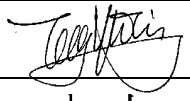
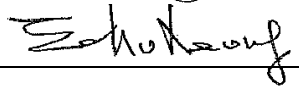
China Harbour Engineering Company Limited

Contract No. HY/2010/02

Hong Kong – Zhuhai – Macao Bridge Hong Kong Boundary Crossing Facilities – Reclamation Works

Annual Review Report for March 2015 to February 2016

[01/2017]

	Name	Signature
Prepared & Checked:	Y T Tang	
Reviewed, Approved and Certified:	Echo Leong (ETL)	

Version:	Rev. 0	Date: 19 January 2017

AECOM Asia Co. Ltd.
15/F, Grand Central Plaza, Tower 1, 138 Shatin Rural Committee Road, Shatin, NT, Hong Kong
Tel: (852) 3922 9000 Fax: (852) 2317 7609 www.aecom.com

RAMBOLL ENVIRON

Ref.: HYDHZMBEEM00_0_4978L.17

19 January 2017

By Fax (3698 5999) and By Post

Ove Arup & Partners
Chief Resident Engineer's Office
5 Ying Hei Road, Tung Chung, Lantau
Hong Kong

Attention: Mr. Paul Appleton

Dear Sir,

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

Contract No. HY/2010/02 – HZMB HKBCF – Reclamation Works
Annual EM&A Review Report for March 2015 to February 2016

Reference is made to the Environmental Team's submission of the Annual EM&A Review Report for March 2015 to February 2016 certified by the ET Leader (ET's ref.: "60249820/C/RMKY17011901" dated 19 January 2017) and provided to us via e-mail on 19 January 2017.

Please be informed that the Annual EM&A Review Report for March 2015 to February 2016 shall be submitted to EPD as per the EM&A Manual. As such, ET Leader is reminded that it is the ET's responsibility to ensure their duties under the EPs and EM&A programmes are fully discharged.

The ET Leader and the dolphin specialist of the ET are reminded that the EM&A report should never be regarded as a platform to express their own opinions towards a government topic, or to advocate his/her personal ideas, and also our verification to your report does not release any of your obligation in the EM&A Manual under the applicable Environmental Permit(s) for this project.

Thank you very much for your attention and please feel free to contact the undersigned should you require further information.

Yours faithfully,
For and on behalf of
Ramboll Environ Hong Kong Limited

Raymond Dai
Independent Environmental Checker

c.c.	HyD	Mr. Vico Cheung	(By Fax: 3188 6614)
	HyD	Mr. Wai-Ping Lee	(By Fax: 3188 6614)
	AECOM	Ms. Echo Leong	(By Fax: 2317 7609)
	CHEC	Mr. Lim Kim Chuan	(By Fax: 2578 0413)

Internal: DY, YH, ENPO Site

Q:\Projects\HYDHZMBEEM00\02_Proj_Mgt\02_Corr\HYDHZMBEEM00_0_4978L.17.doc

Ramboll Environ Hong Kong Limited 英環香港有限公司
21/F, BEA Harbour View Centre, 56 Gloucester Road, Wanchai, Hong Kong Tel: 852.3465 2888 Fax: 852.3465 2899
www.Ramboll-Environ.com

TABLE OF CONTENTS

		Page
EXECUTIVE SUMMARY		1
1.	INTRODUCTION	4
	1.1 Background	4
	1.2 Scope of Report	4
	1.3 Contract Organization	5
	1.4 Summary of Construction Works	5
2.	SUMMARY OF EM&A PROGRAMME REQUIREMENTS	7
	2.1 Monitoring Parameters	7
	2.2 Environmental Quality Performance (Action/Limit Levels)	8
	2.3 Environmental Mitigation Measures	8
3.	MONITORING RESULTS	9
	3.1 Air Quality Monitoring	9
	3.2 Noise Monitoring	2
	3.3 Water Quality Monitoring	5
	3.4 Dolphin Monitoring	13
4.	ENVIRONMENTAL SITE INSPECTION AND AUDIT	21
5.	ADVICE ON THE SOLID AND LIQUID WASTE MANAGEMENT STATUS	28
	5.1 Summary of Solid and Liquid Waste Management	28
6.	IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES	28
	6.1 Implementation Status of Environmental Mitigation Measures	28
7.	SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT	30
	7.1 Summary of Exceedances of the Environmental Quality Performance Limit	30
8.	SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS	31
	8.1 Summary of Environmental Complaints, Notification of Summons and Successful Prosecutions	31
9.	REVIEW OF THE VALIDITY OF THE EIA PREDICTION	33
10.	REVIEW OF ENVIRONMENTAL IMPLEMENTATION STATUS	34
11.	REVIEW OF EM&A PROGRAMME	35
12.	COMMENTS, RECOMMENDATIONS AND CONCLUSIONS	36
	12.1 Comments on mitigation measures	36
	12.2 Air Quality Impact	36
	12.3 Construction Noise Impact	36
	12.4 Water Quality Impact	36
	12.5 Chemical and Waste Management	37
	12.6 Landscape and Visual Impact	37
	12.7 Recommendations on EM&A Programme	37
	12.8 Conclusions	38

List of Tables

Table 1.1 Contact Information of Key Personnel
Table 3.1 Summary of Number of Monitoring Events for 1-hr & 24-hr TSP Concentration
Table 3.2 Summary of Number of Exceedances for 1-hr & 24-hr TSP Monitoring
Table 3.3 Maximum Predicted TSP concentrations under the “Mitigated” scenario
Table 3.4 Summary of Number of Monitoring Events for Impact Noise
Table 3.5 Summary of Number of Monitoring Exceedances for Impact Noise
Table 3.6 Construction Noise Impact at Noise Sensitive Receivers
Table 3.7 Summary of Construction Noise Monitoring Results in the Reporting Period
Table 3.8 Summary of Number of Monitoring Events for Impact Water Quality
Table 3.9 Summary of Water Quality Exceedances in Mar 15-Feb 16
Table 3.10 Summary of number of water quality exceedances per monitoring day
Table 3.11 Comparison of depth averaged dissolved oxygen levels (Surface & Mid-depth, Bottom depth) during baseline and impact monitoring period (mgL^{-1})
Table 3.12 Ambient and Tolerance Values for Suspended Sediment Concentrations (mgL^{-1}) in the Vicinity of Sensitive Receivers adopted in the EIA
Table 3.13 Calculated Elevations in Suspended Sediment Concentrations at Sensitive Receivers (mgL^{-1}) under the 2012 mitigated scenario from the EIA
Table 3.14 Baseline suspended solids levels and 30% of baseline mean (mgL^{-1})
Table 3.15 Average suspended solids levels at sensitive receivers (mgL^{-1}) in May 2015
Table 3.16 Summary of the STG/ANI Quarterly Values
Table 3.17 Comparison of low, moderate and high habitat utilisation in NEL and NWL between years 2011-12; 2013-14, 2014-15 and 2015-16 (in %)

Figures

Figure 1 General Contract Layout Plan
Figure 2 Impact Air Quality and Noise Monitoring Stations and Wind Station
Figure 3 Impact Water Quality Monitoring Stations
Figure 4 Impact Dolphin Monitoring Line Transect Layout Map
Figure 5 Environmental Complaint Handling Procedure

List of Appendices

Appendix A Contract Organization for Environmental Works
Appendix B Three Month Rolling Construction Programmes
Appendix C Implementation Schedule of Environmental Mitigation Measures (EMIS)
Appendix D Summary of Action and Limit Levels
Appendix E Graphical Presentation of Impact Air Quality Monitoring Results
Appendix F Graphical Presentation of Impact Daytime Construction Noise Monitoring Results
Appendix G Graphical Presentation of Impact Water Quality Monitoring Results
Appendix H Impact Dolphin Monitoring Survey Findings and Analysis
Appendix I Quarterly Summary of Waste Flow Table
Appendix J Cumulative Statistics on Exceedances, Complaints, Notifications of Summons and Successful Prosecutions
Appendix K Event Action Plan

EXECUTIVE SUMMARY

Contract No. HY/2010/02 – Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Reclamation Works (here below, known as "the Contract") mainly comprises reclamation at the northeast of the Hong Kong International Airport of an area of about 130-hectare for the construction of an artificial island for the development of the Hong Kong Boundary Crossing Facilities (HKBCF), and about 19-hectare for the southern landfall of the Tuen Mun - Chek Lap Kok Link (TMCLKL). It is a designated Project and is governed by the current permits for the Project, i.e. the amended Environmental Permits (EPs) issued on 11 April 2016 (EP-353/2009/K) and 13 March 2015 (EP-354/2009/D) (for TMCLKL Southern Landfall Reclamation only).

Ove Arup & Partners Hong Kong Limited (Arup) was appointed by Highways Department (HyD) as the consultants for the design and construction assignment for the Project's reclamation works (i.e. the Engineer for the Contract).

China Harbour Engineering Company Limited (CHEC) was awarded by HyD as the Contractor to undertake the construction work of the Contract.

Ramboll Environ Hong Kong Ltd. was employed by HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO) for the Contract.

AECOM Asia Co. Ltd. (AECOM) was appointed by CHEC to undertake the role of Environmental Team for the Contract for carrying out the environmental monitoring and audit (EM&A) works.

The construction phase of the Contract under the EPs was commenced on 12 March 2012 and will be tentatively completed by early Year 2017. The EM&A programme, including air quality, noise, water quality and dolphin monitoring and environmental site inspections, was commenced on 12 March 2012.

This report documents the findings of EM&A works conducted in the period between 1 March 2015 and 29 February 2016. As informed by the Contractor, major activities in the reporting period were:-

Marine-base works

- Cellular structure installation and backfilling
- Capping Beams structures
- Conforming sloping seawalls
- Surcharge remove & laying
- Earthwork fill
- Deep Cement Mixing
- Jet grout columns works
- Geotechnical Instrumentation works
- Removal of Temporary Seawall
- Installations of Precast Culverts except sloping outfalls
- Maintenance of silt curtain & silt screen at sea water intake of HKIA
- Cellular structure – Connecting Arcs
- Cellular structure – Capping Beams
- Cellular structure – Backfill
- Rubble Mound Seawall
- Rock fill

Land-base works

- Maintenance works of Site Office at Works Area WA2
- Maintenance works of Public Works Regional Laboratory at Works Area WA3
- Maintenance of Temporary Marine Access at Works Area WA2
- Earthwork fill
- Jet grout columns works
- Surcharge removal & laying
- Deep Cement Mixing
- Removal of Temporary Seawall
- Vertical Band Drains

- Installations of Precast Culverts except sloping outfalls
- Geotechnical Instrumentation Works

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

24-hour Total Suspended Particulates (TSP) monitoring	65 sessions
1-hour TSP monitoring	65 sessions
Noise monitoring	53 sessions
Impact water quality monitoring	156 sessions
Impact dolphin monitoring	24 surveys
Joint Environmental site inspection	52 sessions

Breaches of Action and Limit Levels for Air Quality

One (1) Limit Level Exceedance of 24hr-TSP was recorded at AMS2 on 10 August 2015. After investigation, there is no adequate information to conclude the recorded exceedances are related to this Contract. No 1hr-TSP was recorded in the reporting year.

Breaches of Action and Limit Levels for Noise

For construction noise, no exceedance was recorded at all monitoring stations in the reporting year.

Breaches of Action and Limit Levels for Water Quality

Two (2) Action Level Exceedances of SS at IS10 and SR5 during Flood tide were recorded on 23 March 2015. No Action and Limit Level exceedance was recorded on other monitoring date in March 2015. After investigation, there is no adequate information to conclude the recorded exceedances are related to this Contract.

Two (2) Action Level Exceedances of suspend solids were recorded at IS5 and IS(Mf)6 during flood tide on 17 July 2015, the exceedances were confirmed after checking against relevant control station(s) during flood tide i.e. CS6, CSA and CS(Mf)5 following the Action and Limit Levels for Water Quality. After investigation, there is no adequate information to conclude the recorded exceedances are related to this Contract.

One (1) Action Level Exceedance of SS at SR7 during flood tide was recorded on 30 September 2015. After investigation, there is no adequate information to conclude the recorded exceedance is related to this Contract. No Action and Limit Level exceedance was recorded on other monitoring date in September 2015; one (1) Action Level Exceedance of SS at SR6 during flood tide was recorded on 2 October 2015. After investigation, there is no adequate information to conclude the recorded exceedance is related to this Contract. No Action and Limit Level exceedance was recorded on other monitoring date in October 2015; one (1) Action Level Exceedance of SS at IS(Mf)9 during flood tide was recorded on 6 Nov 2015. After investigation, there is no adequate information to conclude the recorded exceedance is related to this Contract. No Action and Limit Level exceedance was recorded on other monitoring date in November 2015.

One (1) action level impact water quality monitoring exceedance at monitoring station IS(Mf)11 has been recorded on 28 December 2015 during flood tide. After investigation, there is no adequate information to conclude the recorded exceedance is related to this Contract; 2 limit level exceedances of turbidity level were recorded at monitoring station SR4(N) and IS8 respectively on 5 February 2016; 2 action level exceedances of suspended solids were recorded at monitoring station SR4(N) and IS8 respectively on 5 February 2016. No exceedance at other monitoring stations in the between December 2015 and February 2016. After investigation, there is no adequate information to conclude the recorded exceedances are related to this Contract.

Triggering of Event and Action Plan for Impact Dolphin Monitoring

Four (4) Limit level exceedances were recorded in the reporting year for impact dolphin monitoring. The investigation results showed that although no unacceptable changes in environmental parameters of this Contract have been measured. Event and Action Plan for Impact Dolphin Monitoring was triggered. After investigation, there was no evidence that indicated that the reduced number of dolphins in NWL and NEL was

related solely to Contract works. It was also concluded the contribution of impacts due to the HZMB works as a whole (or individual contracts) cannot be quantified nor separate from the other stress factors. For investigation results please refer to Appendix L of the corresponding quarterly reports.

Implementation Status and Review of Environmental Mitigation Measures

Most of the recommended mitigation measures, as included in the EM&A programme, were implemented properly in the reporting year. Reference is made to ET's proposal of the omission of air monitoring station (AMS 6) dated on 1 November 2012 and EPD's letter dated on 19 November 2012 regarding the conditional approval of the proposed omission of air monitoring station (AMS 6) for Contract No. HY/2010/02. The aforesaid omission of Monitoring Station AMS6 was effective since 19 November 2012.

As informed by the premises owner of (AMS7A) - Chu Kong Air-Sea Union Transportation Co. LTD would not grant us the permission to install air quality monitoring equipment (High volume sampler) and conduct 1-hour TSP/24 hour TSP monitoring at the premises of Chu Kong Air-Sea Union Transportation Co. LTD after December 2015. In order to fulfil the EM&A requirement of this Contract, as permission to conduct impact air quality monitoring at the premise of Hong Kong SkyCity Marriott Hotel has been granted in December 2015, ET proposed relocation of air quality monitoring station (AMS7A) on 15 December 2015, with no further comment received from IEC on 15 December 2015 and no particular comment received from EPD on 21 December 2015, the impact air quality monitoring station AMS7A (Chu Kong Air-Sea Union Transportation Company Limited) has been relocated to AMS7 (Hong Kong SkyCity Marriott Hotel) on 30 December 2015. The impact air quality monitoring for December 2015 was conducted before the relocation of AQM Station from AMS7A to AMS7. The impact air quality monitoring for January and February 2016 were conducted at AMS7 (Hong Kong SkyCity Marriott Hotel), Action Level for air quality, as derived from the baseline monitoring data recorded at Hong Kong SkyCity Marriott Hotel will be adopted for this air quality monitoring location.

The recommended environmental mitigation measures effectively minimize the potential environmental impacts from the Contract. The EM&A programme effectively monitored the environmental impacts from the construction activities and ensure the proper implementation of mitigation measures. No particular recommendation was advised for the improvement of the programme.

Moreover, regular review and checking on the construction methodologies, working processes and plants were carried out to ensure the environmental impacts were kept minimal and recommended environmental mitigation measures were implemented effectively.

Complaint, Notification of Summons and Successful Prosecution

Eight (8) environmental complaints were received in the reporting year.

No summons or successful prosecution was received in the reporting year.

1. INTRODUCTION

1.1 Background

1.1.1 Contract No. HY/2010/02 – Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Reclamation Work (here below, known as "the Contract") mainly comprises reclamation at the northeast of the Hong Kong International Airport of an area of about 130-hectare for the construction of an artificial island for the development of the Hong Kong Boundary Crossing Facilities (HKBCF), and about 19-hectare for the southern landfall of the Tuen Mun - Chek Lap Kok Link (TMCLKL).

1.1.2 The environmental impact assessment (EIA) reports (Hong Kong – Zhuhai – Macao Bridge Hong Kong Boundary Crossing Facilities – EIA Report (Register No. AEIAR-145/2009) (HKBCFEIA) and Tuen Mun – Chek Lap Kok Link – EIA Report (Register No. AEIAR-146/2009) (TMCLKLEIA), and their environmental monitoring and audit (EM&A) Manuals (original EM&A Manuals), for the Project were approved by Environmental Protection Department (EPD) in October 2009.

1.1.3 EPD subsequently issued the Environmental Permit (EP) for HKBCF in November 2009 (EP-353/2009) and the Variation of Environmental Permit (VEP) in June 2010 (EP-353/2009/A), November 2010 (EP-353/2009/B), November 2011 (EP-353/2009/C), March 2012 (EP-353/2009/D), October 2012 (EP-353/2009/E), April 2013 (EP-353/2009/F), August 2013 (EP-353/2009/G), January 2015 (EP-353/2009/H), July 2015 (EP-353/2009/I), February 2016 (EP-353/2009/J) and April 2016 (EP-353/2009/K). Similarly, EPD issued the Environmental Permit (EP) for TMCLKL in November 2009 (EP-354/2009) and the Variation of Environmental Permit (VEP) in December 2010 (EP-354/2009/A), January 2014 (EP-354/2009/B), December 2014 (EP-354/2009/C) and March 2015 (EP-354/2009/D).

1.1.4 The Project is a designated Project and is governed by the current permits for the Project, i.e. the amended EPs issued on 11 April 2016 (EP-353/2009/K) and 13 March 2015 (EP-354/2009/D) (for TMCLKL Southern Landfall Reclamation only).

1.1.5 A Contract Specific EM&A Manual, which included all Contract-relation contents from the original EM&A Manuals for the Contract, was issued in May 2012.

1.1.6 Ove Arup & Partners Hong Kong Limited (Arup) was appointed by Highways Department (HyD) as the consultants for the design and construction assignment for the Project's reclamation works (i.e. the Engineer for the Contract).

1.1.7 China Harbour Engineering Company Limited (CHEC) was awarded by HyD as the Contractor to undertake the construction work of the Contract.

1.1.8 Ramboll Environ Hong Kong Ltd. was employed by HyD as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO) for the Project.

1.1.9 AECOM Asia Co. Ltd. (AECOM) was appointed by CHEC to undertake the role of Environmental Team for the Contract for carrying out the EM&A works.

1.1.10 The construction phase of the Contract under the EPs was commenced on 12 March 2012 and will be tentatively completed by early Year 2017.

1.1.11 According to the Contract Specific EM&A Manual, there is a need of an EM&A programme including air quality, noise, water quality and dolphin monitoring and environmental site inspections. The EM&A programme of the Project commenced on 12 March 2012.

1.2 Scope of Report

1.2.1 This is the fourth Annual EM&A Review Report under the Contract No. HY/2010/02 Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Reclamation Works. This report presents a summary of the environmental monitoring and audit works, list of activities and mitigation measures proposed by the ET for the Contract from 1 March 2015 and 29 February 2016.

1.3 Contract Organization

1.3.1 The Contract organization structure is shown in Appendix A. The key personnel contact names and numbers are summarized in Table 1.1.

Table 1.1 Contact Information of Key Personnel

Party	Position	Name	Telephone	Fax
Engineer's Representative (ER) (Ove Arup & Partners Hong Kong Limited)	Chief Resident Engineer	Roger Marechal (Effective between 1 March 2015 – 15 September 2015 during the reporting year)	2528 3031	2668 3970
Engineer's Representative (ER) (Ove Arup & Partners Hong Kong Limited)	Chief Resident Engineer	Paul Appleton (Effective 16 September 2015 onward)	2528 3031	2668 3970
IEC / ENPO (Ramboll Environ Hong Kong Limited)	Independent Environmental Checker	Raymond Dai	5181 8401	3548 6988
	Environmental Project Office Leader	Y.H. Hui	3547 2133	3548 6988
Contractor (China Harbour Engineering Company Limited)	General Manager (S&E)	Daniel Leung	3157 1086	2578 0413
	Environmental Officer	Richard Ng (Left this project on 15 June 2015)	36932253	2578 0413
		Louie Chan (Effective on 15 June 2015)	36932254	2578 0413
	24-hour Hotline	Alan C.C. Yeung	9448 0325	--
ET (AECOM Asia Company Limited)	ET Leader	Echo Leong	3922 9280	2317 7609

1.4 Summary of Construction Works

1.4.1 The construction phase of the Contract under the EP commenced on 12 March 2012.

1.4.2 As informed by the Contractor, details of the major works carried out in the reporting year are listed below:-

Marine-base works

- Cellular structure installation and backfilling

- Capping Beams structures
- Conforming sloping seawalls
- Surcharge remove & laying
- Earthwork fill
- Deep Cement Mixing
- Jet grout columns works
- Geotechnical Instrumentation works
- Removal of Temporary Seawall
- Installations of Precast Culverts except sloping outfalls
- Maintenance of silt curtain & silt screen at sea water intake of HKIA
- Cellular structure – Connecting Arcs
- Cellular structure – Capping Beams
- Cellular structure – Backfill
- Rubble Mound Seawall
- Rock fill

Land-base works

- Maintenance works of Site Office at Works Area WA2
- Maintenance works of Public Works Regional Laboratory at Works Area WA3
- Maintenance of Temporary Marine Access at Works Area WA2
- Earthwork fill
- Jet grout columns works
- Surcharge removal & laying
- Deep Cement Mixing
- Removal of Temporary Seawall
- Vertical Band Drains
- Installations of Precast Culverts except sloping outfalls
- Geotechnical Instrumentation Works

1.4.3 The construction programme of the Contract is shown in Appendix B.

1.4.4 The general layout plan of the Contract site showing the detailed works areas is shown in Figure 1.

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

2. SUMMARY OF EM&A PROGRAMME REQUIREMENTS

2.1 Monitoring Parameters

2.1.1 The Contract Specific EM&A Manual designated 4 air quality monitoring stations, 2 noise monitoring stations, 21 water monitoring stations (9 Impact Stations, 7 Sensitive Receiver Stations and 5 Control/Far Field Stations) to monitor environmental impacts on air quality, noise and water quality respectively. Pre-set and fixed transect line vessel based dolphin survey was required in two AFCD designated areas (Northeast and Northwest Lantau survey areas). The impact dolphin monitoring at each survey area should be conducted twice per month.

2.1.2 For impact air quality monitoring, monitoring locations AMS2 (Tung Chung Development Pier) and AMS7 (Hong Kong SkyCity Marriott Hotel) were set up at the proposed locations in accordance with Contract Specific EM&A Manual. The conditional omission of Monitoring Station AMS6 was effective since 19 November 2012. For monitoring location AMS3 (Ho Yu College), as proposed in the Contract Specific EM&A Manual, approval for carrying out impact monitoring could not be obtained from the principal of the school. Permission on setting up and carrying out impact monitoring works at nearby sensitive receivers, like Caribbean Coast and Coastal Skyline, was also sought. However, approvals for carrying out impact monitoring works within their premises were not obtained. Impact air quality monitoring was conducted at site boundary of the site office area in Works Area WA2 (AMS3A) respectively. Same baseline and Action Level for air quality, as derived from the baseline monitoring data recorded at Ho Yu College, was adopted for this alternative air quality location. Due to hand over of work site where the AMS3A and NMS3A was located, it was proposed to EPD on 27 December 2014 to relocate both monitoring station to alternative location AMS3B and NMS3B and approval of such relocation was given by the EPD on 2 January 2014. The monitoring stations AMS3A and NMS3A were renamed to monitoring station AMS3B and NMS3B respectively after relocation on 29 January 2014. The monitoring at AMS3B and NMS3B commenced at February 2014.

2.1.3 Reference is made to ET's proposal of relocation of air quality monitoring station (AMS7) dated on 2 February 2015, with no further comment received from IEC on 2 February 2015 and no objection received from EPD on 5 February 2015, the impact air quality monitoring station AMS7 (Hong Kong SkyCity Marriott Hotel) has been relocated to AMS7A (Chu Kong Air-Sea Union Transportation Company Limited) on 3 February 2015. Action Level for air quality, as derived from the baseline monitoring data recorded at Hong Kong SkyCity Marriott Hotel, was adopted for this alternative air quality location.

2.1.4 As informed by the premises owner of (AMS7A) - Chu Kong Air-Sea Union Transportation Co. LTD would not grant us the permission to install air quality monitoring equipment (High volume sampler) and conduct 1-hour TSP/24 hour TSP monitoring at the premises of Chu Kong Air-Sea Union Transportation Co. LTD after December 2015. In order to fulfil the EM&A requirement of this Contract, as permission to conduct impact air quality monitoring at the premise of Hong Kong SkyCity Marriott Hotel has been granted in December 2015, ET proposed relocation of air quality monitoring station (AMS7A) on 15 December 2015, with no further comment received from IEC on 15 December 2015 and no particular comment received from EPD on 21 December 2015, the impact air quality monitoring station AMS7A (Chu Kong Air-Sea Union Transportation Company Limited) has been relocated to AMS7 (Hong Kong SkyCity Marriott Hotel) on 30 December 2015. The impact air quality monitoring for December 2015 was conducted before the relocation of AQM Station from AMS7A to AMS7. The impact air quality monitoring for January and February 2016 were conducted at AMS7 (Hong Kong SkyCity Marriott Hotel), Action Level for air quality, as derived from the baseline monitoring data recorded at Hong Kong SkyCity Marriott Hotel will be adopted for this air quality monitoring location.

2.1.5 For impact noise monitoring, monitoring locations NMS2 (Seaview Crescent Tower 1) was set up at the proposed locations in accordance with Contract Specific EM&A Manual. However, for monitoring location NMS3 (Ho Yu College), as proposed in the Contract Specific EM&A Manual, approval for carrying out impact monitoring could not be obtained from the principal of the school. Permission on setting up and carrying out impact monitoring works at nearby sensitive receivers, like Caribbean Coast and Coastal Skyline, was also sought. However, approvals for carrying out impact monitoring works within their premises were not obtained. Impact noise monitoring was conducted at site

boundary of the site office area in Works Area WA2 (NMS3A) respectively. Same baseline noise level, as derived from the baseline monitoring data recorded at Ho Yu College was adopted for this alternative noise monitoring location.

2.1.6 In accordance with the Contract Specific EM&A Manual, twenty-one stations were designated for impact water quality monitoring. The nine Impact Stations (IS) were chosen on the basis of their proximity to the reclamation and thus the greatest potential for water quality impacts, the seven Sensitive Receiver Stations (SR) were chosen as they are close to the key sensitive receives and the five Control/ Far Field Stations (CS) were chosen to facilitate comparison of the water quality of the IS stations with less influence by the Contract/ ambient water quality conditions.

2.1.7 Due to safety concern and topographical condition of the original locations of SR4 and SR10B, alternative impact water quality monitoring stations, naming as SR4(N) and SR10B(N), were adopted, which are situated in vicinity of the original impact water quality monitoring stations (SR4 and SR10B) and could be reachable. Same baseline and Action Level for water quality, as derived from the baseline monitoring data recorded, were adopted for these alternative impact water quality monitoring stations.

2.1.8 The monitoring locations used during the reporting year are depicted in Figures 2, 3 and 4 respectively.

2.1.9 The Contract Specific EM&A Manual also required environmental site inspections for air quality, noise, water quality, chemical, waste management, marine ecology and landscape and visual impact.

2.2 Environmental Quality Performance (Action/Limit Levels)

2.2.1 The environmental quality performance limits (i.e. Action and/or Limit Levels) of air, water quality and Chinese White Dolphin monitoring were derived from the baseline air, baseline water quality monitoring results at the respective monitoring stations and baseline Chinese White Dolphin monitoring respectively, while the environmental quality performance limits of noise monitoring were defined in the EM&A Manual.

2.2.2 The environmental quality performance limits of air quality, noise, water and Chinese White Dolphin monitoring are given in Appendix D.

2.3 Environmental Mitigation Measures

2.3.1 Relevant environmental mitigation measures were stipulated in the Particular Specification and EPs (EP-353/2009/K and EP-354/2009/D) (for TMCLKL Southern Landfall Reclamation only) for the Contractor to adopt. A list of environmental mitigation measures and their implementation statuses are given in Appendix C.

3. MONITORING RESULTS

3.1 Air Quality Monitoring

3.1.1 Introduction

3.1.1.1. In accordance with the Contract Specific EM&A Manual, impact 1-hour Total Suspended Particulates (TSP) monitoring was conducted for at least three times every 6 days, while impact 24-hour TSP monitoring was carried out for at least once every 6 days at the 4 monitoring stations (AMS2, AMS3B, AMS6 and AMS7/7A[1]).

3.1.1.2. The monitoring locations for impact air quality monitoring are depicted in Figure 2. However, for AMS6 (Dragonair/CNAC (Group) Building), permission on setting up and carrying out impact monitoring works was sought, however, access to the premise has not been granted yet on this report issuing date.

3.1.1.3. Reference is made to ET's proposal of relocation of air quality monitoring station (AMS7) dated on 2 February 2015, with no further comment received from IEC on 2 February 2015 and no objection received from EPD on 5 February 2015, the impact air quality monitoring station AMS7 (Hong Kong SkyCity Marriott Hotel) has been relocated to AMS7A (Chu Kong Air-Sea Union Transportation Company Limited) on 3 February 2015 and monitoring work at AMS7A commenced on 5 February 2015. Action Level for air quality, as derived from the baseline monitoring data recorded at Hong Kong SkyCity Marriott Hotel, was adopted for this alternative air quality location.

3.1.1.4. ET proposed relocation of air quality monitoring station (AMS7A) on 15 December 2015, with no further comment received from IEC on 15 December 2015 and no particular comment received from EPD on 21 December 2015, the impact air quality monitoring station AMS7A (Chu Kong Air-Sea Union Transportation Company Limited) has been relocated to AMS7 (Hong Kong SkyCity Marriott Hotel) on 30 December 2015. The impact air quality monitoring for December 2015 was conducted before the relocation of AQM Station from AMS7A to AMS7. The impact air quality monitoring for January and February 2016 were conducted at AMS7 (Hong Kong SkyCity Marriott Hotel), Action Level for air quality, as derived from the baseline monitoring data recorded at Hong Kong SkyCity Marriott Hotel will be adopted for this air quality monitoring location.

3.1.1.5. The weather was mostly sunny and fine, with occasional cloudy and occasional rainy in the reporting period. The major dust source in the reporting period included construction activities from the Contract, as well as nearby traffic emissions.

3.1.1.6. The number of monitoring events and exceedances recorded in each month of the reporting period are presented in Table 3.1 and Table 3.2 respectively.

3.1.1.7. The baseline and impact air quality monitoring data are provided in the baseline monitoring report and monthly EM&A reports respectively. The graphical plots of the impact air quality monitoring results are provided in Appendix E. No specific trend of the monitoring results or existence of persistent pollution source was noted.

Table 3.1 Summary of Number of Monitoring Events for 1-hr & 24-hr TSP Concentration

Monitoring Parameter	Location	No. of monitoring events
		Mar 15 – Feb 16
1-hr TSP	AMS2	195
	AMS3B	195
	AMS7/7A	195
24-hr TSP	AMS2	65

[1] The monitoring stations AMS7 was renamed to monitoring station AMS7A after relocation on 3 February 2014. Monitoring work was resumed from AMS7A to AMS7 since January 2016.

	AMS3B	65
	AMS7/7A	65

Table 3.2 Summary of Number of Exceedances for 1-hr & 24-hr TSP Monitoring

Monitoring Parameter	Location	Level of Exceedance	Level of Exceedance
			Mar 15 – Feb 16
1-hr TSP	AMS2	Action	0
		Limit	0
	AMS3B	Action	0
		Limit	0
	AMS7/7A	Action	0
		Limit	0
	Total		***0***
24-hr TSP	AMS2	Action	0
		Limit	**1**
	AMS3B	Action	0
		Limit	0
	AMS7/7A	Action	0
		Limit	0
	Total		***1***

3.1.2 Environmental Mitigation Measures

3.1.2.1 Relevant Air mitigation measures, as recommended in the EIA Report were stipulated in the EM&A Manual for the Contractor to adopt. The implementation status of air quality mitigation measures is depicted in Appendix C.

3.1.3 Summary of Actions Taken in the event of Non-Compliance

3.1.3.1 Other than the mitigation measures implemented as mentioned in Appendix C, in the event of non-compliance, actions were taken in accordance with the Event-Action Plan in the EM&A Manual. The Contractor was notified immediately. Investigation was carried out within three working days of identification of non-compliance such as identifying the air pollution sources, checking the implementation status of the mitigation measures, etc., and measurement was repeated to confirm the investigation findings. Further investigation was carried out to identify the source of pollution when deemed necessary. In summary, no direct evidence between the exceedance at AMS2 and the Hong Kong Boundary Crossing Facilities - reclamation works could be established for all non-compliances and therefore no action was required to be taken.

3.1.4 Review of Reasons for and the implications of Non-Compliance

3.1.4.1 A total of 1 Limit Level exceedance was recorded during the 24-hr TSP impact monitoring period. No exceedance of 1-hour TSP exceedance level was recorded at all monitoring station during the 1-hr TSP impact monitoring period. Investigation into the possible causes of each exceedance was undertaken and reported in the respective monthly EM&A reports.

3.1.5 Environmental Acceptability of the Contract

3.1.5.1 Trend of 1-hour and 24-hour TSP

3.1.5.1.1 The 24-hour TSP monitoring results were well below the Action and Limit levels, despite the exceedance caused by non Contract activities at AMS2. The trend of TSP at AMS2, AMS3B and AMS7/7A were comparable to the baseline range and showed no noticeable deterioration of air quality during the impact monitoring period.

3.1.5.2 Correlation between exceedances with possible dust generating activities

3.1.5.2.1 Possible dust generating activities of the Contract did not cause any noticeable deterioration in air quality at Hong Kong Boundary Crossing Facilities – Reclamation Works. With proper implementation of air quality mitigation measures, the monitoring results showed no adverse air quality impact.

3.1.5.3 Comparison of EM&A results with EIA predictions

Table 3.3 Maximum Predicted TSP concentrations under the "Mitigated" scenario

ASR	Location	Predicted Daily Concentrations*		Average Impact 1-hour TSP Levels, μg/m^3	Average Impact 24-hour TSP Levels, μg/m^3
		1-hour	24-hour		
AMS7	Hong Kong SkyCity Marriott Hotel	344	92	80	72

*Extracted from Table 5-8 of the EIA report

3.1.5.3.1 At 1-hour and 24-hour TSP monitoring station at AMS7/7A, the average 24-hour TSP levels recorded in the EM&A programme were in similar magnitude as the Daily dust level predicted in the EIA.

3.1.6 Practicality and Effectiveness of the EIA process and the EM&A programme

3.1.6.1 Monitoring and auditing of air quality was recommended for the construction phase of the Project in the EIA to ensure no exceedance of the TSP standard at the sensitive receiver.

3.1.6.2 The air quality monitoring methodology was effective in monitoring the air quality impacts of the Contract. Baseline monitoring of 1-hour and 24-hour TSP helped to determine the ambient TSP levels at the sensitive receiver prior to commencement of construction works. During periods when there were possible dust generating construction activities, impact monitoring of 24-hour TSP helped to determine whether the Contract caused unacceptable air quality impacts on the sensitive receiver. As the scope of the Contract mainly includes reclamation works during the reporting period and dust generation from the construction activities such as wind erosion and sand filling is the key concern during the construction phase. The monitoring of TSP was therefore considered to be cost effective for the Contract.

3.1.6.3 All recommended mitigation measures were applicable to the Contract. As discussed above, the Contract did not cause unacceptable air quality impacts. However, as the nature of the Contract is reclamation works of approximately 130 hectares of land in size, some mitigation measures in practice were generally focused on dust generating activities only. Nevertheless, the mitigation measures implemented were effective and efficient in controlling air quality impacts.

3.1.6.4 Monitoring and audit of 24-hour TSP levels had ensured that any deterioration in air quality was readily detected and timely actions taken to rectify any non-compliance. Assessment and analysis of 24-hour TSP results collected throughout the baseline and impact monitoring periods also demonstrated the environmental acceptability of the Contract. Weekly site inspections had ensured that the EIA recommended air quality mitigation measures were effectively implemented. The EM&A program is considered to be cost effective.

3.1.7 Conclusion

3.1.7.1 Air quality monitoring for the Contract was conducted during the baseline and impact monitoring periods. Key construction activities including geotextile laying, stone column installation, stone blanket laying, construction of cellular structure and backfill cellular structure. The trend of 1-Hour TSP and 24-hour TSP was comparable to the baseline range and showed no noticeable deterioration of air quality during the monitoring period. Although exceedances were recorded, they were isolated and short-term events. There is no evidence of long-term deteriorating trend.

3.1.7.2 The average 24-hour TSP levels recorded at AMS7/7A in EM&A programme were in similar magnitude with the Daily dust level predicted in the EIA. No TSP level was predicted by the Project EIA at AMS2 and AMS3B and therefore, no comparison of EM&A data with EIA predictions could be made. Air quality mitigation measures implemented were effective in controlling air quality impacts.

3.2 Noise Monitoring

3.2.1 Introduction

3.2.1.1 Impact noise monitoring was conducted at the 2 monitoring stations (NMS2 and NMS3B) for at least once per week during 07:00 – 19:00 in the reporting period.

3.2.1.2 The monitoring locations used during the reporting period are depicted in Figure 2.

3.2.1.3 Major noise sources during the noise monitoring included construction activities of the Contract and nearby traffic noise.

3.2.1.4 The number of impact noise monitoring events and exceedances are summarized in Table 3.4 and Table 3.5 respectively.

Table 3.4 Summary of Number of Monitoring Events for Impact Noise

Monitoring Parameter	Location	No. of monitoring events
		Mar 15- Feb 16
Noise	NMS2	53
	NMS3B	53

Table 3.5 Summary of Number of Monitoring Exceedances for Impact Noise

Monitoring Parameter	Location	Level of Exceedance	No. of Exceedance(s)
Noise	NMS2	Action	0
		Limit	0
	NMS3B	Action	0
		Limit	0
	Total		**0**

3.2.1.5 The graphical plots of the trends of the monitoring results are provided in Appendix F. No specific trend of the monitoring results or existence of persistent pollution source was noted.

3.2.2 Environmental Mitigation Measures

3.2.2.1. Relevant noise mitigation measures, as recommended in the EIA Report were stipulated in the EM&A Manual for the Contractor to adopt. The implementation status of noise mitigation measures is depicted in Appendix C. Construction Noise Permits were applied and complied with when construction works were carried out during restricted hours.

3.2.3 Non-compliance (exceedances) of the Environmental Quality Performance Limits (Action and Limit Levels)

3.2.3.1 Summary of Non-compliance (Exceedances)

3.2.3.1.1 Table 3.5 summarised the number exceedance recorded at each monitoring station throughout the impact monitoring period. There was no exceedance recorded at both NMS2 and NMS3B.

3.2.3.2 Summary of Actions Taken in the event of Non-Compliance

3.2.3.2.1 No event of non-compliance of construction noise was recorded in the reporting period.

3.2.3.3 Review of Reasons for and the implications of Non-Compliance

3.2.3.3.1 No event of non-compliance of construction noise was recorded in the reporting period.

3.2.3.3.2 In summary, the average impact noise levels recorded in the reporting period were generally within the range of the predicted construction noise levels in the Project EIA.

3.2.4 Environmental Acceptability of the Contract

3.2.4.1 Trend of Measured Noise Level (Leq)

3.2.4.1.1 All the noise monitoring results for all monitoring stations were below the Action and Limit levels. The trend showed no noticeable noise impact from the Contract during the impact monitoring period.

3.2.4.2 Correlation between exceedances with possible noise generating activities

3.2.4.2.1 No Exceedance was recorded for all monitoring stations. The impact noise levels recorded were generally similar to the predicted construction noise levels in the Project EIA.

3.2.5 Comparison of EM&A results with EIA predictions

3.2.5.1 The EIA predicted that noise emitted by the use of Powered Mechanical Equipment (PME) on site would be the major source of noise impact during construction. The Construction Noise Impact at Noise Sensitive Receivers are summarised in Table 3.6 (extracted from Table 6-9 of the EIA Report).

Table 3.6 Construction Noise Impact at Noise Sensitive Receivers

NSR	Location	Predicted Noise Levels, dB(A)	
		Total Noise Impacts, dB(A)	Criterion, dB(A)
NMS2	Seaview Crescent Tower 1	74	75

3.2.5.2 During the construction period of the Contract, no exceedances were received in the impact monitoring period. The measured impact noise levels of the Contract for each monitoring station are summarised in Table 3.7 for comparison with EIA.

Table 3.7 Summary of Construction Noise Monitoring Results in the Reporting Period

NSR	Location	Average, dB(A), $L_{eq,30\ mins}$	Range, dB(A), $L_{eq,30\ mins}$	Limit Level, dB(A), $L_{eq,30\ mins}$
NMS2	Seaview Crescent Tower 1	66.9	62.8 – 70.7*	75
NMS3B	Site Boundary of Site Office Area at Works Area WA2	65.9	55 – 68.5*	70

* +3dB(A) Façade correction included

3.2.5.3 The average impact noise levels recorded in EM&A during impact monitoring were all within the range of the predicted construction noise levels in the EIA Report.

3.2.6 Practicality and Effectiveness of the EIA process and the EM&A programme

3.2.6.1 Monitoring and auditing of noise was recommended for the construction phase of the Project in the EIA process to ensure compliance with the appropriate criterion at the receivers.

3.2.6.2 The noise monitoring methodology was effective in monitoring the noise impacts of the Contract. Baseline noise monitoring determined the ambient noise levels at the sensitive receivers prior to commencement of construction works. During periods when possible noise generating construction activities were on-going, impact noise monitoring would determine whether the Contract caused adverse noise impacts on the sensitive receivers. The monitoring methodology which focus on $L_{eq30\ minute}$ therefore considered to be cost effective for the Contract.

3.2.6.3 Noise mitigation measures recommended in the EIA Report were stipulated in the EM&A Manual for the Contractor to implement during the construction phase of the Project. The list of noise mitigation measures is depicted in Appendix C. All recommended mitigation measures were applicable to the Contract. As discussed above, the Contract did not cause adverse noise impacts to the receivers. Therefore, the mitigation measures implemented were effective and efficient in controlling noise impacts.

3.2.6.4 Monitoring and audit of noise levels ensured that any noise impact to the receivers would readily be detected and timely actions could be taken to rectify any non-compliance. Assessment and analysis of noise results collected throughout the baseline and impact monitoring periods also demonstrated the environmental acceptability of the Contract. Weekly site inspections ensured that the EIA recommended noise mitigation measures were effectively implemented. The EM&A program is considered to be cost effective.

3.2.7 Conclusion

3.2.7.1 The trend of L_{eq} was comparable to the baseline range and showed no noticeable noise impact during the impact monitoring period. Although exceedance was recorded, there was no evidence of long-term increasing trend. The average impact noise levels recorded in EM&A programme were all lower than the construction noise levels predicted in the EIA.

3.3 Water Quality Monitoring

3.3.1 Introduction

3.3.1.1 Impact water quality monitoring was conducted 3 times per week during mid-ebb and mid-flood tides at 21 water monitoring stations (9 Impact Stations, 7 Sensitive Receiver Stations and 5 Control/Far Field Stations).

3.3.1.2 The monitoring locations used during the reporting period are depicted in Figure 3.

3.3.1.3 Number of impact water quality monitoring events and exceedances recorded in the reporting period at each impact station are summarized in Table 3.8 and Table 3.9 respectively.

Table 3.8 Summary of Number of Monitoring Events for Impact Water Quality

Monitoring Parameter	Tide	No. of monitoring events
		Mar 15 - Feb 16
Water Quality	Mid-Ebb	156
	Mid-Flood	156

Table 3.9 Summary of Water Quality Exceedances in Mar 15-Feb 16

Station	Exceedance Level	DO (S&M)		DO (Bottom)		Turbidity		SS		Total	
		Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood
IS5	Action	0	0	0	0	0	0	0	**(1) 17 July 2015**	0	**(1) 17 July 2015**
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)6	Action	0	0	0	0	0	0	0	**(1) 17 July 2015**	0	**(1) 17 July 2015**
	Limit	0	0	0	0	0	0	0	0	0	0
IS7	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS8	Action	0	0	0	0	0	0	0	**(1) 5 Feb 16**	0	**(1) 5 Feb 16**
	Limit	0	0	0	0	0	**(1) 5 Feb 16**	0	0	0	**(1) 5 Feb 16**
IS(Mf)9	Action	0	0	0	0	0	0	0	**(1) 6 Nov 15**	0	**(1) 6 Nov 15**
	Limit	0	0	0	0	0	0	0	0	0	0
IS10	Action	0	0	0	0	0	0	0	**(1) 23 Mar 15**	0	**(1) 23 Mar 15**
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)11	Action	0	0	0	0	0	0	0	**(1) 28 Dec 15**	0	**(1) 28 Dec 15**
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)16	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS17	Action	0	0	0	0	0	0	0	0	0	0

Station	Exceedance Level	DO (S&M)		DO (Bottom)		Turbidity		SS		Total	
		Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood
	Limit	0	0	0	0	0	0	0	0	0	0
SR3	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR4(N)	Action	0	0	0	0	0	0	0	**(1) 5 Feb 16**	0	**(1) 5 Feb 16**
	Limit	0	0	0	0	0	**(1) 5 Feb 16**	0	0	0	**(1) 5 Feb 16**
SR5	Action	0	0	0	0	0	0	0	**(1) 23 Mar 15**	0	**(1) 23 Mar 15**
	Limit	0	0	0	0	0	0	0	0	0	0
SR6	Action	0	0	0	0	0	0	0	**(1) 2 Oct 2015**	0	**(1) 2 Oct 2015**
	Limit	0	0	0	0	0	0	0	0	0	0
SR7	Action	0	0	0	0	0	0	0	**(1) 30 Sept 2015**	0	**(1) 30 Sept 2015**
	Limit	0	0	0	0	0	0	0	0	0	0
SR10A	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR10B (N)	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
Total	**Action**	0	0	0	0	0	0	0	**10**	**10**	
	Limit	0	0	0	0	0	**2**	0	0	2	

Note: S: Surface;
M: Mid-depth;

3.3.1.4 Please refer to the monthly EM&A report (March 2015 to February 2016) accordingly for the details of the captioned exceedances.

3.3.1.5 The graphical plots of the trends of the monitoring results are provided in Appendix G. No specific trend of the monitoring results or existence of persistent pollution source was noted.

3.3.2 Environmental Mitigation Measures

3.3.2.1 Relevant water quality mitigation measures, as recommended in the EIA Report were stipulated in the EM&A Manual for the Contractor to adopt. The implementation status of water quality mitigation measure is depicted in Appendix C.

3.3.3 Non-compliance (exceedances) of the Environmental Quality Performance Limits (Action and Limit Levels)

3.3.3.1 Summary of Non-compliance (Exceedances)

3.3.3.1.1 Table 3.9 summarised the number of dissolved oxygen, turbidity and suspended solids exceedances recorded at each sensitive receiver station throughout the impact monitoring period. A total of twelve exceedances were recorded during the entire construction period with 10 Action level exceedances and 2 Limit level exceedances.

3.3.4 Review of Reasons for and the implications of Non-Compliance

3.3.4.1 Ten (10) Action Level exceedances of measured suspended solids (SS) values (in mg/L) and two (2) Limit Level exceedances of Turbidity (in NTU) were recorded during the reporting period. After investigation, all impact water quality exceedances were considered not related to this Contract. For details of investigation please refer to monthly EM&A Report of this Contract.

3.3.4.2 After review of the investigation results of the water quality exceedances (for detail of investigations please refer to section 4 of monthly EM&A report (Mar 15 to Feb 16), ambient conditions were considered to have effects on the water quality monitoring results. Exceedances were considered to be due local effects in the vicinity of the monitoring station where exceedance was recorded and after investigation, there is no adequate information to conclude the recorded exceedances are related to this Contract.

3.3.5 Environmental Acceptability of the Contract

3.3.5.1 Trend of water quality

Dissolved Oxygen

3.3.5.1.1 The dissolved oxygen levels recorded in the impact monitoring period showed a seasonal trend in which lower DO levels were recorded during the wet season and higher DO levels were recorded during the dry season. One reason for this seasonal trend may have been the increase in water temperature during the wet season leading to decreases in the solubility of oxygen in water and vice versa during the dry season. The trend of dissolved oxygen levels was presented in Appendix G. Other than an isolated action level exceedance, the trend of dissolved oxygen levels at each monitoring stations in Appendix G did not show any noticeable deterioration of dissolved oxygen levels.

Turbidity

3.3.5.1.2 The turbidity levels were fairly distributed at most monitoring station during the reporting period. While trend of turbidity levels at impact station IS5, IS17, IS7, IS8 and IS10 were more fluctuated and a higher turbidity level were recorded March 2015 and but no apparent trend was observed. The trend of turbidity levels of each monitoring station was shown in Appendix G. Despite two isolated events, turbidity levels of all monitoring stations were still lower than the Action Level during the monitoring period.

Suspended Solids

3.3.5.1.3 The trend of suspended solid levels of each impact monitoring station was shown similar with the control stations of each tide, i.e , slightly fluctuated between the period from September 2015 to February 2016. The trend of suspended solid levels of each monitoring station was shown in Appendix G. Despite few isolated events, suspended solids levels of all monitoring stations were still lower than the Action Level during the monitoring period.

3.3.6 Correlation between exceedances with possible marine construction activities

3.3.6.1 With proper implementation of water quality mitigation measures, marine construction activities of the Contract were not observed to cause any unacceptable water quality impacts to the sensitive receiver stations.

Table 3.10 Summary of number of water quality exceedances per monitoring month

Month	Imported Fill* m^3/month	Depth averaged DO	Depth averaged Turbidity	Depth averaged SS	Total
Mar-15	376,294	0	0	**2**	**2**
Apr-15	240,642	0	0	0	0
May-15	743,731	0	0	0	0
Jun-15	368,595	0	0	0	0
Jul-15	35,549	0	0	**2**	**2**
Aug-15	23,625	0	0	0	0
Sep-15	34,520	0	0	**1**	**1**
Oct-15	9,246	0	0	**1**	**1**
Nov-15	0	0	0	**1**	**1**
Dec-15	0	0	0	**1**	**1**
Jan-16	0	0	0	0	0
Feb-16	0	0	**2**	**2**	**4**

*Only marine filling is counted

3.3.6.2 As shown in Table 3.10, there was no apparent correlation between the filling rates and the number of water quality exceedances recorded per monitoring day.

3.3.6.3 For dissolved oxygen, the numbers of dissolved oxygen exceedances show no noticeable deterioration of dissolved oxygen or correlation between filling rate and dissolve oxygen exceedance.

3.3.6.4 For turbidity, the numbers of turbidity exceedances show no noticeable deterioration of turbidity or correlation between filling rate and turbidity exceedance.

3.3.6.5 For suspended solids, the numbers of suspended solids exceedances show no noticeable deterioration of suspended solid or correlation between filling rate and suspended exceedance.

3.3.6.6 The trend did not show any correlation between water quality impact and the filling rates during the impact monitoring period.

3.3.6.7 With proper implementation of water quality mitigation measures and additional mitigation measures, marine construction activities of the Contract were not observed to cause any unacceptable water quality impacts to the sensitive receiver stations.

3.3.7 Comparison of EM&A results with EIA predictions

3.3.7.1 Results from the sensitive receiver stations were compared with the EIA predictions for the sensitive receivers in the following manner:

- WSR 27 - San Tau Beach SSSI with SR3
- WSR 22c- Tai Ho Wan Inlet (outside) with SR4(N)

- WSR 25 - Cooling water intake at HK International Airport with SR5

Dissolved oxygen (DO)

3.3.7.2 According to Section 9.10.7.4 of the EIA Report, the dissolved oxygen depletion from the loss of sediment to suspension during the construction of the reclamation for HKBCF was calculated to be 0.4 mg/L at WSR25. Since, as stated in the Table 9.6a of the EIA report the DO of the NW Western water is generally high with average ranges between 5.7 – 6.8 mg/L and depletion will not be detrimental to the ecological systems of the area. The average Depth averaged DO record at SR5 is 6.2 mg/L in May 2015 when the filling rate/month is the highest during the reporting period and therefore no significant dissolved oxygen depletion from was noted during impact monitoring.

3.3.7.3 The baseline dissolved oxygen levels and the level of depletion during impact monitoring at each sensitive receiver are summarised in Tables 3.11.

Table 3.11 Comparison of depth averaged dissolved oxygen levels (Surface & Mid-depth, Bottom depth) during baseline and impact monitoring period (mgL^{-1})

Sensitive Receiver in Baseline	Associated Location during Impact Monitoring	Monitoring Depth	Baseline mean		Impact mean (May 2015)		Depletion during Impact Monitoring	
			Mid-ebb	Mid-flood	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood
SR3	SR3*	Surface & mid	6.8	6.7	6.4	6.5	-0.4	-0.2
		Bottom	-	6.2	-	-	-	-
SR4^	SR4(N)**	Surface & mid	6.1	6.3	6.6	6.4	0.5	0.1
		Bottom	6.0	6.2	6.4	6.4	0.4	0.2
SR5	SR5**	Surface & mid	6.4	6.3	6.3	6.2	-0.1	-0.1
		Bottom	6.1	6.1	6.2	6.1	0.1	0
SR6	SR6**	Surface & mid	6.6	6.5	6.4	6.3	-0.2	-0.2
		Bottom	6.2	6.1	6.3	6.2	0.1	0.1
SR7	SR7**	Surface & mid	6.3	6.0	6.2	6.5	-0.1	0.5
		Bottom	6.1	5.9	6.2	6.4	0.1	0.5
SR10A	SR10A	Surface & mid	6.0	6.0	6.0	5.9	0	-0.1
		Bottom	5.7	5.8	5.9	5.7	0.2	-0.1
SR10B^	SR10B(N)**	Surface & mid	6.1	6.0	6.1	6.0	0	0
		Bottom	6.2	5.8	6.0	5.8	-0.2	0

^Due to safety issue, the water quality monitoring location of SR4 has been changed to SR4(N) and water quality monitoring location of SR10B has been changed as SR10B(N) during impact monitoring.
*Only mid-depth station of DO were monitored at SR3 in mid-ebb during baseline monitoring, in both mid-ebb and mid-flood during impact monitoring as the water depth less than 3m.
** The mid-depth station of DO was omitted at SR4(N) during impact monitoring as the water depth is less than 6m.

3.3.7.4 Comparing baseline averaged dissolved oxygen levels with EM&A results; no significant depletion was found at all sensitive receiver locations. There was no adverse effect on dissolved oxygen concentrations as a result of the filling works of the Contract as the depleted dissolved oxygen concentrations did not breach the Water Quality Objectives nor did they exceed the AL levels adopted for the Contract.

Suspended solids (SS)

3.3.7.5 The EIA determined the acceptability of elevations in suspended sediment concentrations based on the Water Quality Objectives. The Water Quality Objectives for suspended sediments for the North Western Water Control Zones were defined as being an allowable elevation of 30% above the background. The ambient and tolerance values for suspended sediment concentrations in the vicinity of sensitive receivers adopted in Table 9.11 of the EIA Report are presented in Table 3.12.

Table 3.12 Ambient and Tolerance Values for Suspended Sediment Concentrations (mgL^{-1}) in the Vicinity of Sensitive Receivers adopted in the EIA

Sensitive Receiver in EIA Report	Associated EPD Station	Ambient value (90th Percentile)		Tolerance value (30% Tolerance)	
		Dry Season	Wet Season	Dry Season	Wet Season
WSR 27	NM5,6,8	8.3	5.6	2.5	1.7
WSR 22c	NM1,2,3	5.5	3.7	1.7	1.1
WSR 25	NM1,2,3	5.5	3.7	1.7	1.1

3.3.7.6 The use of single layer silt curtain system has been modelled in the 2012 mitigated scenario. The predicted suspended sediment concentrations under the 2012 mitigated scenario of the Contract as shown in Table 9.21 in the EIA Report are summarised in Table 3.13.

Table 3.13 Calculated Elevations in Suspended Sediment Concentrations at Sensitive Receivers (mgL^{-1}) under the 2012 mitigated scenario from the EIA

Sensitive Receiver in EIA Report	Associated Location during Impact Monitoring	Calculated Elevations	
		Dry Season	Wet Season
WSR 27	SR3	0.0	0.0
WSR 22c	SR4(N)	0.1	0.0
WSR 25	SR5	3.0	2.7

3.3.7.7 For suspended solids, as the baseline monitoring was conducted in October 2011 which is the transitional season or just the start of dry season while no data were recorded in the wet season, direct comparison with the EIA predictions could not be made. The comparison of EM&A results with baseline results in the following paragraphs was based on the criteria of acceptability of 30 percent elevations above the background as defined in the Water Quality Objectives which was also used in scenario predictions in the EIA.

3.3.7.8 Baseline water quality monitoring for the Contract was conducted during the transitional season. The mean baseline suspended solids level at each sensitive receiver and 30 percent of the baseline mean are presented in Table 3.14.

Table 3.14 Baseline suspended solids levels and 30% of baseline mean (mgL^{-1})

Associated Location in Baseline Report	Baseline mean		30% of baseline mean	
	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood
SR3	14.0	16.3	4.2	4.9
SR4	11.3	12.2	3.4	3.7
SR5	10.6	11.9	3.2	3.6
SR6	11.9	11.9	3.6	3.6
SR7	11.4	10.4	3.4	3.1
SR10A	10.2	10.2	3.1	3.1
SR10B	11.5	11.1	3.5	3.3

3.3.7.9 The average elevations in suspended solids concentrations of May 2015 were compared with the baseline levels are provided in Table 3.15.

Table 3.15 Average suspended solids levels at sensitive receivers (mgL^{-1}) in May 2015

Sensitive Receiver in Baseline	Associated Location during Impact Monitoring	Impact SS Mean (in May 2015)			
		Mid-ebb	Elevation	Mid-flood	Elevation
SR3	SR3	7.12	-6.88	7.51	-8.79
SR4	SR4(N)*	5.30	-6.00	7.67	-4.53
SR5	SR5	5.92	-4.68	6.02	-5.88
SR6	SR6	6.09	-5.81	4.98	-6.92
SR7	SR7	5.49	-5.91	4.55	-5.85
SR10A	SR10A	5.40	-4.80	4.25	-5.95
SR10B	SR10B(N)*	4.49	-7.01	6.81	-4.29

*Due to safety issue, the water quality monitoring location of SR4 & SR10B have been changed to SR4(N) & SR10B(N) respectively during impact monitoring.

3.3.7.10 With the highest filling rate in May 2015, the elevations in suspended solids levels were below 30 percent of the baseline suspended solids levels at all stations. Regional influences would have effects on the deterioration in water quality than activities at the work site. Exceedances were considered to be due local effects in the vicinity of the monitoring station where exceedance was recorded and after investigation, there is no adequate information to conclude the recorded exceedances are related to this Contract.

3.3.8 Practicality and Effectiveness of the EIA process and the EM&A programme

3.3.8.1 Monitoring and audit of water quality was recommended for the construction phase of the Contract in the EIA process to ensure any deterioration in water quality would be readily detected and timely action could be taken to rectify the situation.

3.3.8.2 Baseline water quality monitoring determined the ambient water quality in the region prior to commencement of construction works. Impact water quality monitoring helped to determine whether the Contract would cause unacceptable water quality impacts on the sensitive receivers.

3.3.8.3 Water quality mitigation measures were recommended in the EIA and a list of water quality mitigation measures were stipulated in the EM&A Manual for the Contractor to implement during the construction phase of the Project. The list of water quality mitigation measures is depicted in Appendix C. All recommended mitigation measures were applicable to the Contract. Precautionary measures including installation of silt curtains were also implemented to prevent migration of suspended solids towards the sensitive receivers. Monitoring results showed that water quality at sensitive receivers was affected by regional water quality influenced by tidal and climatic conditions, local impacts from the vicinity of the receivers. As discussed above, the Contract was not observed to cause unacceptable water quality impacts to the sensitive receivers. Therefore, the mitigation measures implemented were effective and efficient in controlling water quality impacts.

3.3.8.4 Monitoring and audit of water quality ensured that any water quality impacts to the receivers would be readily detected and timely actions could be taken to rectify any non-compliance. Assessment and analysis of water quality results collected throughout the baseline, impact and post-Contract monitoring periods also demonstrated the environmental acceptability of the Contract. Weekly site inspections ensured that the EIA recommended and additional water quality mitigation measures were effectively implemented.

3.3.9 Conclusion

3.3.9.1 Water quality monitoring for the Contract was conducted during the baseline and impact monitoring periods. For turbidity and suspended solids levels, a total of 12 exceedances were recorded. Assessment indicated that there was no correlation between the filling rates and the number of water quality exceedances recorded. Exceedances were considered to be due local effects in the vicinity of

the monitoring station where exceedance was recorded and after investigation, there is no adequate information to conclude the recorded exceedances are related to this Contract.

3.3.9.2 The DO and SS levels recorded at SR3, SR4 (N) and SR5 were in similar magnitude as predicted in the Project EIA. No comparison could be made from SR6 to SR10B(N) as predictions were not made in the Project EIA. For turbidity, as no prediction was made in the Project EIA, no comparison could be made. With the implementation of water quality mitigation measures recommended in the EIA and additional water quality mitigation measures implemented during the EM&A programme, marine construction activities of the Contract did not cause any unacceptable water quality impacts to the sensitive receivers.

3.4 Dolphin Monitoring

3.4.1 Introduction

3.4.1.1 In accordance with the requirements specified in Section 9.3 of the EM&A Manuel, monthly vessel-based surveys were conducted to monitor impacts on the Indo-Pacific humpback or Chinese white dolphin (*Sousa chinensis*). The surveys were conducted in the areas known as NEL and NWL and travelled the transect lines depicted in Figure 4.

3.4.1.2 The total transect length for NEL and NWL combined is approximately 111km although some Contract and other works at times have caused temporary truncation of some lines, particularly lines 1,2,9 and 10. Due to the presence of deployed silt curtain systems at the site boundaries of the Contract, some of the transect lines shown in Figure 5 could not be fully surveyed during the regular survey. Transect 10 is reduced from 6.4km to approximately 3.6km in length due to the HKBCF construction site.

3.4.1.3 Coordinates for transect lines 1, 2, 7, 8, 9 and 11 have been updated inrespect to the Proposal for Alteration of Transect Line for Dolphin Monitoring approved by EPD on 19 August 2015.Therefore the total transect length for both NEL and NWL combined is reduced to approximately 108km.

3.4.1.4 Surveys were conducted twice per month, using combined line transect and photo-identification techniques. The research team comprised qualified and experienced researchers and Marine Mammal Observers (MMO).

3.4.2 Environmental Mitigation Measures

3.4.2.1 Relevant mitigation measures for dolphins, as recommended in the EIA Report were stipulated in the EM&A Manual for the Contractor to adopt. The implementation status of mitigation measures for dolphins is depicted in Appendix C.

3.4.3 Summary of Actions Taken in the event of Non-Compliance

3.4.3.1 The enhanced EAP for CWD monitoring with numerical AL/LL were implemented in the reporting period.

3.4.3.2 Four (4) Limit level exceedance**s** were recorded in the reporting period for impact dolphin monitoring. (Table 3.16). The investigation results showed that although no unacceptable changes in environmental parameters of this Contract have been measured. The Event and Action Plan for Impact Dolphin Monitoring was triggered. For investigation results please refer to Appendix L of the corresponding quarterly reports. For information on environmental acceptability of the Contract see Section 3.4.13

Table 3.16 Summary of the STG/ANI Quarterly Values

Quarterly period		STG*	ANI**	Level Exceeded
March 2015- May 2015	**NEL**	0	0	Limit Level
	NWL	1.6	5.2	
June 2015- August 2015	**NEL**	0	0	Limit Level
	NWL	1.7	4.7	
September 2015- November 2015	**NEL**	0	0	Limit Level
	NWL	1.9	3.8	
December 2015- February 2016	**NEL**	0	0	Limit Level
	NWL	1.2	4.5	

* STG represents groups of dolphins (recorded on effort)
** ANI represents number of individual dolphins (recorded on effort)

3.4.4 Summary of Survey Effort and Dolphin Sightings

3.4.4.1 Vessel-based surveys were conducted monthly from March 2015 to February 2016, i.e., during the fourth year of the construction phase. A total of 48 survey days were completed between March 2015-February 2016 (Appendix H: Table 1). A total of 2615.7km were completed of which 2572 km were conducted under favourable conditions (defined as Beaufort Sea State 3 or better and with visibility of >1km) (Appendix H: Table 2). In the first year of impact monitoring (2012-13), 49 survey days were completed (total travelled 2627.5km; under favourable conditions 2601.4km). In the second year of impact monitoring (2013-14), 50 survey days were completed (total travelled 2667.1km; 2595.4km under favourable conditions). In the third year of impact monitoring (2014-15), 48 survey days were completed (total travelled 2641.7km; 2637.1km conducted under favourable conditions). In all four years, >98% of the track length covered was completed under favourable conditions. Between March 2015-February 2016, a total of 43 dolphin sightings were recorded, 26 as on effort and 17 as opportunistic[2] (Appendix H: Figure 1). In the first year of impact monitoring, a total of 203 dolphin sightings were recorded, 145 as on effort and 58 as opportunistic. In the second year, a total of 135 dolphin sightings were recorded, 91 on effort and 44 opportunistic. In the third year, a total of 72 dolphin sightings were recorded, 46 on effort and 26 opportunistic. The total number of sightings has decreased between each year of impact monitoring.

3.4.5 Distribution

3.4.5.1. Sightings of dolphins were divided into quarterly periods. The highest number of sightings were made between June 2015 – November 2015. The lowest number of sightings were recorded in December 2015–February 2016. No sightings were made in the NEL section of the survey area (Appendix H: Figure 2). In NWL and adjacent waters, dolphins were consistently distributed in areas of rocky, reefy shoreline or where there was a marked depth contour. These areas are the Sha Chau and Lung Kwu Chau Marine Protected Area (SCLKCMPA), the adjacent maritime border of Hong Kong SAR and the Peoples Republic of China (PRC) and the Tai O area. Since long term monitoring has been initiated by AFCD, there has been a regular and year round occurrence of dolphins in these areas of northern Lantau.

3.4.6 Encounter Rate

3.4.6.1. Encounter rates of “on effort” sightings (i.e. groups) per area per quarter for the year March 2015 to February 2016 were calculated[3]. For NWL, quarterly dolphin encounter rates were similar between March-November with a slight peak during the period September–November (Appendix H: Figure 3). Within NWL, quarterly encounter rates ranged from 3 to 6 groups (Year 1); 5 to 9 groups (Year 2); 2 to 4 groups (Year 3) and one group (Year 4) per 100km on effort (figures rounded). Years 3 and 4 of construction works showed the lowest encounter rates.

3.4.7. Group Size

3.4.7.1. The majority of all sightings recorded were of less than 5 individuals (79%). Larger groups were seen in southern NWL and in, or adjacent to, SCLKCMPA. There was no seasonal pattern although with so few sightings patterns may be difficult to discern. The two mother and calf groups sighted were both in groups of five or more individuals. Two of the large groups sighted were noted as exhibiting multiple behavior which incorporated feeding and two groups were recorded as feeding. Four groups were recorded as travelling and one group was milling near an anchored fishing vessel. Groups of five or more were sighted throughout the year (Appendix H: Figure 4).

3.4.8. Habitat Use

[2] “On effort” sightings are classified as those sightings which are made when the vessel is on the designated trackline and observers are actively searching. “Opportunistic sightings” are those sightings which occur while travelling between tracklines, additional sightings made when travelling back to a transect line after photographing a dolphin group and/or any dolphins noted when transiting between areas or on passage to transect lines.

[3] The same calculation as implemented in the AFCD Annual Monitoring Reports was used; [(total ‘on effort” sightings/total track conducted in Beaufort Sea State 3 or better)*100] for both NEL and NWL separately and for the two areas combined.

3.4.8.1 The EM&A Manuel stipulated that surveys be conducted in such a way as to be comparable to the baseline survey for this Contract (September -November 2011) and to the long term annual monitoring conducted by AFCD. As such, analyses of density per survey effort (DPSE) and sightings per survey effort (SPSE) were calculated in accordance with the methodology detailed in AFCD reports (e.g., AFCD 2012[4]). The survey areas are divided into 1km x 1km squares and the relative number of sightings and densities are calculated for each block. NEL has 55 blocks and NWL has 90 blocks (only blocks of more than 0.75km^2 are included). For the period March 2015-February 2016, DPSE was calculated in six categories, ranging from low use to high use. Neither NEL nor NWL have any areas of high use (> 60 DPSE); 0% (NEL) and 10% (NWL) as moderate use (20.1-60 DPSE); and 100% (NEL) and 90% (NWL) as low use (< 20 DPSE). (Appendix H: Figure 5).

3.4.8.2 For the period March 2015-February 2016, SPSE was calculated in six categories, ranging from low use to high use. NEL and NWL have 0% and 2% of each respective area classified as high use (> 15 SPSE); 0% of NEL and 10% NWL and; as moderate use (5.1-15 SPSE); and 100% (NEL) and 88% (NWL) as low use (< 5 SPSE) (Appendix H: Figure 6).

3.4.8.3 For the period February 2011 – January 2012, DPSE was calculated in six categories, ranging from low use to high use. NEL and NWL have 4% and 17% of each respective area classified as high use (> 60 DPSE); 20% (NEL) and 16% (NWL) as moderate use (20.1-60 DPSE); and 76% (NEL) and 68% (NWL) as low use (< 20 DPSE) (Appendix H: Figure 7). These figures were compared to impact monitoring data for March 2013-February 2014, March 2014-February 2015 and March 2015-February 2016 (Table 3.17). For DPSE in NWL, there was an increase in low use grid cells, a decrease in moderate use cells and a decrease in high use cells. Noting the geographical location of the cells between advanced and impact monitoring, there are less high use cells in the centre of the NWL area indicating that habitat utilisation of this area has decreased. In NEL, all cell use was low during impact monitoring and there were no on effort sightings in NEL during March 2015-February 2016.

3.4.8.4 For the period February 2011 – January 2012, SPSE was calculated in six categories, ranging from low use to high use. NEL and NWL have 9% and 22% of each respective area classified as high use (> 15 SPSE); 31% (NEL) and 27% (NWL) as moderate use (5.1-15 SPSE); and 60% (NEL) and 51% (NWL) as low use (< 5 SPSE) (Appendix H: Figure 7). These figures were compared to impact monitoring data for March 2013-February 2014 and March 2014-February 2015 (Table 3.17). For SPSE in NWL, there has been an increase in low use grid cells and a reduction in both moderate and high use area. This correlates with that observed for DPSE, unsurprisingly as they are derived from interrelated data. For SPSE in NEL, this is also true, with an observed increase in low use areas and a concomitant decrease in high and moderate use cells, when compared to impact monitoring. No on effort sightings were made in NEL during March 2015-February 2016 and only one sighting in the previous year (2014-15).

Table 3.17 Comparison of low, moderate and high habitat utilisation in NEL and NWL between years 2011-12; 2013-14, 2014-15 and 2015-16 (in %)

	Advanced*	2013-14	2014-15	2015-16	Advanced*	2013-14	2014-15	2015-16
Frequency of Use	NWL				NEL			
	DPSE							
<20	68	76	85	90	76	100	100	100
20-60	16	14	13	10	20	0	0	0
> 60	17	10	2	0	4	0	0	0
	SPSE							
<5	51	72	86	88	60	91	98	100
5-15	27	20	11	10	31	9	2	0
>15	22	8	3	2	9	0	0	0

[4] Agriculture, Fisheries and Conservation Department (AFCD) 2012. *Annual Marine Mammal Monitoring Programme April 2011-March 2012.)* The Agriculture, Fisheries and Conservation Department, Government of the Hong Kong SAR.

*Advance = advance baseline monitoring conducted between 2011 and 2012.

3.4.9 Mother and Calf Pairs

3.4.9.1 Two mothers and the offspring of individuals identified from the first year of impact monitoring (2012) were sighted during the year 2015-16. Two mother and calves born in year 2015-16 were also sighted, both of which were previously identified (Appendix H: Figure 8). Although it is often difficult to identify calves, using high resolution images and the identity of mothers, it is sometimes possible to track poorly marked individual calves, while they still stay in close proximity to their mother. Mother-offspring bonds are known to last years, sometimes decades, in delphinid species. During 2015-18, HZMB 023 and her offspring HZMB 022 were sighted on two occasions each, once together and once each without the other. This juvenile is well marked and was born prior to the impact monitoring period and estimated to be five to six years old. HZMB 044 is a well-known individual and is recorded in AFCD records as NL98. She was first sighted with a new born calf in 2012 and the calf was individually identified in 2014-15 as HZMB 125. Both were seen together on a single occasion in January 2016. A female identified as HZMB 047 was initially recorded in September 2012 and was sighted with a new born calf in March 2015. A female identified as HZMB 114 was initially recorded in October 2013 and was sighted with a new calf in November 2015 (Appendix H: Figure 9). There were no sightings of the three known females, HZMB 026, HZMB 098 and HZMB 116, who were identified with calves previously during impact monitoring.

3.4.10 Activities Associated with Fishing Boats

3.4.10.1 Four distinctive behavioural categories were defined; “boat association”, “feeding”, “travelling” and “surface active”. Three other categories were also defined; “multiple” (more than one behaviour was observed at one time), “other” and “unknown” (Appendix H: Figure 10). From spring (March – May 2014) onwards throughout the year, the frequency of feeding decreased and travelling and multiple activities increased. Multiple activities included both travelling and feeding behavior. When compared to the previous three years of impact monitoring, feeding is an important activity although its frequency appears to have decreased and travelling times have increased in 2015-16 (Appendix H: Figure 11). Again, it is noted that as sightings numbers become less, patterns can be difficult to interpret with confidence.

3.4.10.2 In 2012-13, the area of Lung Kwu Chau in NWL was highlighted as an important feeding area as it was again in 2013-14, 2014-15 and 2015-16. The area to the south of NWL is also important for feeding/surface active behaviours. As the impact monitoring progresses, a decreasing trend in the overall number of dolphin sightings in NEL and mid NWL has become apparent (Appendix H: Figure 12).

3.4.11 Photo-Identification Catalogue

3.4.11.1 A total of 119 dolphins comprise the photo identification catalogue established specifically for the HZMB Contract (Appendix H: Table 3). Not all dolphins photographed are identifiable as only individuals with unambiguous marks, cuts, wounds, injuries and/or pigmentation or with uniquely shaped fins can be included in the photo-identification catalogue. There are 15 dolphins which have been sighted on six days or more during impact monitoring, nine (9) of which are known from the AFCD catalogue (HZMB 001 [WL46]; HZMB 002 [WL111]; HZMB 011 [EL01]; HZMB 041 [NL24]; HZMB 044 [NL98]; HZMB 51 [NL213]; HZMB 054 [CH34]; HZMB 083 [NL136]; HZMB 098 [NL104]). The highest number of re-sightings recorded during impact monitoring surveys is 12 (HZMB 002 and HZMB 054), excluding multiple sightings made on the same day.

3.4.12 Dolphin Abundance

3.4.12.1 No sightings were recorded in NEL. For NWL, the overall abundance estimate is 15 [95% CI 4.3, 32.0])

3.4.13 **Environmental Acceptability of the Contract**

3.4.13.1 It was recognised in the EIA that the HZMB is adjacent to several areas of importance to the dolphin population of Hong Kong. As such, it was stipulated in the EM&A Manuel for the HKBCF that a suitable analytical technique be proposed and implemented so that significant changes could be detected. A multi-parameter spatial (sometimes known as predictive) model was proposed and reviewed by management authorities and analyses developed as and when data has been made available. The purpose of the model was to make predictions of future habitat use, derived from baseline information, and compare these predictions to actual observations. Environmental covariates, such as salinity, temperature, depth, etc., which may also be drivers of dolphin habitat use, were also tested within spatial models so as to either eliminate or incorporate any influence these may have. The model thus incorporated environmental variables salinity, temperature, turbidity, depth, tidal state, time of day, as well as information associated with the sighting, e.g., group size, behavior, boat association. Following a meeting in October 2015, ENPO suggested that the information regarding density surface modelling presented in Quarterly EM&A Reports and Annual EM&A Review Reports be provided as a separate report with details for review before incorporating it into the EM&A reports. This ET agreed all such data and results be removed and provided separately.

3.4.14 **Summary**

3.4.14.1. The variable nature of habitat use, group size, behavior, mother and calf occurrence and encounter rates by small delphinids and the ability to detect significant change in small populations is a challenge faced by many research studies. Historical data from AFCD also shows such variability (in AFCD annual monitoring reports). A view of individual distribution and behavioural activities for the reporting year do show that areas of importance, such as Lung Kwu Chau, are still being frequented, behavioural activities appear similar to that known from pre construction information, although travelling frequency appears to be on the increase, and that at least two calves identified in 2012-13 have survived to 2015-16. In 2013-14, an emerging trend for decreased use of NEL was noted and no sightings were seen in NEL in 2015-16. In addition, a decrease in sightings in the mid-section of NWL is also noted.

3.4.15 **Verification of Impact Statements Stated in EIA and Supporting Documentation**

3.4.15.1 The statements made in the EIA and supporting documents are descriptive and do not provide a quantitative framework against which to compare data gathered during impact monitoring for the purposes of verifying impact on CWD. Further, some statements made pertain only to the operational phase of HZMB (that is, when all in water construction works are completed) and not the explicit impacts of the many different construction activities which are required to construct HZMB. In the interests of thoroughness, any impact statements made in key documents relevant to HKBCF are extracted here and commented on with regards to the data gathered from this the reporting year of construction activities at HKBCF.

3.4.15.2 The EIA report for HZMB[5] makes several statements with regards to impact on cetaceans during the construction phase in sections pertaining to water quality and bioaccumulation:

3.4.15.3 Construction Phase: In section 10.6.4.25 of the EIA report, it is stated that, "Project has low potential to cause increased sewage discharge, therefore this potential impact is insignificant. The potential water quality impacts due to site runoff, sewage from workforce and wastewater from various construction activities, and accidental spillage would be controlled through the implementation of suitable mitigation measures, including temporary drainage system, chemical toilets, etc"

3.4.15.4 This Contract has largely maintained water quality objectives as described in the EM&A Manual except where noted in Section 7.1.5 (see here for full details). The exceedances noted were short in duration and localised to the Project site. These incidents were short in duration and when the Contractor was notified, actions were promptly taken and no further exceedances were noted.

3.4.15.5 In Section 10.6.4.37 of the EIA report, it is stated that, "Thus insignificant bioaccumulation impacts from the construction of HKBCF and HKLR are predicted for CWD (except perhaps with the exception of silver – as per 10.6.4.32)"

3.4.15.6 It is noted that for both of the above impact predictions to be investigated more thoroughly, long term trends in pathogens and toxin loads in CWD should be analysed. This has recently been completed for the Pearl River Delta (PRD) population of CWD and it is noted that both bioaccumulation and biomagnification are significantly higher than populations elsewhere (Gui *et al* 2014[6]). There has been no updated toxin analyses of Chinese white dolphin in the reporting year.

3.4.15.7 In Section 10.7.2.8 of the EIA report, it is stated that, "164 ha of sea area (138 ha reclamation and 26 ha works area) will be lost during construction due to HKBCF reclamation near the northeast Airport Island. Although the sea area is only utilised by limited number of individual CWD, it is of moderate ecological value due to the close proximity of the dolphin hotspot at the Brothers Islands. Moderate impact is anticipated and mitigation measures are required. As the habitat loss due to construction would largely be carried forward to the operational phase and become permanent habitat loss, mitigation measures for operational phase (see Section 10.7.4) will mitigate this impact as well."

3.4.15.8 At HKBCF, moderate impact is anticipated but the degree or type of impact is not quantified in any numerical, spatial or temporal scale. In the second year of construction activities at HKBCF there was an emerging pattern of decreased habitat use as indicated by encounter rate and number and type of "high" density cells in NEL. As anticipated in the second year (2013-14) report, this became more apparent in the third year (2014-2015) and NEL recorded no sightings in year four (2015-16) although a single sighting adjacent to HKBCF was made by MMO and site staff in November 2015. AFCD data indicate that higher than usual dolphin mortality has continued from 2014-15 to 2015-16. Again it is suggested that appropriate review of these data should be conducted to investigate any possible relationship with both anthropogenic activities and natural processes in the dolphins habitat. The impact of "permanent habitat loss" as a result of the HKBCF reclamation (Section 10.7.4. of the EIA), is stated to be fully mitigated by the establishment of a Marine Protected Area after the construction phase of the Project is completed. This predication cannot be assessed until the HZMB operational phase starts and the Marine Park Area is established.

[5] Ove Arup & Partners Hong Kong Ltd 2009 HZMB – HKBCF & HKLR EIA Report. 24037-REP-125-01 Pages 83-5, 97, 115
[6] Gui, D., Yu, R., He, X., Tu, Q., Chen, L. and Wu, Y. Bioaccumulation and biomagnification of persistent organic pollutants in Indo-Pacific humpback dolphins (*Sousa chinensis*) from the Pearl River Estuary, China. *Chemosphere* 114:106-113

3.4.15.9 The Ecological Baseline Survey[7] defines an Impact Index which is used to predict impact for each area through which the HZMB structure passes. HKBCF is located in the area defined as the "Northeast Lantau Section (NELS) – from the eastern edge of the airport platform to its connection to the North Lantau Highway".

3.4.15.10 It is noted that this report states (Section 5.7.10) that "it is imperative that cumulative impacts along the whole alignment [of HZMB] are thoroughly assessed".

3.4.15.11 A reference to cumulative impacts is made in Section 10.7.6 of the EIA. Section 10.7.6.3 is relevant to HKBCF. This refers only to the cumulative impact of the permanent loss of CWD habitat and no other impacts of either the construction or operational phase of the HZMB Contract. Nonetheless, the conclusion of this section states that the setting up of a marine park "effectively mitigates" CWD habitat loss. As such, this prediction cannot be verified until such a time as a marine park is established.

3.4.15.12 A cumulative assessment has been published using data gathered prior to the initiation of HKBCF construction activities (Marcotte *et al*, 2015[8]). This assessment notes that the increase in high speed ferry traffic has been concomitant to a significant decrease in dolphins sighted in NEL and adjacent NWL waters. Several other threats were considered in this study, however, high speed ferries were the most significant impact. Therefore, this study showed a significant decline in dolphins in NEL and adjacent areas was ongoing for a decade prior to commencement of HKBCF activities. The high speed ferry traffic has continued to increase in the area as HKBCF and other Projects have commenced[9].

3.4.16 Practicality and Effectiveness of the EM&A Programme

3.4.16.1 Monitoring and auditing of marine mammals was recommended for the construction phase of HKBCF to evaluate impact on marine mammals.

3.4.16.2 Combined line transect and photo-identification methodologies have been used as part of the AFCD long term monitoring programme for over 15 years. As such, a long term data set can be used to establish trends in population distribution and abundance over the long term.

3.4.16.3 The AFCD annual monitoring reports for the period 2011-2012, 2012-13, 2013-14 and 2014-15 have all stated that a significant decline had been detected in population abundance in the NEL area over the last decade. Only long term inter annual abundance estimates can be used to detect such changes. This decline was noted prior to construction had begun at HKBCF and has now been attributed to high speed ferries by an independent study (see Section 3.4.6.4.2).

3.4.17 Conclusion

3.4.17.1 Between March 2015 and February 2016, dolphins have been almost entirely absent from NEL and parts of NWL are no longer frequently used.

3.4.17.2 Marine mammal monitoring was conducted between March 2015 and February 2016 in accordance with EM&A Manuel methodologies. These methodologies have been invaluable in the past in determining both broad scale and long term patterns of distribution, abundance, association, habitat use and behavioral activities. There is historically much variation in these parameters and most observations to date have concurred with observations documented previously with the now emerging trend of decreased habitat use within NEL. As AFCD Monitoring has reported a significant decline in this area prior to HKBCF construction activities, it is difficult to distinguish how much HKBCF activities may have influenced this existing decline.

[7] Agreement No. MW 01/2003. Hong Kong- Zhuhai- Macao Bridge: Hong Kong Section and the North Lantau Highway Connection: Ecological Baseline Survey. Final 9 Month Ecological Baseline Survey Report the (p 42 – 43)
[8] Marcotte, D., Hung, S. K., & Caquard, S. 2015. Mapping cumulative impacts on Hong Kong's pink dolphin population. *Ocean & Coastal Management*, *109*, 51-63
[9] http://www.mardep.gov.hk/en/publication/pdf/portstat_1_y_d2.pdf

3.4.17.3 Four (4) Limit level exceedances were recorded in the reporting period for impact dolphin monitoring. The investigation results showed that although no unacceptable changes in environmental parameters of this Contract have been measured. Event and Action Plan for Impact Dolphin Monitoring was triggered. After investigation, there was no evidence that indicated that the reduced number of dolphins in NWL and NEL was related solely to Contract works. It was also concluded the contribution of impacts due to the HZMB works as a whole (or individual contracts) cannot be quantified nor separate from the other stress factors. Please also refer to the attachment for full investigation result. For investigation results please refer to Appendix L of the corresponding quarterly reports.

4. ENVIRONMENTAL SITE INSPECTION AND AUDIT

4.1.1 Site Inspection

4.1.1.1 Site Inspections were carried out on a weekly basis to monitor the implementation of proper environmental pollution control and mitigation measures for the Contract. In the reporting period, 52 site inspections were carried out. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audits.

4.1.1.2 Particular observations during the site inspections are described below:

Air Quality

4.1.1.3 Dust was observed when vehicle passes through access roads at portion C2c and E2 and when vehicle passed through road at Portion C1a and Portion D; fugitive dust was observed when vehicle was drove pass portion C2c and road at Portion B, E2 and during rock filling; fugitive dust was observed at northeastern part of the site and at northeastern part of the site. the Contractor was reminded to provide sufficient dust control measures to prevent generation of fugitive dust. The Contractor provided watering or other preventative measures to prevent generation of fugitive dust. (Closed)

4.1.1.4 Fugitive dust was observed generated when spoil was excavated at east side of the reclamation works, unloading of rocks and at Portion E1. The Contractor was reminded to sprayed dusty materials with water or a dust suppression chemical immediately prior to loading or unloading or transfer operation and the Contractor was advised to provide dust control measures when material during excavated of the spoil. The Contractor applied water on exposed soil during excavation of spoil. (Closed)

4.1.1.5 Fugitive dust was observed at Portion E1. The Contractor was reminded to provide effective dust control measures such as sufficient watering on road. Photo record shows that watering was provided on site to prevent generation of fugitive dust. The Contractor was reminded to provide sufficient measures to prevent generation of fugitive dust. (Reminder)

4.1.1.6 Exposed soil was observed at Portion D, the Contractor was reminded to provide sufficient measures to prevent site runoff of turbid water to the sea or to area which is outside the site boundary. (Reminder)

4.1.1.7 Dark smoke emission from plant/equipment was observed at Portion D and C1a; from pelican barge was observed at Portion C2b and emitted from excavator was observed at Portion D, the Contractor was reminded to ensure dark smoke emission from plant/equipment should be avoided. The Contractor prevented dark smoke emission of plant/equipment. (Closed)

4.1.1.8 Dark smoke was observed from an excavator at Portion C2c. The Contractor was reminded to maintain to equipment in good condition. Photo record shows that dark smoke was no longer observed from the excavator and barge near Portion C2c. The Contractor was reminded to check the dark smoke of machineries and ensure proper implementation of air quality mitigation measures. (Reminder)

4.1.1.9 Dark smoke emission was observed from plant/equipment of derrick barge and pelican barge and on at Portion E1, the Contractor was advised to provide measures to avoid emission of dark smoke. The Contractor subsequently provided measures to avoid emission of dark smoke. (Closed)

4.1.1.10 Dark smoke was observed at portion C2a when a vessel was in operation. The Contractor was reminded to prevent. (Reminder)

4.1.1.11 Watering was observed during site walk, the Contractor was reminded to continue to provide sufficient dust control measures and ensure generation of fugitive dust is prevented. (Reminder)

4.1.1.12 Rock material was observed dry; the Contractor was reminded to moisten to prevent generation of fugitive dust during operation. The Contractor provided dust control measure on barge. (Closed)

4.1.1.13 Cement was observed on surface of grout production facility; the Contractor was reminded that to ensure generation of fugitive dust is prevented and the entire grouting process and materials unloading, loading and transfer shall be performed within an enclosed system. (Reminder)

4.1.1.14 Road was observed moistened. The Contractor was reminded to continue to provide control measures to prevent generation of fugitive dust. (Reminder)

4.1.1.15 The Contractor was reminded to continue to provide sufficient dust control to prevent generation of fugitive dust. (Reminder)

4.1.1.16 Fugitive dust was observed when vehicle was drove pass the road, during grout production process and during rock filling process. The Contractor was reminded to provide sufficient dust control to prevent generation of fugitive dust. The Contractor subsequently provided dust control measures to the area. (Closed)

4.1.1.17 Two idling generators were found at Portion B without proper NRMM labels.The Contractor was reminded to label the generator properly. Subsequently, the Contractor properly labelled one of the generator and the Contractor was reminded to label the another generator properly. As informed by the Contractor, another idle generator was provided with NRMM label and removed from site. (Closed)

Noise

4.1.1.18 The panel of the air compressor at Portion C2c was observed open during operation. The Contractor was reminded to keep all flaps and/or panels closed during operation. The Contractor subsequently closed the panels. (Closed)

4.1.1.19 The Contractor was reminded to provide the facilities with acoustic decoupling measures in accordance with the proposed mitigation measures for noise stated in the EP-353/2009/H. (Reminder)

Water Quality

4.1.1.20 Defect on part of the pipe for transferring DCM material was observed on barge (天駿 3). The Contractor was reminded to ensure all pipes in a good condition and provide sandbags along the edge of the barge in order to prevent such materials from entering nearby water (Closed)

4.1.1.21 Tipping of rock material to the sea was observed at Portion D, the Contractor was reminded to keep the tipping point as low as possible. (Reminder)

4.1.1.22 Insufficient sand bags was observed on idle grout production facilities, the Contractor was reminded to provide enough sand bags before operation of the grout production facilities to prevent potential runoff. (Reminder)

4.1.1.23 Insufficient sand bund was observed at Portion C2b when DCM was conducted. The Contractor was reminded to provide sufficient bunding to prevent potential runoff. The Contractor subsequently enhanced sand bund at the works area. (Closed)

4.1.1.24 Defects were observed on the secondary enclosure of grout delivery pipes. The Contractor was reminded to provide effective measure to contain any potential leakage of wastewater/grout and prevent them from releasing to the sea. The Contractor enhanced the measures to contain any potential leakage of wastewater/grout and prevent them from releasing to the sea. (Closed)

4.1.1.25 Grout mixture was observed on land at the connection point of pipes. The Contractor was reminded to ensure no grout material is released to the sea. (Reminder)

4.1.1.26 Pipes were observed at Portion E1, the Contractor was reminded to provide preventive measures and avoid potential release of turbid water. (Reminder)

4.1.1.27 Disconnection of secondary protective pipe was observed, the Contractor was reminded provide effective measures to avoid any wastewater discharged from the grouting production process or domestic sewage to the sea. The Contractor subsequently provided maintenance to the disconnected pipes. (Closed)

4.1.1.28 Delivery pipe of floating grout production facilities was observed not fully enclosed. The Contractor was reminded to ensure full enclosure and prevent any potential runoff. The Contractor subsequently provided full enclosure to delivery pipes of the grout production facilities. (Closed)

4.1.1.29 Soil was observed accumulated one side of the vessel, the Contractor was reminded to clear them regularly prevent runoff and keep the site clean and tidy. (Reminder)

4.1.1.30 Soil was observed at area near water outlet. The Contractor was reminded to provide measures such as sand bags to prevent silty water at water outlet. (Reminder)

4.1.1.31 Silt plume was observed at the northern part of the Portion C2b inside area enclosed by perimeter silt curtain. The Contractor was reminded to properly implement water quality mitigation measures. The Contractor provided measures such as rock bund the edge of Portion C2b. The contractor was reminded to ensure silt plume is prevented (Reminder)

4.1.1.32 Oil was observed in water adjacent to Portion C2c. The Contractor was reminded to clear the oil and take actions in accordance with the Spill Response Plan. The oil was cleared by the Contractor using oil spill kit and the used spill kit was disposed of by the Contractor as chemical waste. (Closed)

4.1.1.33 Turbid water was observed to flow from land area to seawall. The Contractor was advised to provide measures to prevent turbid water from going to the sea area. The Contractor provided measure to prevent the turbid water from going into the sea area from the land area. (Closed)

4.1.1.34 A deformed drip tray was observed on site. The Contractor was reminded to provide drip tray which can effectively contain potential leakage of oil. The Contractor subsequently provided drip tray without defect. (Closed)

4.1.1.35 Gaps between vehicle accesses were observed on the landing barge near Portion E1. The Contractor was reminded to provide measure to prevent potential runoff on the landing barge. (Reminder)

4.1.1.36 Material was observed stockpiled on cells at Portion E1 and near Portion C2a. The Contractor was reminded to provide preventative measures to the works process to prevent runoff. The Contractor subsequently removed the material from Portion E1. (Closed)

4.1.1.37 The Contractor was reminded to provide preventive measures, such as liner and bunding, for the stockpile of excavated materials at Portion C2a and C2b. (Reminder)

4.1.1.38 Runoff was observed onsite and silt plume was observed by at the sea area by the seawall near Portion C2a. The Contractor was advised to provide control measures to prevent runoff. The Contractor subsequently provided measures to prevent runoff. (Closed)

4.1.1.39 Turbid water was observed at Portion E1, the Contractor was reminded to prevent runoff of turbid water. The Contractor subsequently provided measures to prevent runoff of turbid water. (Closed)

4.1.1.40 Silt curtain was observed temporarily disconnected during maintenance. The Contractor was reminded the silt curtain should be reinstated after maintenance is completed. The Contractor subsequently collected the silt curtain. (Reminder)

4.1.1.41 The Contractor was reminded to continue to carry out maintenance as necessary and ensure integrity of the perimeter silt curtain at all time. (Reminder)

Chemical and Waste Management

4.1.1.42 A generator was placed on ground without provision of drip tray on barge (天駿 3), chemical containers were placed on bare ground without provision of drip tray at Portion C2C. The Contractor was reminded to provide the generator with drip tray to retain oil leakage, if any. The Contractor removed the generator on barge on barge (天駿 3). (Closed)

4.1.1.43 Generator was observed without drip tray. The Contractor was reminded to provide mitigation measures such as drip tray to all generators. Contractor removed the generator from the area. (Closed)

4.1.1.44 Generator was observed without drip tray on barge San Han Bo 210, the Contractor was reminded to provide mitigation measure such as drip tray or bunding to generator. The Contractor subsequently provided bunding to the generator. (Closed)

4.1.1.45 Oil drum was observed outside drip tray at Portion C1 and on barge Wing Hop Lee, were observed without drip tray at workshop area; oil drums were observed without drip tray on barge. The Contractor was reminded to provide mitigation measure such as drip tray to oil drum. The Contractor provided drip tray to oil drums. (Closed)

4.1.1.46 Oil drums was observed without drip tray at Portion C2b, on barge 振明 93 and on barge 港龍, the Contractor was reminded to provided drip tray to oil drums. The Contractor subsequently removed the oil drums from the concerned area. (Closed)

4.1.1.47 Oil drums without drip trays were observed barge 利航 8, on deck surface of barge Evershine18 and barge 振明 and material supplying vessel and on deck surface of barge DL4; generator was observed without drip tray. The Contractor was reminded to provide mitigation measures such as drip tray to oil drums. The Contractor removed the oil drums on deck surface of barge Evershine18 and barge 振明. The contractor removed the generator or provided drip tray to the oil drum on ground. The material supplying vessel where the oil drums were observed left the site. (Closed)

4.1.1.48 Oil drums without drip trays were observed on deck surface of barge DL4. The Contractor was reminded to provide mitigation measures such as drip tray to oil drums. The Contractor removed the oil drum. (Closed)

4.1.1.49 Oil drums without drip trays were observed at portion C2a. The Contractor was reminded to provide mitigation measures such as drip tray to oil drums. The oil drums were removed by the Contractor. (Closed)

4.1.1.50 Idle air compressors were observed without drip tray, the Contractor was reminded to provide trip tray to air compressor before use of air compressor. (Reminder)

4.1.1.51 A moveable lighting was observed without drip tray, the Contractor was reminded to provide preventive measures such as trip tray to the machine. The Contractor subsequently removed the machine from the area. (Closed)

4.1.1.52 Oil water mixture was observed accumulated inside bunding. The Contractor was reminded to regularly clear the oil water mixture accumulated inside drip tray. Subsequently, the Contractor removed the oil water mixture accumulated inside drip tray. (Closed)

4.1.1.53 It was observed that sand was loaded inside drip trays. The Contractor was reminded to clear the sand inside drip tray. The Contractor subsequently cleared the sand inside drip tray. (Closed)

4.1.1.54 It was observed that water and oil mixture accumulated inside drip tray at Portion E2. The Contractor was reminded to clear the sand inside drip tray. The Contractor subsequently cleared the water and oil mixture accumulated inside drip tray. (Closed)

4.1.1.55 Bags of inert waste were observed on site, the Contractor was reminded to collect and dispose them of properly and regularly. (Reminder)

4.1.1.56 General refuses were observed at Portion D and Portion E. The Contractor was reminded to regular collect and dispose of the general refuses on site to keep the site clean and tidy. The Contractor subsequently collected and removed the general refuses at Portion D. (Closed)

4.1.1.57 Oil drum were observed without drip tray on barge GD852, the Contractor was reminded to provide drip tray to oil drums. The oil drums were subsequently removed by the Contractor. (Closed)

4.1.1.58 A generator was observed without drip tray, the Contractor was reminded to provide drip tray to generator. The Contractor subsequently provided drip tray to generator. (Closed)

4.1.1.59 Chemical container was observed placing on bare ground at Portion C2b.The Contractor should provide drip trays as proper chemical container storage measure. Subsequently, the Contractor provided drip tray to oil drums. (Closed)

4.1.1.60 The Contractor was reminded to remove the water mixture which accumulated inside the drip trays at Portion C2a and dispose of as chemical waste properly. The Contractor subsequently removed the water mixture inside drip tray. (Closed)

4.1.1.61 Stagnant water was observed accumulated inside a drip tray on Barge Luen Hing 368; Oil and water mixture was observed on barge 振明 18, s informed by the Contractor, the barge 振明 18 had left construction site of HKBCF reclamation works. The Contractor was reminded to clear the water/oil water mixture regularly to prevent potential runoff. (Reminder)

4.1.1.62 It was observed that liquid was accumulated inside drip tray, the Contractor was reminded to regularly clear the water accumulated inside drip tray to prevent potential runoff. The Contractor subsequently rectified the situation and cleared the water accumulated inside drip tray. (Closed)

4.1.1.63 It was observed that sand was loaded inside drip tray. The Contractor was reminded to clear the sand inside drip tray. (Pending for Contractor's rectification)

4.1.1.64 A deformed drip tray was observed on site. The Contractor was reminded to provide drip tray which can effectively contain potential leakage of oil. (Pending for Contractor's rectification)

4.1.1.65 Defective drip tray was observed on barge, the Contractor was advised to provide drip tray without defects on barges. The Contractor rectified the defect of the drip tray. (Closed)

4.1.1.66 Water was observed inside drip tray at workshop area, the Contractor was reminded to clear the water accumulated inside drip tray to prevent runoff. The Contractor subsequently cleared the water accumulated in the drip tray. (Closed)

4.1.1.67 General refuse and bags of general refuse were observed on land area of Portion D and C1a; was observed at entrance area of workshop at portion C1a and C2c.. The Contractor was reminded to regularly clear the general refuse and provide rubbish bin with cover/lid. The Contractor cleared the general refuse on land area of Portion D and C1a. (Closed)

4.1.1.68 Oil stain was observed on ground at workshop area; the Contractor was reminded to clean the oil stain and disposed them of as chemical waste, subsequently, the Contractor cleared the oil stain and disposed them of as chemical waste. (Closed)

4.1.1.69 Floating debris on water surface at Portion D was observed. The Contractor was reminded to remove the debris on sea regularly. The Contractor removed the debris on sea. (Closed)

4.1.1.70 Temporary waste storage or rubbish bin was not provided on land area of Portion B beside Portion E2. To keep the site clean and tidy, the Contractor was reminded to provide rubbish bin with cover/lid to works area. (Reminder)

4.1.1.71 Waste water generated from the grout mixing process was stored within soil bund; the Contractor was advised to provide sufficient enclosure and ensure the wastewater from the work process is not released to the sea. The Contractor provided sufficient enclosure to the waste water observed. (Closed)

4.1.1.72 General refuse was observed stored on site without proper covers and at portion at portion C2c and on site. The Contractor was reminded to provide rubbish bin with over to general refuse. General refuse was cleared by the Contractor. (Closed)

4.1.1.73 General refuse was observed on site and at area near the pier of southern part and south eastern part of the site; the Contractor was reminded to provide sufficient rubbish bin on site and regular properly collect and dispose of general refuse. General refuse was removed by the Contractor. (Closed)

4.1.1.74 It was observed that the pipes used for transferring grout between barge DL4 and 天駿 3 were not fully enclosed, the Contractor was advised to provide measures to ensure potential leakage of grout from the grouting production process to the sea can be effective prevented. The Contractor provided measures to prevent potential leakage of grout from the grouting production process to the sea. (Closed)

4.1.1.75 Solidified grout was observed on deck of barge DL4. The Contractor was reminded to keep the deck surface clean and tidy. The solidified grouts were cleared by the Contractor. (Closed)

4.1.1.76 Hole was observed within bunding placed on Barge SHB 209, the Contractor was advised to provide effective mitigation measures by sealing the hole to prevent leakage and potential runoff. The Contractor rectified the deficiency by sealing the hole within the bunding on barge SHB 209. (Closed)

4.1.1.77 It was observed that waste water was generated from the jet grout process; the Contractor was advised to provide sufficient enclosure and ensure the wastewater from the work process is not released to the sea. Contractor enhanced the soil bund and ensures the wastewater from the work process is not released to the sea. (Closed)

4.1.1.78 Solidified grout was observed stored on deck of barge 天駿 3. The Contractor was reminded to sort and dispose them of properly (Reminder).

4.1.1.79 General refuse was observed on site, on ground at Portion D and on ground at portion C2a, the Contractor was reminded to clear the general refuse and keep the site clean and tidy. Subsequently, the Contractor collected and cleared the general refuse and kept the site clean and tidy. (Closed)

4.1.1.80 Bags of waste was observed, the Contractor was reminded to regularly clear bags of waste to keep the site clean and tidy.(Reminder)

4.1.1.81 Chemical container was observed without bunding. The Contractor was reminded to store chemical in bunded area. The Contractor subsequently removed the chemical container from the area. (Closed)

4.1.1.82 Wood materials were observed scattered at Portion C2a. The Contractor was reminded to regualrly clear the materials and keep the site tidy. The Contractor subsequently assigned area for temporary storage of wood materials. (Closed)

Landscape and Visual Impact

4.1.1.83 No adverse observation was identified in the reporting period.

Others

4.1.1.84 The Contractor has rectified most of the observations as identified during environmental site inspection in the reporting period. Rectifications of remaining identified items are undergoing by the

Contractor. Follow-up inspections on the status on provision of mitigation measures will be conducted to ensure all identified items are mitigated properly.

5. ADVICE ON THE SOLID AND LIQUID WASTE MANAGEMENT STATUS

5.1 Summary of Solid and Liquid Waste Management

5.1.1 The Contractor registered as a chemical waste producer for this Contract. Sufficient numbers of receptacles were available for general refuse collection and sorting.

5.1.2 As advised by the Contractor, 2167739.6 m^3 of imported fill were imported for the Contract use in the reporting period. 19kg of metals, 2,573kg of paper/cardboard packaging, 11,000.2kg of plastics, 800kg of chemical waste and 682.5m^3 of others, e.g. general refuse were generated and disposed of in the reporting period. Summary of waste flow table is detailed in Appendix I.

5.1.3 The Contractor is advised to properly maintain on site C&D materials and wastes 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 is reminded to properly maintain the site tidiness and dispose of the wastes accumulated on site regularly and properly.

5.1.4 The Contractor is reminded that chemical waste containers should be properly treated and stored 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.

5.1.5 The treated marine sediment and/or treated excavated filling material specified by Contract no. HY/2013/01 has been received as public fill for Contract no. HY/2010/02's reclamation filling works since January 2015. As informed by the Contractor in the reporting year, such site arrangement has been discontinued since 24 February 2016.

6. IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

6.1 Implementation Status of Environmental Mitigation Measures

6.1.1 A summary of the Implementation Schedule of Environmental Mitigation Measures (EMIS) is presented in Appendix C. Moreover, regular review and checking on the construction methodologies, working processes and plants were carried out to ensure the environmental impacts were kept minimal and recommended environmental mitigation measures were implemented effectively.

6.1.2 Training of marine travel route for marine vessels operator was given to relevant staff and relevant records were kept properly.

6.1.3 Regarding the implementation of dolphin monitoring and protection measures (i.e. implementation of Dolphin Watching Plan, Dolphin Exclusion Zone and Silt Curtain integrity Check), regular checks were conducted by experienced MMOs within the works area to ensure that no dolphins were trapped by the silt curtain area. There were no dolphins spotted within the silt curtain during this reporting year. The relevant procedures were followed and all measures were well implemented. The silt curtains were also inspected in accordance to the submitted plan. As informed by the Contractor, a precast box culvert segment was delivered to Portion D on 10 Aug 2015, 22 Aug 2015 and 25 Aug 2015, the northwestern part of the perimeter silt curtain was temporarily opened for the delivery. Dolphin Exclusion Zone was implemented accordingly.

6.1.4 Acoustic decoupling measures on noisy plants on construction vessels were checked regularly and these measures were implemented.

6.1.5 The Contractor was reminded to carry out necessary actions to rectify the above deficiencies and the Contractor was reminded not to operate those PME during restricted hours without compliance with the CNP conditions.

6.1.6 The Contractor was reminded to strictly comply with the condition of the CNP.

6.1.7 The Contractor was reminded that all water quality mitigation measures with respect to the recommendations in the EIA Report and EM&A Manual in particular on EIA Ref. Section 9.11.1.1 should be fully and properly implemented.

6.1.8 As informed by the Contractor, an area of Portion B has been handed over to other Contract and the perimeter silt curtain near this area of Portion B has been rearranged on 31 July 2015 for berthing another Contractor's vessels (which do not belong to this Contract). IEC/ENPO was informed on 5 Aug 2015 immediately after ET's review. IEC/ENPO provided further comments on 1 September 2015, ET responded 2 September 2015 with notification letter ref.:60249820/rmky15090201.IEC/ENPO expressed no further comment via letter ref.: HYDHZMBEEM00_0_03351L.15 on 8 September 2015 for the removal of section of perimeter silt curtain near Portion B of HKBCF. EPD replied on 24 September 2015 via memo (39) in Ax(1) to EP2/G/A/146 pt.8 and reminded HyD that if grouting trial is undertaken, to adhere to the VEP requirement and undertake the necessary mitigation measures after the phase removal of the perimeter silt curtain.

7. SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT

7.1 Summary of Exceedances of the Environmental Quality Performance Limit

7.1.1 One (1) Limit Level Exceedance of 24hr-TSP was recorded at AMS2 on 10 August 2015. After investigation, there is no adequate information to conclude the recorded exceedances are related to this Contract. No 1hr-TSP was recorded in the reporting period.

7.1.2 For construction noise, no exceedance was recorded at all monitoring stations in the reporting period.

7.1.3 Ten (10) Action Level exceedances were recorded at measured suspended solids (SS) values (in mg/L) and two (2) Limit Level exceedances were recorded at measured turbidity (in NTU). After investigation, all impact water quality exceedances were considered not related to this Contract.

7.1.4 Four (4) Limit level exceedances were recorded in the reporting period for impact dolphin monitoring. The investigation results showed that although no unacceptable changes in environmental parameters of this Contract have been measured. Event and Action Plan for Impact Dolphin Monitoring was triggered. After investigation, there was no evidence that indicated that the reduced number of dolphins in NWL and NEL was related solely to Contract works. It was also concluded the contribution of impacts due to the HZMB works as a whole (or individual contracts) cannot be quantified nor separate from the other stress factors. Please also refer to the attachment for full investigation result. For investigation results please refer to Appendix L of the corresponding quarterly reports.

7.1.5 Cumulative statistics on exceedances is provided in Appendix J.

8. SUMMARY OF COMPLAINTS, NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS

8.1 Summary of Environmental Complaints, Notification of Summons and Successful Prosecutions

8.1.1 Total of eight (8) environmental complaints were received in the reporting period. The Environmental Complaint Handling Procedure is annexed in Figure 5.

8.1.2 As informed by the Contractor on 09 March 2015, there is an air quality complaint received on 06 March 2015. The complainant Mr. Fung requested for follow-up actions to be taken by relevant departments in response to his Complaint about sand and dust emission from 4-5 uncovered sand barges parking near the coastline of Tuen Mun, the complainant concerns about the health problems to residents as the sand is blown to their apartments. After investigation, there is no adequate information to conclude the observed impact is related to this Contract.

8.1.3 Environmental Protection Department (EPD) referred a noise complaint to this project on 10 April 2015 and ENPO forwarded the noise complaint to Environmental Team on 15 April 2015. The complaint involves a complainant, who is resident of Caribbean Coast, Tung Chung and he was disturbed by noise from construction activities of the HZMB Project during weekends and holidays. After investigation, there is no adequate information to conclude the observed noise nuisance is related to this Contract.

8.1.4 A complainant contacted EPD through EPD's hotline on 21 May 2015 and complained that noise was generated from construction works when construction of artificial island at Lantau Island area was carried out overnight and dark smoke was emitted by construction plant. EPD's staff has contacted complainant and came to know that the dark smoke referring to could also be construction dust emitting from the filling work at the HKBCF. This complaint was subsequently referred by EPD to HZMB project team on 22 May 2015 to follow-up. Investigation was conducted and with referred to the available information; it is unable to determine whether the night time noise and dark smoke complaint is related to this Contract.

8.1.5 As informed by the Contractor, 3 July 2015, an air quality complaint has been received on 11 June 2015 by HyD via complaint hotline 1823. The complainant complained that sand and dust pollution near Richland Garden, 138 Wu Chui Road, Tuen Mun, caused by sand delivery barges. After investigation, there is no adequate information to conclude the observed impact is related to this Contract

8.1.6 As informed by Engineer Representative of this Contract on 13 July 2015, EPD referred a noise related complaint to this Contract on 13 July 2015. The complainant complained noise came from BCF site near HK Skycity Marriott Hotel during nighttime period of the past 10 days which involves excavation with a grab dredger, transfer of excavated material using a derrick barge and a tug boat, and backfilling with a pelican barge. Based on EPD's record, the above activities are covered by CNP no. GW-RS0503-15. After investigation, the construction activities carried out during restricted hour between 1- 13 July 2015 were considered complied with CNP conditions (no. GW-RS0503-15).

8.1.7 As informed by the Contractor on 30 July, Home Affairs Department referred a complaint to project team of this Contract on 29 July 2015. The complaint involved Mr. Chan and Mr. Tang, Resident Representatives of Tong Fuk Village who complained significant sand loss of Tong Fuk Beach, particularly after typhoon when the beach was hit by strong waves; this exposed the rocks at the beach. The complainant enquired whether the sand loss is related to sand extraction for construction of airport and reclamation works of HZMB artificial island. After investigation, the complaint is considered as non-project related.

8.1.8 A complainant who lives at 1 Sky City Road East, Hong Kong SkyCity Marriott Hotel, Hong Kong International Airport, Lantau, Hong Kong complained to EPD's hotline on 23 October 2015 that loud noise were generated by HZMB artificial island construction site of China Harbour Engineering Company Ltd adjacent to the premises approximately between 10pm to 12am, during recent weekdays and Saturday. In addition, loud noise and dark smoke were noted on the construction site of HZMB artificial island during Sunday and public holiday. The complainant questioned whether the

Contractor was allowed to conduct construction work during Sunday and public holiday. The complaint was referred by EPD to the project team of Contract No. HY/2010/02 to follow up on 23 October 2015. After investigation, with referred to the available information, it is unable to determine whether the night time noise complaint and the concerned dark smoke are related to this Contract.

8.1.9 A water quality complaint was referred to the ENPO at 10:22 am on the 4 December 2015 by EPD; ENPO referred this complaint to this Contract on the same day. With referred to the information provided by ENPO, EPD has contacted the complainant, and obtained the additional information from the complainant and it is suspected that the incident happened in the afternoon on 28 November 2015. A video was provided by the complainant who shows that turbid water behind a barge, the incident is suspected to be happened in the afternoon on 28 November 2015. After investigation, it is considered not related to this Contract.

8.1.10 No notification of summons and successful prosecutions is noted during the reporting period.

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

9. REVIEW OF THE VALIDITY OF THE EIA PREDICTION

9.1 One (1) Limit Level Exceedance of 24hr-TSP was recorded at AMS2 on 10 August 2015. After investigation, there is no adequate information to conclude the recorded exceedances are related to this Contract. No 1hr-TSP was recorded in the reporting period. All the rest of air quality monitoring results in the reporting period were below the Action Levels established in the baseline air quality monitoring carried out in November 2011. The result was in line with the Environmental Impact Assessment (EIA) prediction that dust generation would be controlled and would not exceed the acceptable criteria, with proper implementation of the recommended dust mitigation measures.

9.2 No noise monitoring exceedance was recorded in the reporting period. This is generally in line with the EIA and ERR prediction that with the implementation of noise mitigation measures, the construction noise from the Contract works will meet the stipulated criterion at the residential NSRs and at a majority of the education institutions as predicted by the EIA.

9.3 Twelve (12) water quality monitoring exceedances were recorded in the reporting period and it was considered not related to the Contract works, considering all the rest of water quality monitoring results in the reporting period were below the Action Levels established in the baseline water quality monitoring carried out in November 2011. The result was in line with the Environmental Impact Assessment (EIA) prediction that water quality impact would be controlled and would not exceed the acceptable criteria, with proper implementation of the recommended water quality mitigation measures.

10. REVIEW OF ENVIRONMENTAL IMPLEMENTATION STATUS

10.1 The impact air quality, noise and water quality monitoring programme ensured that any environmental impact to the receivers would be readily detected and timely actions could be taken to rectify any non-compliance. The environmental monitoring results indicated that the construction activities in general were in compliance with the relevant environmental requirements and were environmentally acceptable. The weekly site inspection ensured that all the environmental mitigation measures recommended in the EIA were effectively implemented. Despite the minor deficiencies found during site audits, the Contractor had taken appropriate actions to rectify deficiencies within reasonable timeframe. Therefore, the effectiveness and efficiency of the mitigation measures were considered high in most of the time.

10.2 For all the parameters under monitoring as mentioned in Section 3, the measured levels were in line with the EIA predictions generally. This indicates that the mitigation measures were effectively implemented.

10.3 Four (4) oil spillages were observed on 14 May 2015 on sea area near Northeastern of Portion C2c, near Cell No. 78 on 23 June 2015, near Cell No. 28 on 23 December 2015 and 17 February 2016 at Sea surface near cell no.109. These oil spillage incidents including size, location, time of the spillage and Contractor's actions taken in response to the spill incident have been reviewed during the reporting period and closed out during the reporting period. The Contractor was reminded to continue to follow the spill response plan when oil is observed on sea.

10.4 As informed by the Contractor, an area of Portion B has been handed over to other Contract and the perimeter silt curtain near this area of Portion B has been rearranged on 31 July 2015 for berthing another Contractor's vessels (which do not belong to this Contract). IEC/ENPO was informed on 5 Aug 2015 immediately after ET's review. IEC/ENPO provided further comments on 1 September 2015, ET responded 2 September 2015 with notification letter ref.:60249820/rmky15090201. IEC/ENPO expressed no further comment via letter ref.: HYDHZMBEEM00_0_03351L.15 on 8 September 2015 for the removal of section of perimeter silt curtain near Portion B of HKBCF. EPD replied on 24 September 2015 via memo (39) in Ax(1) to EP2/G/A/146 pt.8 and reminded HyD that if grouting trial is undertaken, to adhere to the VEP requirement and undertake the necessary.

10.5 There is a report of silt plume observed near the silt curtain for HZMB HKBCF Project maintained by Contract No. HY/2010/02 during a site visit conducted by HyD on 15 April 2015. The location was near the eastern part of HKBCF reclamation works (portion B and E), near the silt curtain for HZMB HKBCF Project maintained by Contract No. HY/2010/02. After investigation, there was no adequate information to indicate that the observed silt plume was caused by active works.

10.6 IEC/ENPO notified ET via email on 22 June 2015 that silt plume was observed being dispersed from Portion E1 to the open waters outside the silt curtain for the HZMB HKBCF Contract maintained by Contract No. HY/2010/02 at about 3:00 pm on 20 June 2015. After investigation, there was no adequate information to indicate that the observed silt plume was generated by active works or due to inadequate clearance maintained between vessels of this Contract and the sea bed during navigation. However, the Contractor was reminded to regularly check the performance of the silt curtain and ensure swift provision of maintenance to the perimeter silt curtains once defects of the perimeter silt curtain were observed.

10.7 Frequency of watering per day on exposed soil was checked; with reference to the record provided by the Contract, watering was conducted at least 8 times per day on reclaimed land. The frequency of watering is the mainly refer to water truck. Sprinklers are only served to strengthen dust control measure for busy traffic at the entrance of Portion D. As informed by the Contractor, during the mal-function period of sprinkler, water truck will enhance watering at such area. The Contractor was reminded to ensure provision of watering of at least 8 times per day on all exposed soil

11. REVIEW OF EM&A PROGRAMME

11.1 The environmental monitoring methodology was considered well established as the monitoring results were found in line with the EIA predictions.

11.2 As effective follow up actions were promptly taken once exceedances were recorded, no further exceedance occurred for each case. The EM&A programme was considered successfully and adequately conducted during the course of the reporting period.

12. COMMENTS, RECOMMENDATIONS AND CONCLUSIONS

12.1 Comments on mitigation measures

12.1.1 According to the environmental site inspections performed in the reporting period, the following recommendations were provided:

12.2 Air Quality Impact

- All working plants and vessels on site should be regularly inspected and properly maintained to avoid dark smoke emission.
- All vehicles should be washed to remove any dusty materials before leaving the site.
- Haul roads should be sufficiently dampened to minimize fugitive dust generation.
- Wheel washing facilities should be properly maintained and reviewed to ensure properly functioning.
- Temporary exposed slopes and open stockpiles should be properly covered.
- Enclosure should be erected for cement debagging, batching and mixing operations.
- Water spraying should be provided to suppress fugitive dust for any dusty construction activity.

12.3 Construction Noise Impact

- Quieter powered mechanical equipment should be used as far as possible.
- Noisy operations should be oriented to a direction away from sensitive receivers as far as possible.
- Proper and effective noise control measures for operating equipment and machinery on-site should be provided, such as erection of movable noise barriers or enclosure for noisy plants. Closely check and replace the sound insulation materials regularly
- Vessels and equipment operating should be checked regularly and properly maintained.
- Noise Emission Label (NEL) shall be affixed to the air compressor and hand-held breaker operating within works area.
- Better scheduling of construction works to minimize noise nuisance.

12.4 Water Quality Impact

- Regular review and maintenance of silt curtain systems, drainage systems and desilting facilities in order to make sure they are functioning effectively.
- Construction of seawall should be completed as early as possible.
- Regular inspect and review the loading process from barges to avoid splashing of material.
- Silt, debris and leaves accumulated at public drains, wheel washing bays and perimeter u-channels and desilting facilities should be cleaned up regularly.
- Silty effluent should be treated/ desilted before discharged. Untreated effluent should be prevented from entering public drain channel.
- Proper drainage channels/bunds should be provided at the site boundaries to collect/intercept the surface run-off from works areas.
- Exposed slopes and stockpiles should be covered up properly during rainstorm.

12.5 Chemical and Waste Management

- All types of wastes, both on land and floating in the sea, should be collected and sorted properly and disposed of timely and properly. They should be properly stored in designated areas within works areas temporarily.
- All chemical containers and oil drums should be properly stored and labelled.
- All plants and vehicles on site should be properly maintained to prevent oil leakage.
- All kinds of maintenance works should be carried out within roofed, paved and confined areas.
- All drain holes of the drip trays utilized within works areas should be properly plugged to avoid any oil and chemical waste leakage.
- Oil stains on soil surface and empty chemical containers should be cleared and disposed of as chemical waste.
- Regular review should be conducted for working barges and patrol boats to ensure sufficient measures and spill control kits were provided on working barges and patrol boats to avoid any spreading of leaked oil/chemicals.

12.6 Landscape and Visual Impact

- All existing, retained/transplanted trees at the works areas should be properly fenced off and regularly inspected.

12.7 Recommendations on EM&A Programme

12.7.1. The impact monitoring programme for air quality, noise, water quality and dolphin ensured that any deterioration in environmental condition was readily detected and timely actions taken to rectify any non-compliance. Assessment and analysis of monitoring results collected demonstrated the environmental impacts of the Contract. With implementation of recommended effective environmental mitigation measures, the Contract's environmental impacts were considered as environmentally acceptable. The weekly environmental site inspections ensured that all the environmental mitigation measures recommended were effectively implemented.

12.7.2. The recommended environmental mitigation measures, as included in the EM&A programme, effectively minimize the potential environmental impacts from the Contract. Also, the EM&A programme effectively monitored the environmental impacts from the construction activities and ensure the proper implementation of mitigation measures. No particular recommendation was advised for the improvement of the programme.

12.8 Conclusions

12.8.1 The construction phase and EM&A programme of the Contract commenced on 12 March 2012.

12.8.2 One (1) Limit Level Exceedance of 24hr-TSP was recorded at AMS2 on 10 August 2015. No 1hr-TSP was recorded in the reporting period.No exceedance of 1-hour TSP exceedance level was recorded at all monitoring station during the 1-hr TSP impact monitoring period. Investigation into the possible causes of each exceedance was undertaken and reported in the respective monthly EM&A reports, the investigations results confirmed that the air quality exceedances were not related to Contract.

12.8.3 Construction noise, no exceedance was recorded at all monitoring stations in the reporting period.. Noise generating activities of the Contract did not cause any noticeable noise impact at the sensitive receivers. The impact noise levels recorded were generally similar to the predicted construction noise levels in the Project EIA.

12.8.4 10 action level exceedances were recorded at measured suspended solids (SS) values (in mg/L), two (2) Limit Level exceedance was recorded at measured turbidity (in NTU). Exceedances were considered to be due to local effects in the vicinity of the monitoring station where exceedance was recorded and after investigation, there is no adequate information to conclude the recorded exceedances are related to this Contract.

12.8.5 Four (4) Limit level exceedances were recorded in the reporting period for impact dolphin monitoring. The investigation results showed that although no unacceptable changes in environmental parameters of this Contract have been measured. Event and Action Plan for Impact Dolphin Monitoring was triggered. After investigation, there was no evidence that indicated that the reduced number of dolphins in NWL and NEL was related solely to Contract works. It was also concluded the contribution of impacts due to the HZMB works as a whole (or individual contracts) cannot be quantified nor separate from the other stress factors. Please also refer to the attachment for full investigation result. For investigation results please refer to Appendix L of the corresponding quarterly reports.

12.8.6 Environmental site inspection was carried out 52 times in the reporting period. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audits.

12.8.7 Eight (8) environmental complaints were received in the reporting period.

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

12.8.9 As discussed in the above sections, the Contract did not cause unacceptable environmental impacts or disturbance to air quality, noise, water quality in the vicinity near the reclamation works.

12.8.10 Apart from the above mentioned monitoring, most of the recommended mitigation measures, as included in the EM&A programme, were implemented properly in the reporting period.

12.8.11 The recommended environmental mitigation measures effectively minimize the potential environmental impacts from the Contract. The EM&A programme effectively monitored the environmental impacts from the construction activities and ensure the proper implementation of mitigation measures. No particular recommendation was advised for the improvement of the programme.

12.8.12 Moreover, regular review and checking on the construction methodologies, working processes and plants were carried out to ensure the environmental impacts were kept minimal and recommended environmental mitigation measures were implemented effectively.