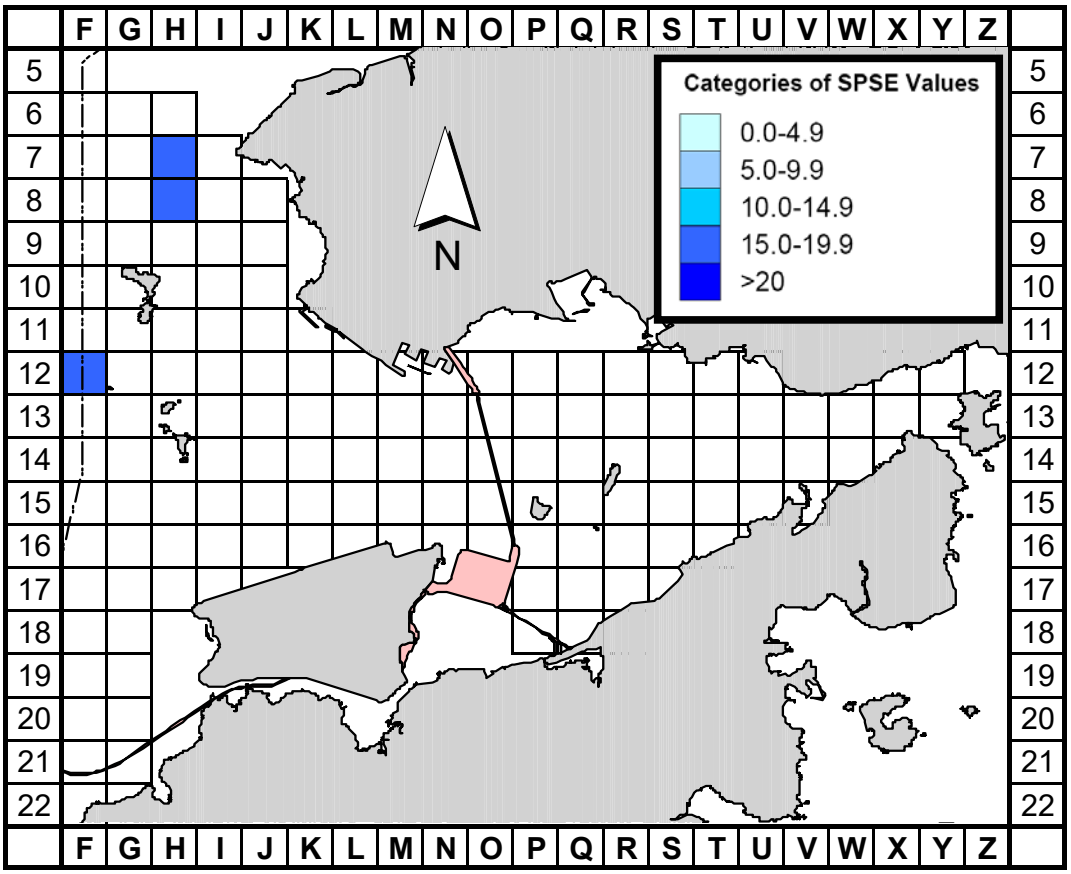


Figure 4a. Sighting density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period monitoring period (March-May 2016) (SPSE = no. of on-effort sightings per 100 units of survey effort)

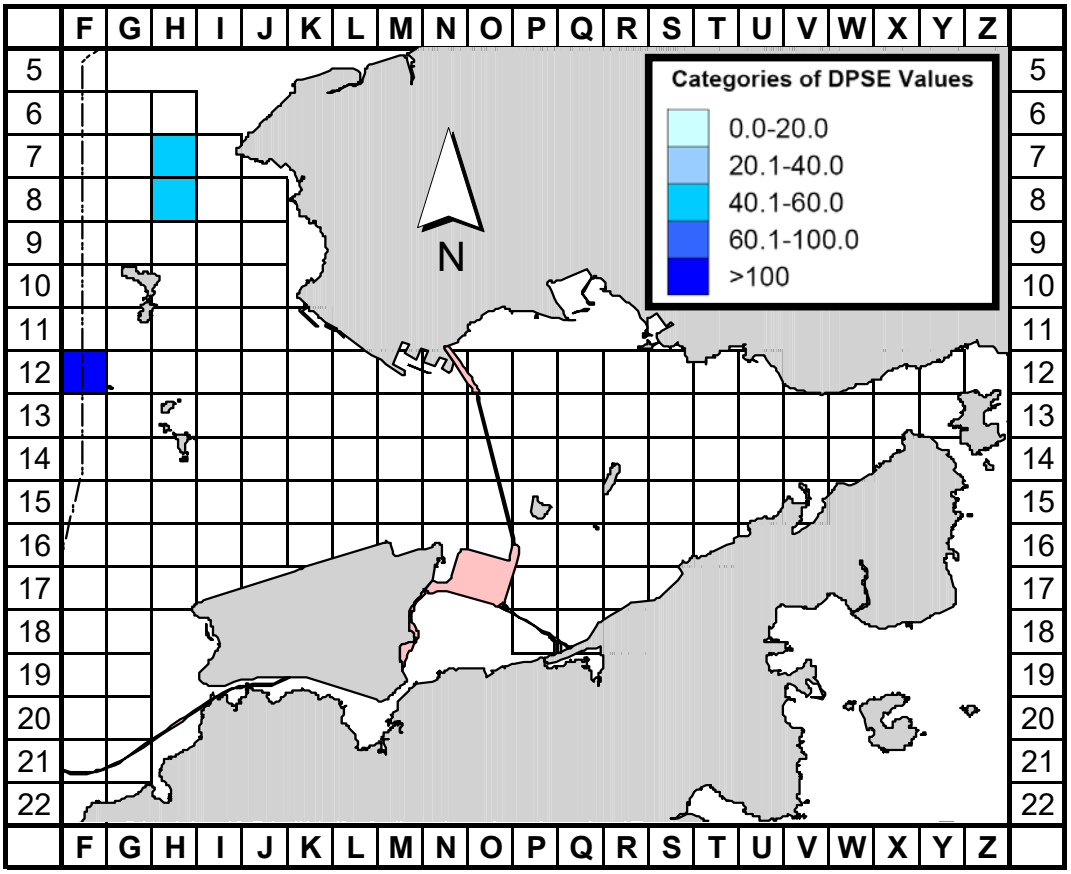


Figure 4b. Density of Chinese white dolphins with corrected survey effort per km^2 in Northeast and Northwest Lantau survey areas, using data collected during HKLR03 impact monitoring period (March-May 2016) (DPSE = no. of dolphins per 100 units of survey effort)

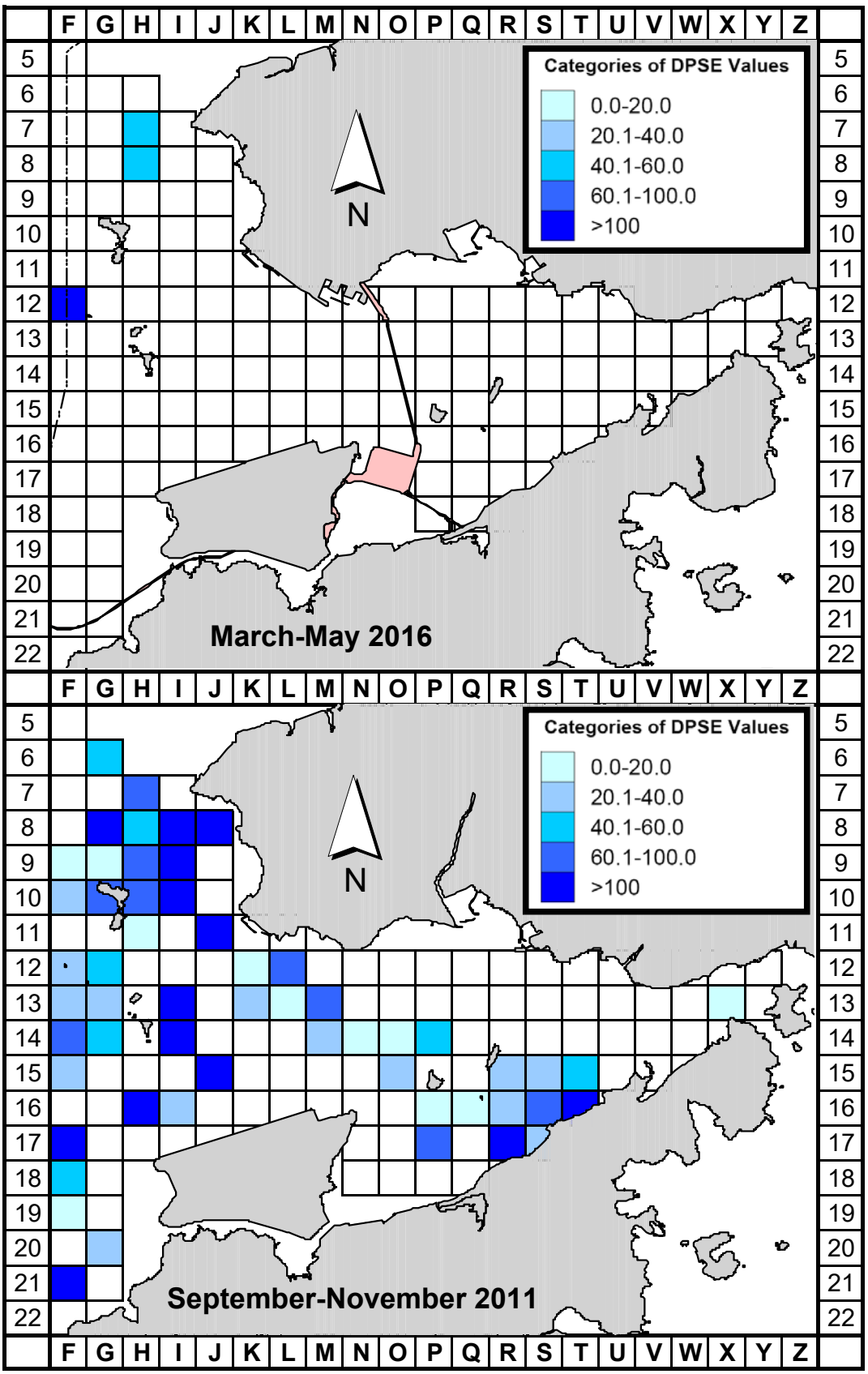


Figure 5. Comparison of density of Chinese white dolphins with corrected survey effort per km^2 in Northwest and Northeast Lantau survey area between the impact monitoring period (March-May 2016) and baseline monitoring period (September-November 2011)
(DPSE = no. of dolphins per 100 units of survey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

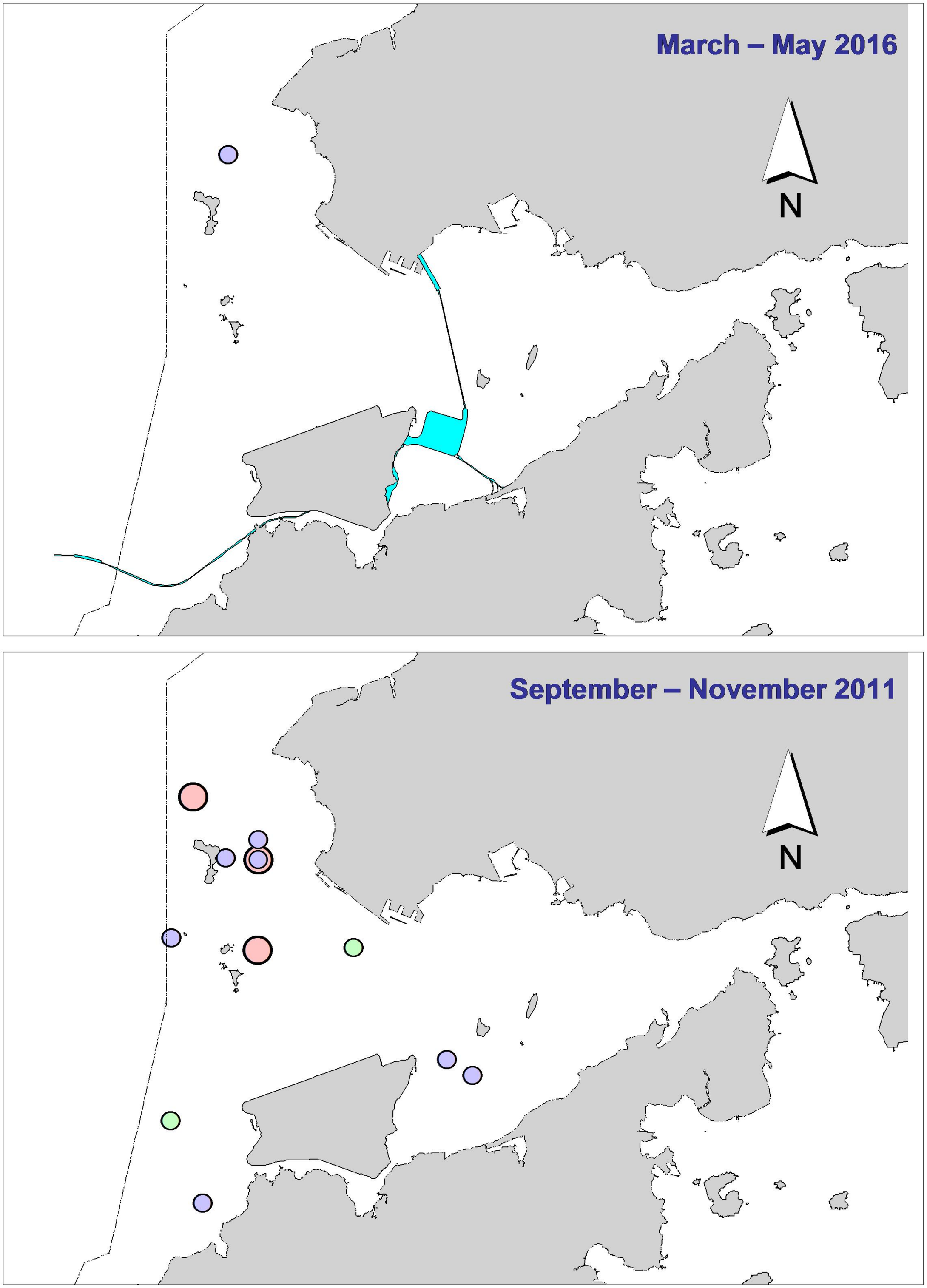


Figure 6. Distribution of Chinese white dolphins engaged in feeding (purple dots), socializing (pink dots) and traveling (green dots) activities during HKLR03 impact phase (top) and baseline monitoring surveys (bottom)

Appendix I. HKLR03 Survey Effort Database (March-May 2016)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
7-Mar-16	NW LANTAU	1	18.42	SPRING	STANDARD31516	HKLR	P
7-Mar-16	NW LANTAU	2	10.78	SPRING	STANDARD31516	HKLR	P
7-Mar-16	NW LANTAU	3	10.30	SPRING	STANDARD31516	HKLR	P
7-Mar-16	NW LANTAU	1	2.50	SPRING	STANDARD31516	HKLR	S
7-Mar-16	NW LANTAU	2	3.70	SPRING	STANDARD31516	HKLR	S
7-Mar-16	NW LANTAU	3	6.70	SPRING	STANDARD31516	HKLR	S
7-Mar-16	NE LANTAU	2	16.44	SPRING	STANDARD31516	HKLR	P
7-Mar-16	NE LANTAU	2	10.46	SPRING	STANDARD31516	HKLR	S
11-Mar-16	NW LANTAU	2	15.40	SPRING	STANDARD31516	HKLR	P
11-Mar-16	NW LANTAU	3	16.20	SPRING	STANDARD31516	HKLR	P
11-Mar-16	NW LANTAU	2	7.60	SPRING	STANDARD31516	HKLR	S
11-Mar-16	NW LANTAU	3	0.30	SPRING	STANDARD31516	HKLR	S
11-Mar-16	NE LANTAU	1	2.04	SPRING	STANDARD31516	HKLR	P
11-Mar-16	NE LANTAU	2	17.97	SPRING	STANDARD31516	HKLR	P
11-Mar-16	NE LANTAU	1	2.40	SPRING	STANDARD31516	HKLR	S
11-Mar-16	NE LANTAU	2	6.19	SPRING	STANDARD31516	HKLR	S
11-Mar-16	NE LANTAU	3	2.20	SPRING	STANDARD31516	HKLR	S
22-Mar-16	NE LANTAU	2	7.42	SPRING	STANDARD31516	HKLR	P
22-Mar-16	NE LANTAU	3	27.44	SPRING	STANDARD31516	HKLR	P
22-Mar-16	NE LANTAU	4	2.30	SPRING	STANDARD31516	HKLR	P
22-Mar-16	NE LANTAU	2	5.86	SPRING	STANDARD31516	HKLR	S
22-Mar-16	NE LANTAU	3	8.18	SPRING	STANDARD31516	HKLR	S
22-Mar-16	NE LANTAU	4	0.40	SPRING	STANDARD31516	HKLR	S
22-Mar-16	NW LANTAU	2	3.59	SPRING	STANDARD31516	HKLR	P
22-Mar-16	NW LANTAU	3	9.39	SPRING	STANDARD31516	HKLR	P
22-Mar-16	NW LANTAU	4	8.10	SPRING	STANDARD31516	HKLR	P
22-Mar-16	NW LANTAU	5	2.40	SPRING	STANDARD31516	HKLR	P
22-Mar-16	NW LANTAU	2	1.40	SPRING	STANDARD31516	HKLR	S
22-Mar-16	NW LANTAU	3	5.12	SPRING	STANDARD31516	HKLR	S
23-Mar-16	NW LANTAU	2	27.12	SPRING	STANDARD31516	HKLR	P
23-Mar-16	NW LANTAU	3	22.69	SPRING	STANDARD31516	HKLR	P
23-Mar-16	NW LANTAU	2	4.11	SPRING	STANDARD31516	HKLR	S
23-Mar-16	NW LANTAU	3	5.20	SPRING	STANDARD31516	HKLR	S
5-Apr-16	NW LANTAU	0	0.83	SPRING	STANDARD31516	HKLR	P
5-Apr-16	NW LANTAU	1	5.38	SPRING	STANDARD31516	HKLR	P
5-Apr-16	NW LANTAU	2	21.07	SPRING	STANDARD31516	HKLR	P
5-Apr-16	NW LANTAU	3	13.64	SPRING	STANDARD31516	HKLR	P
5-Apr-16	NW LANTAU	2	3.00	SPRING	STANDARD31516	HKLR	S
5-Apr-16	NW LANTAU	3	10.08	SPRING	STANDARD31516	HKLR	S
5-Apr-16	NE LANTAU	1	1.60	SPRING	STANDARD31516	HKLR	P
5-Apr-16	NE LANTAU	2	15.44	SPRING	STANDARD31516	HKLR	P
5-Apr-16	NE LANTAU	1	2.10	SPRING	STANDARD31516	HKLR	S
5-Apr-16	NE LANTAU	2	8.06	SPRING	STANDARD31516	HKLR	S
12-Apr-16	NE LANTAU	2	3.81	SPRING	STANDARD31516	HKLR	P
12-Apr-16	NE LANTAU	3	13.73	SPRING	STANDARD31516	HKLR	P
12-Apr-16	NE LANTAU	4	2.60	SPRING	STANDARD31516	HKLR	P
12-Apr-16	NE LANTAU	2	4.20	SPRING	STANDARD31516	HKLR	S
12-Apr-16	NE LANTAU	3	6.46	SPRING	STANDARD31516	HKLR	S
12-Apr-16	NW LANTAU	3	4.57	SPRING	STANDARD31516	HKLR	P
12-Apr-16	NW LANTAU	4	25.36	SPRING	STANDARD31516	HKLR	P
12-Apr-16	NW LANTAU	5	1.90	SPRING	STANDARD31516	HKLR	P

Appendix I. (cont'd)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
12-Apr-16	NW LANTAU	3	5.97	SPRING	STANDARD31516	HKLR	S
12-Apr-16	NW LANTAU	4	2.10	SPRING	STANDARD31516	HKLR	S
15-Apr-16	NW LANTAU	2	5.14	SPRING	STANDARD31516	HKLR	P
15-Apr-16	NW LANTAU	3	20.36	SPRING	STANDARD31516	HKLR	P
15-Apr-16	NW LANTAU	4	6.20	SPRING	STANDARD31516	HKLR	P
15-Apr-16	NW LANTAU	2	3.40	SPRING	STANDARD31516	HKLR	S
15-Apr-16	NW LANTAU	3	3.10	SPRING	STANDARD31516	HKLR	S
15-Apr-16	NW LANTAU	4	1.40	SPRING	STANDARD31516	HKLR	S
15-Apr-16	NE LANTAU	2	14.06	SPRING	STANDARD31516	HKLR	P
15-Apr-16	NE LANTAU	3	6.93	SPRING	STANDARD31516	HKLR	P
15-Apr-16	NE LANTAU	2	7.11	SPRING	STANDARD31516	HKLR	S
15-Apr-16	NE LANTAU	3	2.90	SPRING	STANDARD31516	HKLR	S
19-Apr-16	NE LANTAU	3	10.81	SPRING	STANDARD31516	HKLR	P
19-Apr-16	NE LANTAU	4	6.46	SPRING	STANDARD31516	HKLR	P
19-Apr-16	NE LANTAU	3	10.03	SPRING	STANDARD31516	HKLR	S
19-Apr-16	NW LANTAU	2	6.79	SPRING	STANDARD31516	HKLR	P
19-Apr-16	NW LANTAU	3	15.26	SPRING	STANDARD31516	HKLR	P
19-Apr-16	NW LANTAU	4	9.20	SPRING	STANDARD31516	HKLR	P
19-Apr-16	NW LANTAU	5	9.70	SPRING	STANDARD31516	HKLR	P
19-Apr-16	NW LANTAU	6	1.30	SPRING	STANDARD31516	HKLR	P
19-Apr-16	NW LANTAU	2	3.83	SPRING	STANDARD31516	HKLR	S
19-Apr-16	NW LANTAU	3	3.01	SPRING	STANDARD31516	HKLR	S
19-Apr-16	NW LANTAU	4	6.39	SPRING	STANDARD31516	HKLR	S
3-May-16	NE LANTAU	2	15.29	SPRING	STANDARD31516	HKLR	P
3-May-16	NE LANTAU	3	1.40	SPRING	STANDARD31516	HKLR	P
3-May-16	NE LANTAU	2	10.01	SPRING	STANDARD31516	HKLR	S
3-May-16	NW LANTAU	2	16.24	SPRING	STANDARD31516	HKLR	P
3-May-16	NW LANTAU	3	23.50	SPRING	STANDARD31516	HKLR	P
3-May-16	NW LANTAU	2	7.16	SPRING	STANDARD31516	HKLR	S
3-May-16	NW LANTAU	3	5.60	SPRING	STANDARD31516	HKLR	S
12-May-16	NW LANTAU	2	15.26	SPRING	STANDARD31516	HKLR	P
12-May-16	NW LANTAU	3	16.74	SPRING	STANDARD31516	HKLR	P
12-May-16	NW LANTAU	2	7.60	SPRING	STANDARD31516	HKLR	S
12-May-16	NE LANTAU	2	6.52	SPRING	STANDARD31516	HKLR	P
12-May-16	NE LANTAU	3	13.33	SPRING	STANDARD31516	HKLR	P
12-May-16	NE LANTAU	2	4.72	SPRING	STANDARD31516	HKLR	S
12-May-16	NE LANTAU	3	6.69	SPRING	STANDARD31516	HKLR	S
17-May-16	NE LANTAU	2	10.20	SPRING	STANDARD31516	HKLR	P
17-May-16	NE LANTAU	3	9.92	SPRING	STANDARD31516	HKLR	P
17-May-16	NE LANTAU	2	6.30	SPRING	STANDARD31516	HKLR	S
17-May-16	NE LANTAU	3	4.38	SPRING	STANDARD31516	HKLR	S
17-May-16	NW LANTAU	2	2.74	SPRING	STANDARD31516	HKLR	P
17-May-16	NW LANTAU	3	28.07	SPRING	STANDARD31516	HKLR	P
17-May-16	NW LANTAU	4	0.79	SPRING	STANDARD31516	HKLR	P
17-May-16	NW LANTAU	3	7.80	SPRING	STANDARD31516	HKLR	S
26-May-16	NW LANTAU	2	14.13	SPRING	STANDARD31516	HKLR	P
26-May-16	NW LANTAU	3	26.67	SPRING	STANDARD31516	HKLR	P
26-May-16	NW LANTAU	2	7.10	SPRING	STANDARD31516	HKLR	S
26-May-16	NW LANTAU	3	6.00	SPRING	STANDARD31516	HKLR	S
26-May-16	NE LANTAU	2	2.62	SPRING	STANDARD31516	HKLR	P
26-May-16	NE LANTAU	3	14.38	SPRING	STANDARD31516	HKLR	P
26-May-16	NE LANTAU	2	3.70	SPRING	STANDARD31516	HKLR	S
26-May-16	NE LANTAU	3	6.10	SPRING	STANDARD31516	HKLR	S

Appendix II. HKLR03 Chinese White Dolphin Sighting Database (March-May 2016)

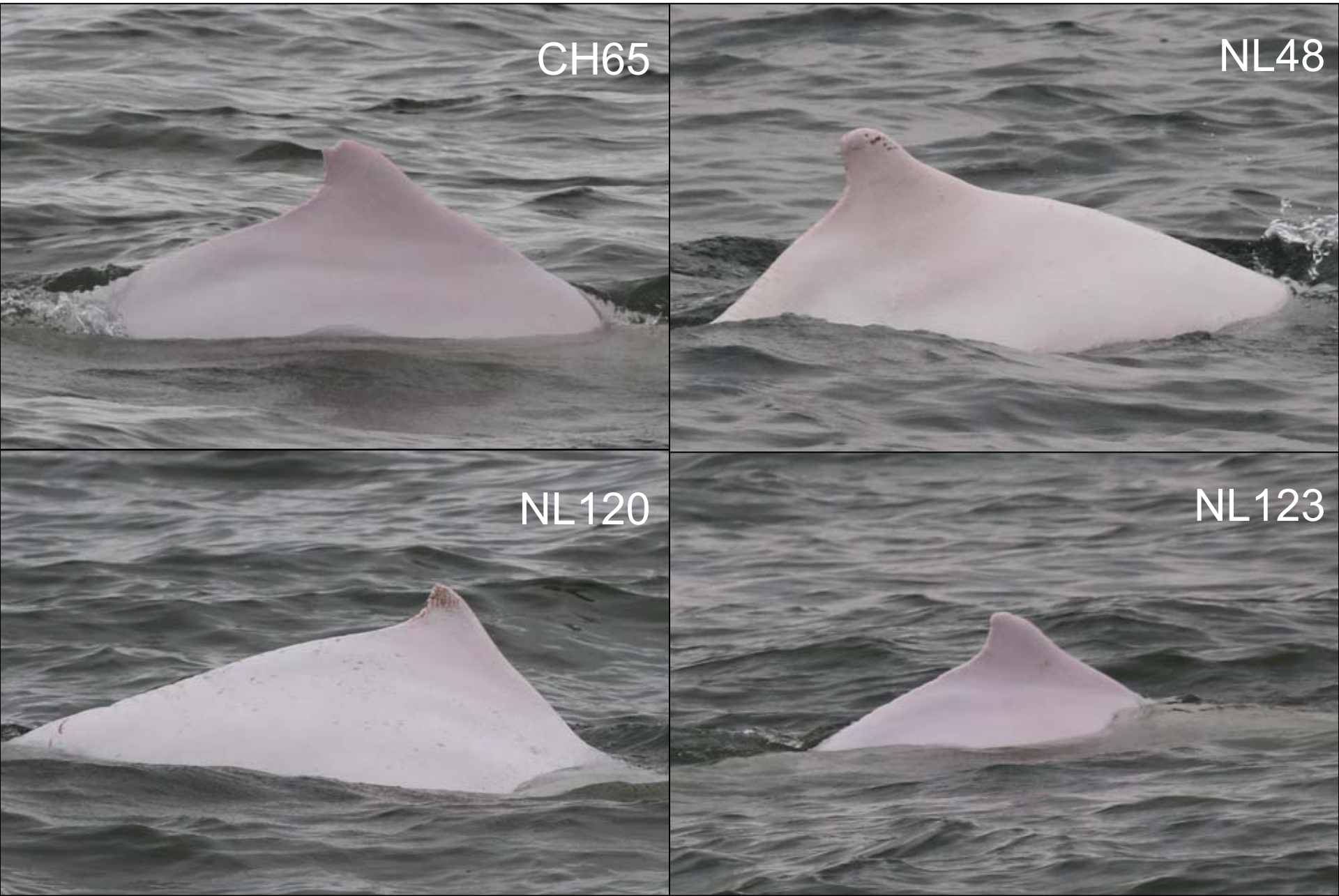
(Abberviations: STG# = Sighting Number; HRD SZ = Dolphin Herd Size; BEAU = Beaufort Sea State; PSD = Perpendicular Distance; BOAT ASSOC. = Fishing Boat Association; P/S: Sighting Made on Primary/Secondary Lines)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
11-Mar-16	1	1300	1	NW LANTAU	2	ND	OFF	HKLR	821158	812895	SPRING	NONE	
23-Mar-16	1	1338	3	NW LANTAU	2	5	ON	HKLR	828123	806459	SPRING	NONE	P
5-Apr-16	1	1059	8	NW LANTAU	2	454	ON	HKLR	824938	804702	SPRING	NONE	P
19-Apr-16	1	1426	2	NW LANTAU	2	ND	OFF	HKLR	828998	806471	SPRING	NONE	
19-Apr-16	2	1451	2	NW LANTAU	2	ND	OFF	HKLR	829109	806461	SPRING	NONE	
19-Apr-16	3	1504	3	NW LANTAU	2	177	ON	HKLR	829696	806297	SPRING	NONE	P
19-Apr-16	4	1519	3	NW LANTAU	2	465	ON	HKLR	829442	806050	SPRING	NONE	S

Appendix III. Individual dolphins identified during HKLR03 monitoring surveys in March-May 2016

ID#	DATE	STG#	AREA
CH65	05/04/16	1	NW LANTAU
NL48	11/03/16	1	NW LANTAU
	05/04/16	1	NW LANTAU
NL120	05/04/16	1	NW LANTAU
NL123	05/04/16	1	NW LANTAU
NL145	05/04/16	1	NW LANTAU
NL202	19/04/16	1	NW LANTAU
NL224	05/04/16	1	NW LANTAU
NL259	05/04/16	1	NW LANTAU
NL261	05/04/16	1	NW LANTAU
NL264	05/04/16	1	NW LANTAU
NL285	23/03/16	1	NW LANTAU
	05/04/16	1	NW LANTAU
NL286	19/04/16	1	NW LANTAU
NL287	05/04/16	1	NW LANTAU
NL288	05/04/16	1	NW LANTAU
NL308	19/04/16	3	NW LANTAU
NL320	23/03/16	1	NW LANTAU

Appendix IV. Sixteen individual dolphins that were identified during March-May 2016 under HKLR03 impact phase monitoring surveys

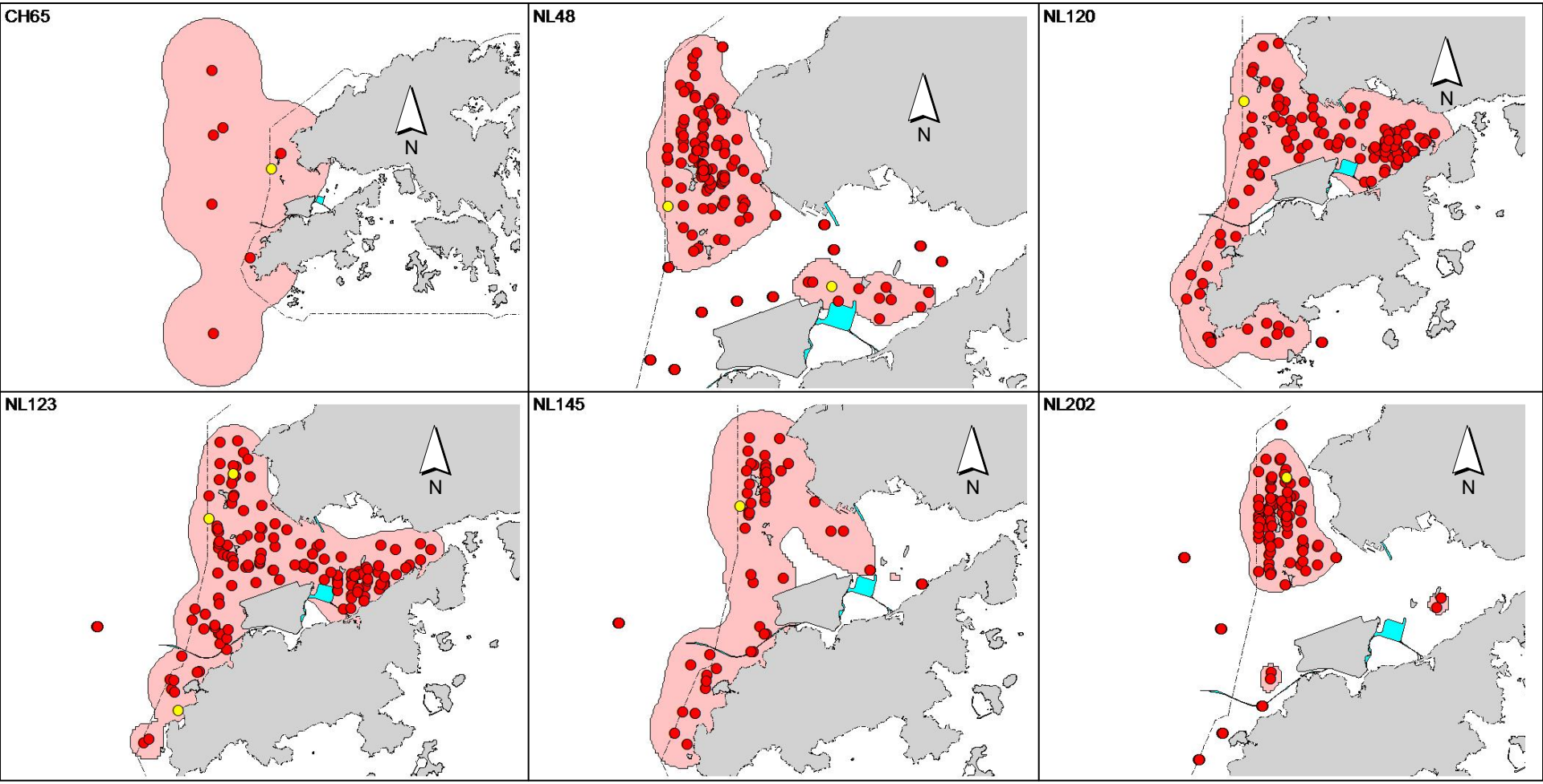


Appendix IV. (cont'd)

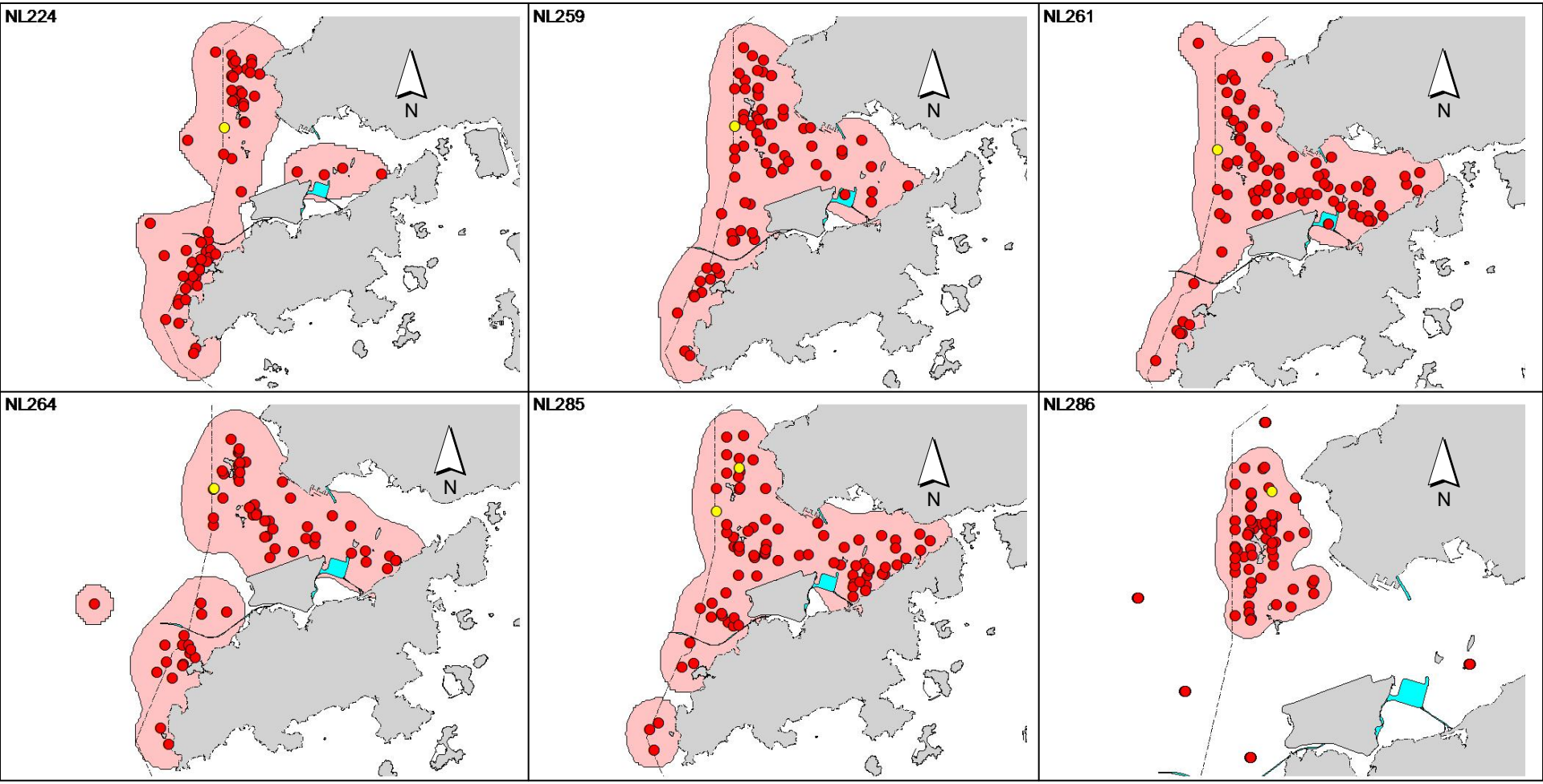
Appendix IV. (cont'd)

Appendix IV. (cont'd)

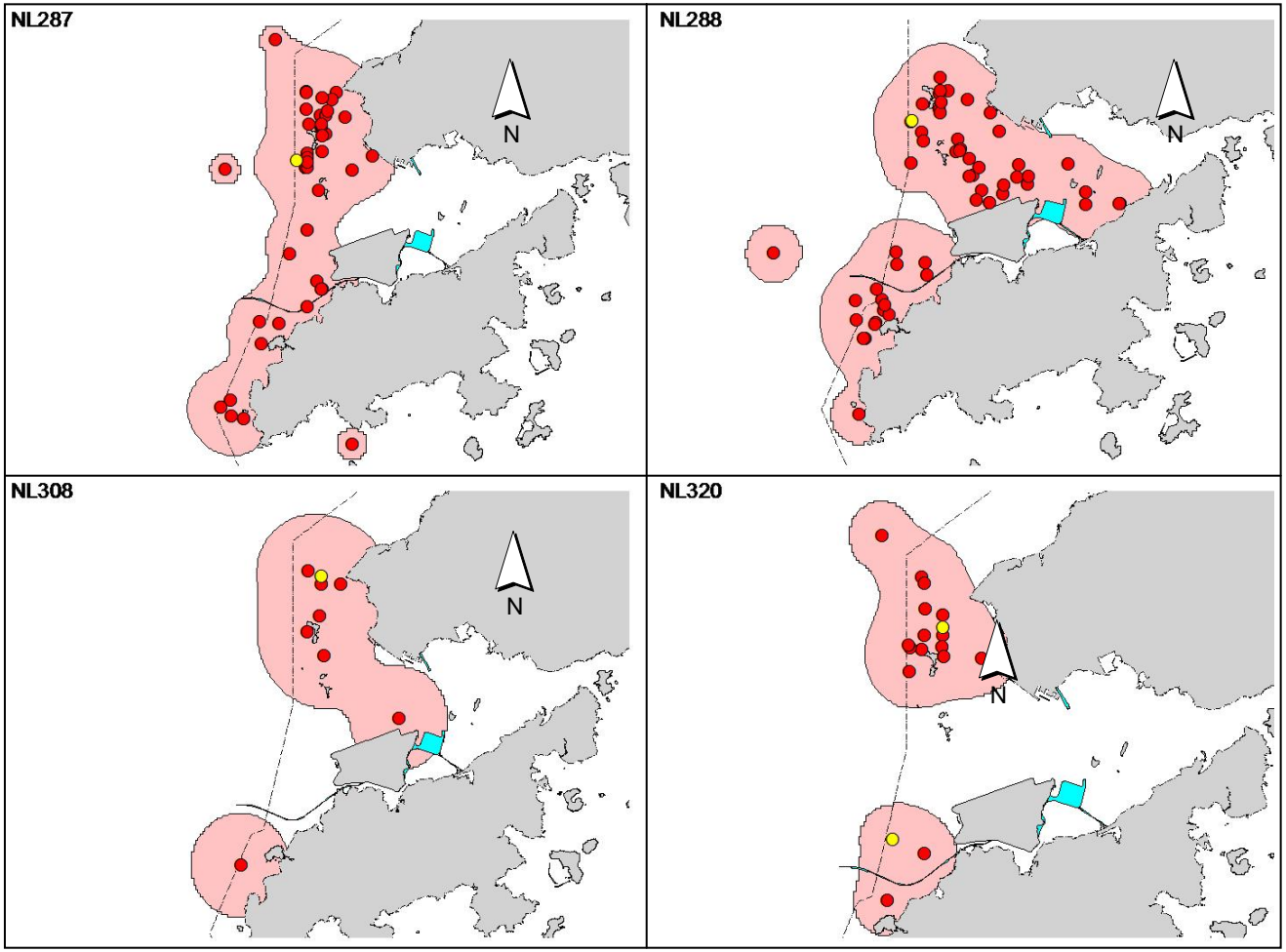
Appendix V. Ranging patterns (95% kernel ranges) of 16 individual dolphins that were sighted during HKLR03 impact phase monitoring period (note: yellow dots indicates sightings made in March-May 2016)



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				
	1. Identify the source. 2. Repeat measurement to confirm finding. If two consecutive measurements exceed Action Level, the exceedance is then confirmed. 3. Inform the IEC and the SOR. 4. Investigate the cause of exceedance and check Contractor's working procedures to determine possible mitigation to be implemented. 5. If the exceedance is confirmed to be Project related after investigation, increase monitoring frequency to daily. 6. Discuss with the IEC and the Contractor on remedial actions required. 7. If exceedance continues, arrange meeting with the IEC and the SOR. 8. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET. 2. Check the Contractor's working method. 3. If the exceedance is confirmed to be Project related after investigation, discuss with the ET and the Contractor on possible remedial measures. 4. Advise the SOR on the effectiveness of the proposed remedial measures. 5. Supervise implementation of remedial measures.	1. Confirm receipt of notification of failure in writing. 2. Notify the Contractor. 3. Ensure remedial measures properly implemented.	1. Rectify any unacceptable practice 2. Amend working methods if appropriate 3. If the exceedance is confirmed to be Project related, submit proposals for remedial actions to IEC within 3 working days of notification 4. Implement the agreed proposals 5. Amend proposal if appropriate

	Action			
	ET [(a)]	**IEC [(a)]**	**SOR [(a)]**	**Contractor(s)**
Limit Level Exceedance				
	1. Identify the source. 2. Repeat measurement to confirm finding. If two consecutive measurements exceed Limit Level, the exceedance is then confirmed. 3. Inform the IEC, the SOR, the DEP and the Contractor. 4. Investigate the cause of exceedance and check Contractor's working procedures to determine possible mitigation to be implemented. 5. If the exceedance is confirmed to be Project related after investigation, increase monitoring frequency to daily. 6. Carry out analysis of the Contractor's working procedures to determine possible mitigation to be implemented. 7. Arrange meeting with the IEC and the SOR to discuss the remedial actions to be taken. 8. Assess effectiveness of the Contractor's remedial actions and keep the IEC, the DEP and the SOR informed of the results. 9. If exceedance stops, cease additional monitoring.	1. Check monitoring data submitted by the ET. 2. Check Contractor's working method. 3. If the exceedance is confirmed to be Project related after investigation, discuss with the ET and the Contractor on possible remedial measures. 4. Advise the SOR on the effectiveness of the proposed remedial measures. 5. Supervise implementation of remedial measures.	1. Confirm receipt of notification of failure in writing. 2. Notify the Contractor. 3. If the exceedance is confirmed to be Project related after investigation, in consultation with the IEC, agree with the Contractor on the remedial measures to be implemented. 4. Ensure remedial measures are properly implemented. 5. If exceedance continues, consider what activity of the work is responsible and instruct the Contractor to stop that activity of work until the exceedance is abated.	1. Take immediate action to avoid further exceedance. 2. If the exceedance is confirmed to be Project related after investigation, submit proposals for remedial actions to IEC within 3 working days of notification. 3. Implement the agreed proposals. 4. Amend proposal if appropriate. 5. Stop the relevant activity of works as determined by the SOR until the exceedance is abated.

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

Event / Action Plan for Impact Dolphin Monitoring

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

EVENT	ACTION			
	ET	**IEC**	**SOR**	**Contractor**
	3. Identify source(s) of impact; 4. Inform the IEC, SOR and Contractor of findings; 5. Check monitoring data; 6. Repeat review to ensure all the dolphin protective measures are fully and properly implemented and advise on additional measures if necessary. 7. If ET proves that the source of impact is caused by any of the construction activity by the works contract, ET to arrange a meeting to discuss with IEC, SOR and Contractor the necessity of additional dolphin monitoring and/or any other potential mitigation measures (e.g., consider to modify the perimeter silt curtain or consider to control/temporarily stop relevant construction activity etc.) and submit to IEC a proposal of additional dolphin monitoring and/or mitigation measures where necessary.	Contractor the necessity of additional dolphin monitoring and any other potential mitigation measures. 4. Review proposals for additional monitoring and any other mitigation measures submitted by ET and Contractor and advise SOR of the results and findings accordingly. 5. Supervise / Audit the implementation of additional monitoring and/or any other mitigation measures and advise SOR the results and findings accordingly.	proposals for additional dolphin monitoring and/or any other mitigation measures submitted by ET and Contractor and verified by IEC, SOR to signify the agreement in writing on such proposals and any other mitigation measures. 3. Supervise the implementation of additional monitoring and/or any other mitigation measures.	potential mitigation measures. 3. Jointly submit with ET to IEC a proposal of additional dolphin monitoring and/or any other mitigation measures when necessary. 4. Implement the agreed additional dolphin monitoring and/or any other mitigation measures.

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

Appendix 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	5

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 (March 2016 to May 2016)	1	0	0
Total No. received since project commencement	5	0	0

Email message

Environmental Resources Management

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

To	Ramboll Environ - Hong Kong, Limited (ENPO)
From	ERM- Hong Kong, Limited
Ref/Project number	Contract No. HY/2012/08 Tuen Mun–Chek Lap Kok Link–Northern Connection Sub-sea Tunnel Section
Subject	Notification of Exceedance for Impact Dolphin Monitoring
Date	26 August 2016

ERM

Dear Sir or Madam,

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

0212330_Mar2016/May2016_dolphin_STG&ANI_NEL&NWL

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

Regards,

Mr Jovy Tam
Environmental Team Leader

ERM-Hong Kong, Limited

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

Impact Dolphin Monitoring
Notification of Exceedance

Log No.	**0212330_Mar2016/May2016_dolphin_STG&ANI_NEL&NWL** **[Total No. of Exceedances = 1 Limit Level Exceedance]**	
Date	March to May 2016 (monitored) 8 July 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 = 0.98 & ANI = 4.78
	One Limit Level Exceedance was recorded in the quarterly impact dolphin monitoring at NEL and NWL between March and May 2016. The exceedance was reported in the approved *Thirty-First Monthly EM&A Report* dated 14 June 2016.	
Statistical Analyses	Further to the review of the available and relevant dolphin monitoring data in the EM&A programme by this Contract, statistical analyses were conducted as follows: • A two-way ANOVA with repeated measures and unequal sample size was conducted using Period (2 levels: baseline vs impact – present quarter, March 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 present impact monitoring quarter. By setting $\alpha = 0.05$ as the significance level in the statistical tests, significant differences in STG ($p = 0.0019$) and ANI ($p = 0.0173$) 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 ($p = 0.000019$) and in ANI ($p = 0.000005$) between Cumulative Period and Location were detected. *Note: The commencement date under *Contract No. HY/2012/08* is 1 November 2013.	
Works Undertaken (in the monitoring quarter)	In the quarter between March 2016 and May 2016, no marine works was carried out in this Contract.	

Possible Reason for Action or Limit Level Exceedance(s)	The potential factors that may have contributed to the observed exceedance are reviewed below: • Blocking of CWD travelling corridor: The *Monitoring of Marine Mammals in Hong Kong Waters (2014 – 15)* (1) reported that dolphin usage and traveling activities to the northern side of the airport (dolphin traveling corridor) are affected by frequent high-speed ferry traffic from Sky Pier (not related to this Contract), which is likely a major factor resulting in the decrease in dolphin abundances in North Lantau. • Marine works of the Contract: As per the findings from the EIA report (*Section 8.11.9*), the major influences on the Chinese White Dolphin (CWD) *Sousa chinensis* under this Contract are marine traffics, reclamation and dredging works. The Contractor implemented the marine traffic control in the reporting period as per the requirements in the *EP-354/2009/D* and the updated *EM&A Manual*. 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. 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 March 2016 and May 2016.
Actions Taken / To Be Taken	A joint team meeting was held on 22 July 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, and Representatives of Main Contractor for Contract No. 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.
Remarks	The results of impact water quality and impact dolphin monitoring, the status of implemented marine ecological mitigation measures are documented in the approved *Twenty-Ninth to Thirty-First Monthly EM&A Reports*.

(1) Hung SKY (2015). Prepared for AFCD. Available from: http://www.afcd.gov.hk/english/conservation/con_mar/con_mar_chi/con_mar_chi_chi/con_mar_chi_chi.html

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

ENVIRONMENTAL COMPLAINT INVESTIGATION REPORT

Our Reference: 0212330_Complaint LOG_20160519_04

Basic Information of Complaints

Reference Numbers:	**N/A**
Date of Complaints Received	19 May 2016
Location of Complaints	Southern Landfall – Barge Area
Nature of Complaints	Dust emission
Complaints Received by	Environmental Protection Department (EPD)
Via	Email
Complainants	Not disclosed

Details of Complaints

On 19 May 2016, a complaint case was received by EPD regarding dust emission from the barge area at Southern Landfall. The Contractor and the ET received the complaint notification on 20 May 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 20 May 2016, the Contractor had promptly checked the works summary.

Based on the record of the Contractor's works summary, dust nuisance was recorded at the barge area of Southern Landfall on 18 May 2016 at around 4:10pm. According to the construction information provided by the Contractor, the majority of works during that period was jet grouting. After dust emission was observed from the barge, the grouting operator has stopped the works within two (2) minutes. Upon thorough investigation, it was found that the pressure of the pipe accidentally increased which caused damage on the pipe and malfunction on the filter, and thus created the dust emission. All related works had stopped. A new filter was added and the damaged pipe was replaced by a new pipe on 19 May 2016. No dust emissions were observed after the replacement.

Also, a joint site inspection was carried out with the Contractor, SOR and EPD on 23 May 2016 to verify the remedial measures (see photo records on Annex A). No further defects were observed and no adverse comments were received.

According to the complaint notification from EPD, the dust nuisance was observed by the complainant in the afternoon of 18 May 2016. After investigation and discussion with the Contractor, it was concluded that the dust nuisance observed by the complainant was the same as the dust nuisance observed by the Contractor.

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

The Contractor has been reminded to adhere strictly to implement all relevant dust mitigation measures 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 dust nuisance.

The loading, unloading, transfer and handling of cement and PFA shall be carried out in a totally enclosed system, and any vent or exhaust shall be fitted with an effective fabric filter.

In the above case, 24-hour supervision of the grouting process has been recommended in order to prevent accidental dust emission. The Contractor has also been reminded to carry out weekly inspection and maintenance of the facility including pipes, filters and tanks, etc. Contingency plan should be implemented to mitigate the environmental impacts. The Contractor should stop the works immediately if similar incident occur. Verification of the facility by the ET is required before the resumption of works.

The Contractor has been reminded to document the mitigation measures in the method statement of construction activities with same cement transportation/handling procedures. No other additional action is required.

Date of File Closed : 27 May 2016

Approved and Filed by:

(Jovy Tam, ET Leader)
Date: 27 May 2016

NOTE:
1) CONCRETE & REBAR DELIVERY BY ROAD
2) PROVISION WILL BE MADE FOR CONCRETE SAMPLING & TESTING
3) ALL LOADS ON THE RECLAMATION WILL NOT EXCEED 20kPa.

WORKS BOUNDARY
SITE MAIN ENTRY EXIT (FUTURE)
PEDESTRIAN ACCESS FOOTWAY
TRAFFIC CONTROL POINT
HKBCF WORKING AREA BACK OF SEAWALL CELLS
CONTAINERS
EXTENT OF BAND DRAIN INSTALLATION
PARKING AREA
10% RAMP
MUD PIT
FUTURE REBAR STORAGE
FUTURE CAGES STORAGE 50mx10m
FUTURE BED 3.5mx35m
JET GROUT TRIAL AREA
CSM PARKING PLUG AREA (23m x 10m)
QUALITY CONTROL
DG STORE
PLANT WORKSHOP (10mx12m)
CHEMICAL STORAGE/WASTE POINT
WORKERS AMENITIES
BENDING YARD
WET MIX PLANT
WATER TREATMENT PLANT
REBAR YARD AREA TO AVOID CLASH WITH BAND DRAIN INSTALLATION
PIPE UTILITIES FROM BARGE (LOCATION FLEXIBLE)
BRIDGE
PEDESTRIAN ACCESS FOOTWAY FROM BARGE
PIPE UTILITIES FROM BARGE
BARGE PONTOON
HOPPER BARGE FOR MARINE DEPOSIT
DERRICK LIGHTER FOR SAND
MARINE ANCHOR
SPOIL DISPOSAL
DESANDING BARGE 2
BENTONITE BARGE
DESANDING BARGE 1
JET GROUTING BARGE
CSM BARGE
WATER BARGE
CEMENT BARGE
WATER SUPPLY
Area of Incident

SITE TEMPORARY LIGHTING
TRAFFIC CONTROL POINT
HKBCF AREA AT BACK OF SEAWALL

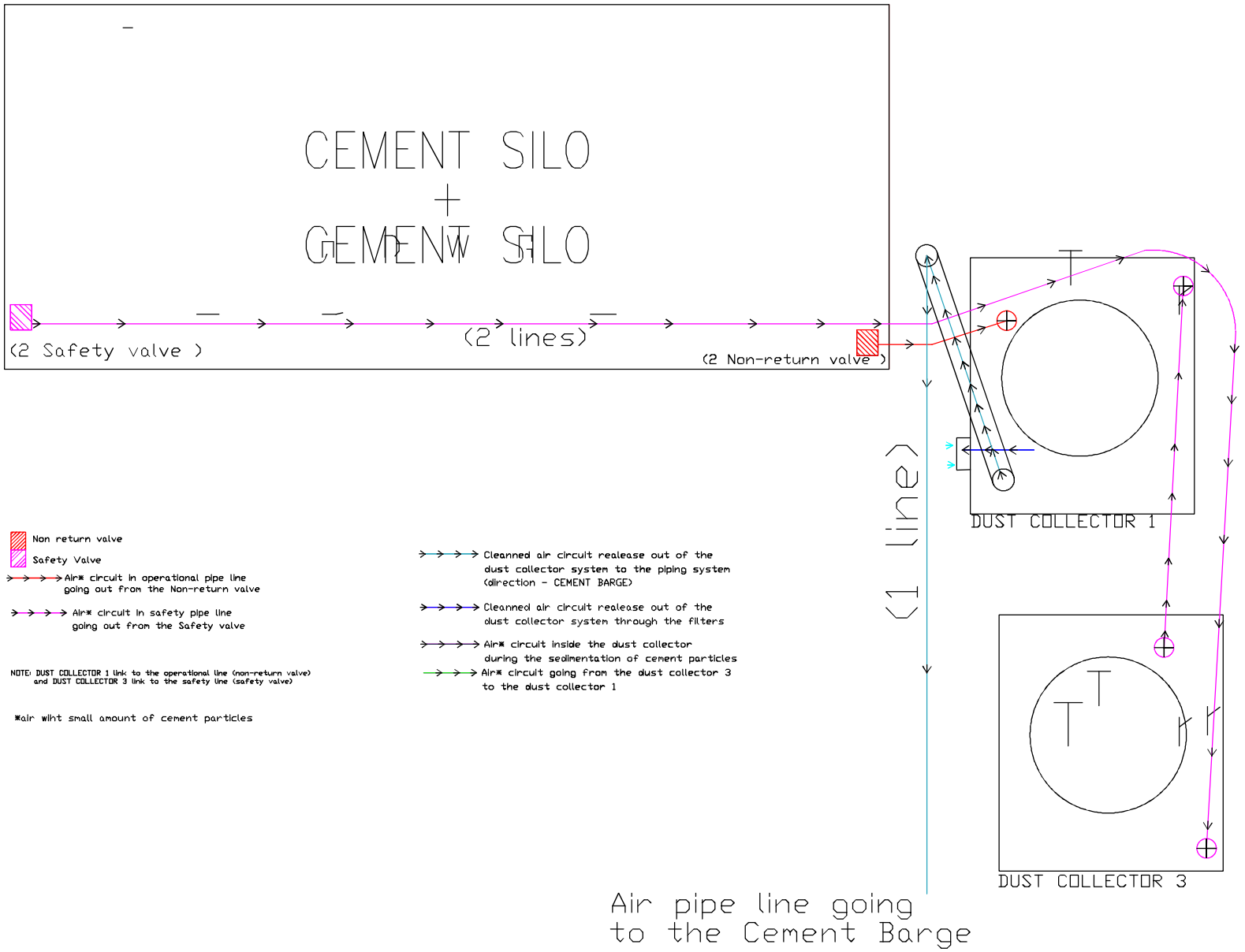
Rev.	Date	Drawn	Designed	Verified	Description	Approved
F	06APR16	pkv	pkv	DLa	ROAD & PEDESTRIAN ACCESS WAY UPDATED	SPo
E	02APR16	pkv	pkv	DLa	SI UPDATED FOR APRIL	SPo
D	23MAR16	pkv	pkv	DLa	PIPE UTILITIES FROM BARGE ROUTE REVISED	SPo
C	21MAR16	pkv	pkv	DLa	WETSEP, 3 LOCATIONS / CSM & JET SET-UP	SPo
B	11MAR16	pkv	pkv	DLa	UPDATE	SPo
A	10MAR16	pkv	pkv	DLa	FIRST ISSUE	SPo

Main Contractor: Dragages - Bouygues Joint Venture 震基 - 布依特聯營
Client: 路政署 HIGHWAYS DEPARTMENT
Contractor's Designer: ARUP Ove Arup & Partners Hong Kong Limited

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

Drawing Title: SOUTHERN LANDFALL
SITE INSTALLATION LAYOUT – APRIL16
SET-UP AFTER SURCHARGE REMOVAL TO +5.5mPD

Drawing no.: TMCLKL8-DBJ-SAA-MSI-06176
Scale: 1:1500(A3)
CADD Ref.: SAA-MSI-06176-F-IFA
Issue Status: IFA (ISSUE FOR APPROVAL)
Revision: F



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

SOUTH VENTILATION SHAFT

DBW MARINE SET-UP

JET GROUTING BARGE – Dust Collector Piping System

No scale

*air wiht small amount of cement particles

CEMENT SILO

CEMENT SILO

Non return valve

Safety Valve

Air* circuit in operational pipe line going out from the Non-return valve

Air* circuit in safety pipe line going out from the Safety valve

Cleanned air circuit realease out of the dust collector system to the piping system (direction - CEMENT BARGE)

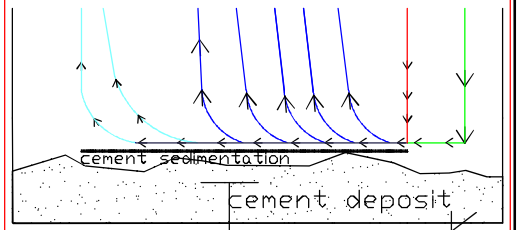
Cleanned air circuit realease out of the dust collector system through the filters

Air* circuit inside the dust collector during the sedimentation of cement particles

Air* circuit going from the dust collector 3 to the dust collector 1

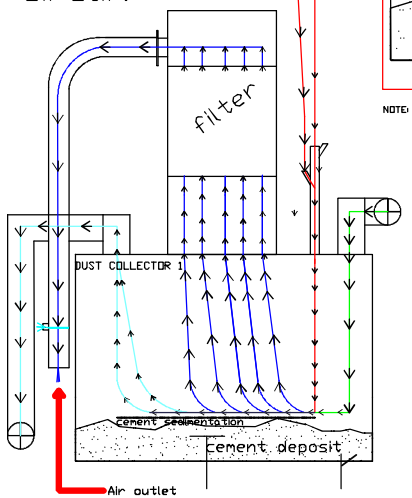
Water inlet in the dust collector outlet

DETAIL OF DUST COLLECTOR STEEL BOX



NOTE: DUST COLLECTOR 1 link to the operational line (non-return valve) and DUST COLLECTOR 3 link to the safety line (safety valve)

Dust collector circuit



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

SOUTH VENTILATION SHAFT

DBW MARINE SET-UP

JET GROUTING BARGE – Dust Collector Piping System

Scale: No scale

Scheme representative of the piping system air circulation in the dust collector

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Annex A Photo Records taken during Site Investigation

*Note: Photos taken on 23/5/2016

New filter was added. (Barge area - Southern Landfall)

The damaged pipe was replaced by a new pipe. (Barge area - Southern Landfall)

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Annex A Photo Records taken during Site Investigation

*Note: Photos taken on 23/5/2016

A joint site inspection was carried out by the ET, the Contractor, SOR and EPD on 23 May 2016.
(Barge area - Southern Landfall)

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 May 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 Inert Construction & Demolition Materials (i.e. Public Fill Materials)				
	(a)=(b)+(c)+(d)+(e) Total Quantity Generated	(b) Hard Rock and Large Broken Concrete	(c) Reused in the Contract	(d) Reused in other Projects	(e) Disposed of as Public Fill
	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)	(in '000 ton)
Sub-total	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					
Half Year Sub-total					
Jul-2016					
Aug-2016					
Sep-2016					
Oct-2016					
Nov-2016					
Dec-2016					
Project Total Quantities	978.633	0.000	0.000	0.000	978.633

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									
Half Year Sub-total									
Jul-2016									
Aug-2016									
Sep-2016									
Oct-2016									
Nov-2016									
Dec-2016									
Project Total Quantities	1.850	1.850	2.750	2.750	6.870	6.870	9.450	9.450	2.943

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 m^3. (**ER Part 8 Clause 8.8.5 (d) (ii)** refers).