

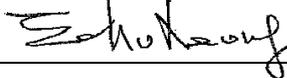
# China Harbour Engineering Company Limited

Contract No. HY/2010/02

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

Annual Review Report for  
March 2014- February 2015

[05/2016]

	Name	Signature
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<p><b>Disclaimer</b></p> <p>This report is prepared for China Harbour Engineering Company Limited and is given for its sole benefit in relation to and pursuant to Contract No. HY/2010/02 Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities-Reclamation Works and may not be disclosed to, quoted to or relied upon by any person other than China Harbour Engineering Company Limited without our prior written consent. No person (other than China Harbour Engineering Company Limited) into whose possession a copy of this report comes may rely on this report without our express written consent and China Harbour Engineering Company Limited may not rely on it for any purpose other than as described above.</p>		

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25 May 2016

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 2014 to February 2015**

Reference is made to the Environmental Team's submission of the Annual EM&A Review Report for March 2014 to February 2015 certified by the ET Leader (ET's ref.: "60249820/C/RMKY16052501" dated 25 May 2016) and provided to us via e-mail on 25 May 2016.

Please be informed that the Annual EM&A Review Report for March 2014 to February 2015 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. Matthew Fung	(By Fax: 3188 6614)
	HyD	Mr. Wai-Ping Lee	(By Fax: 3188 6614)
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## 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 Project.

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 2014 and 28 February 2015. As informed by the Contractor, major activities in the reporting period were:-

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

- Connecting arc cell installation
- Portion D Construction of Access to Portion A
- Construction of temporary pier at Portion A
- Construction of conveyors for public fill
- Temporary bridge at Portion D
- Cellular structure installation
- Capping Beams structures
- Conforming sloping seawalls\*
- Laying geo-textile
- Rock filling
- Sand filling
- Public filling
- Band drain installation
- Surcharge remove & laying
- Deep Cement Mixing
- Geotechnical Instrumentation works
- Precast Yard for seawall blocks & culverts
- Maintenance of silt curtain & silt screen at sea water intake of HKIA
- Connecting arc cell installation
- Laying geo-textile
- Optimizing rubble mound seawalls
- Stone column installation
- Backfill cellular structure
- Geotechnical Instrumentation works
- Construction of temporary seawall
- Portion D Construction of Access to Portion A
- Surcharge laying

- Construction of temporary pier at Portion A
- Precast Yard setup
- Seawall blocks for temporary construction
- Vibro-compaction on surcharge
- Construction of conveyors for public fill
- Temporary bridge at Portion D
- Sand blanket laying
- Backfill cellular structure
- Capping Beams structures
- Construction of temporary jetties for surcharge laying
- Temporary Watermain construction along access at Portion D
- Flat barge of unloading public fill for surcharge laying

\* The term of “Conforming Sloping Seawall” differs from Rubble Mount Seawall in that it is constructed on and in front of cellular structures.

#### **Land-based 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
- Silt curtain fabrication at Works Area WA4
- Installed sand bag at Works Area WA2

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	51 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**

A total of Five (5) Action level exceedances were recorded during the 24-hr TSP impact monitoring period. No Limit level exceedance was recorded during 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.

#### **Breaches of Action and Limit Levels for Noise**

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

#### **Breaches of Action and Limit Levels for Water Quality**

Forty one (41) Action Level exceedances and seven (7) Limit Level exceedances were recorded at measured suspended solids (SS) values (in mg/L), one (1) Action Level exceedance was recorded at measured turbidity (in NTU), one (1) Limit Level exceedance was recorded at measured turbidity (in NTU), six (6) Action Level exceedance was recorded at measured DO (Bottom) (mg/L) and eight (8) Action Level exceedance was recorded at measured DO (S&M) (mg/L) during the reporting period.

After investigation, all impact water quality exceedances were considered not related to this Contract except the Limit Level Exceedance of Turbidity, Limit Level Exceedance of Suspended Solids recorded at IS17 during ebb tide on 10 October 2014 and Action Level Exceedance of Suspended Solids recorded at IS17 during flood tide on 20 October 2014, which were considered related to this Contract. Recommendation has been given and rectification has been carried on by the Contractor on 28 October 2014.

#### **Triggering of Event and Action Plan for Impact Dolphin Monitoring**

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. 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 period. 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.

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.

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**

Thirteen (13) environmental complaints were received in the reporting period.

No summons was received in the reporting period and one (1) successful prosecution was received in the reporting period.

## 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 Third 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 2014 and 28 February 2015.

### 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
<b>Engineer's Representative (ER)</b>  (Ove Arup & Partners Hong Kong Limited)	Chief Resident Engineer	Roger Marechal	2528 3031	2668 3970
<b>IEC / ENPO</b>  (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
<b>Contractor</b>  (China Harbour Engineering Company Limited)	General Manager (S&E)	Daniel Leung	3157 1086	2578 0413
	Environmental Officer	Richard Ng	3693 2253	2578 0413
	24-hour Hotline	Alan C.C. Yeung	9448 0325	--
<b>ET</b>  (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 period are listed below:-

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

- Connecting arc cell installation
- Portion D Construction of Access to Portion A
- Construction of temporary pier at Portion A
- Construction of conveyors for public fill
- Temporary bridge at Portion D
- Cellular structure installation
- Capping Beams structures
- Conforming sloping seawalls\*
- Laying geo-textile
- Rock filling
- Sand filling
- Public filling

- Band drain installation
- Surcharge remove & laying
- Deep Cement Mixing
- Geotechnical Instrumentation works
- Precast Yard for seawall blocks & culverts
- Maintenance of silt curtain & silt screen at sea water intake of HKIA
- Connecting arc cell installation
- Laying geo-textile
- Optimizing rubble mound seawalls
- Stone column installation
- Backfill cellular structure
- Geotechnical Instrumentation works
- Construction of temporary seawall
- Portion D Construction of Access to Portion A
- Surcharge laying
- Construction of temporary pier at Portion A
- Precast Yard setup
- Seawall blocks for temporary construction
- Vibro-compaction on surcharge
- Construction of conveyors for public fill
- Temporary bridge at Portion D
- Sand blanket laying
- Backfill cellular structure
- Capping Beams structures
- Construction of temporary jetties for surcharge laying
- Temporary Watermain construction along access at Portion D
- Flat barge of unloading public fill for surcharge laying

\* The term of “Conforming Sloping Seawall” differs from Rubble Mount Seawall in that it is constructed on and in front of cellular structures.

#### **Land-based 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
- Silt curtain fabrication at Works Area WA4
- Installed sand bag at Works Area WA2

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 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.
- 2.1.5 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.
- 2.1.6 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.

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

2.1.8 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 and water quality monitoring results at the respective monitoring stations, 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**

2.2.3 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<sup>1</sup>).
- 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.
- 3.1.1.4. 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.
- 3.1.1.5. 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 14 – Feb 15
1-hr TSP	AMS2	195
	AMS3B	195
	AMS7/7A	195
24-hr TSP	AMS2	65
	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 14 – Feb 15
1-hr TSP	AMS2	Action	0

<sup>1</sup> The monitoring stations AMS7 was renamed to monitoring station AMS7A after relocation on 3 February 2014.

	AMS3B	Limit	0
		Action	0
	AMS7/7A	Limit	0
		Action	0
	<b>Total</b>		
24-hr TSP	AMS2	Limit	0
		Action	1
	AMS3B	Limit	0
		Action	3
	AMS7/7A	Limit	0
		Action	1
<b>Total</b>			<b>5</b>

### 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, AMS3B, AMS7/7A 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 5 Action level and no Limit Level exceedances were 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, AMS3B and AMS7/7A. 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, $\mu\text{g}/\text{m}^3$	Average Impact 24-hour TSP Levels, $\mu\text{g}/\text{m}^3$
		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 Contract 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 14 - Feb 15
Noise	NMS2	51
	NMS3B	51

**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
	<b>Total</b>		

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 except at one occasion where in relation to the notification of summons received March 2014 due to works carried out on 6 October 13 contrary to conditions of NCO, Cap.400. The Contractor pledged guilty to the charge during the court appearance on 28 April 2014. Rectification actions were conducted by the Contractor and no other summons was received during the reporting period.

### 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

3.2.3.1.2 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.

#### 3.2.4.2.1 Correlation between exceedances with possible noise generating activities

3.2.4.2.2 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),	Range, dB(A),	Limit Level, dB(A),
		Leq:30 mins	Leq:30 mins	Leq:30 mins
NMS2	Seaview Crescent Tower 1	66.8	63.7 – 69.1*	75
NMS3B	Site Boundary of Site Office Area at Works Area WA2	66.2	61.4 - 70*	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 Contract 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  $L_{eq30}$  <sub>minute</sub> 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 14 - Feb 15	
Water Quality	Mid-Ebb	156	
	Mid-Flood	156	

**Table 3.9 Summary of Water Quality Exceedances in Mar 14-Feb 15**

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	(1) 19 Mar 14; (1) 10 Sep 14	0	2	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)6	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS7	Action	0	0	0	0	0	0	0	(1) 31 Mar 14	0	1
	Limit	0	0	0	0	0	0	0	0	0	0
IS8	Action	0	0	0	0	0	0	(1) 31 Oct 14	(2) 5 Sep 14 and 3 Oct 14	1	2
	Limit	0	0	0	0	0	0	0	(1) 20 Oct 14	0	1
IS(Mf)9	Action	0	0	0	0	0	0	(1) 24 Mar 14; (1) 5 Dec 14	(2) 24 and 31 Mar 14	2	2
	Limit	0	0	0	0	0	0	0	0	0	0
IS10	Action	(1) 15 Aug 14	0	0	0	(1) 19 Mar 14; (2) 13 and 24 Oct 14; (2) 12 & 21 Jan 15	2	7			
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)11	Action	(1) 15 Aug 14	0	0	(1) 6 Oct 14	(1) 6 Oct 23 & 26 Jan 15	3	5			
	Limit	0	0	0	0	0	0	0	(1) 23 Feb 15	0	1
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

Station	Exceedance Level	DO (S&M)		DO (Bottom)		Turbidity		SS		Total	
		Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood
IS17	Action	0	0	0	0	0	0	(2) 20 Oct and 28 Nov 14 ; (1) 16 Jan 15	(1) 21 Jan 15	3	1
	Limit	0	0	0	0	(1) 10 Oct 14	0	(1) 19 Mar 14; 0; (1) 10 Oct; (1) 5 Dec 14	0	3	0
SR3	Action	0	0	0	0	0	0	(1) 19 Mar 14; (1) 10 Sep 14	0	2	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR4(N)	Action	0	0	0	0	0	0	0	(3) 13, 20 and 24 Oct 14	0	3
	Limit	0	0	0	0	0	0	0	0	0	0
SR5	Action	(1) 15 Aug 14	(1) 15 Aug14	0	(1) 15 Aug14	(1) 19 Mar 14	0	0	(2) 6 and 13 Oct 14; (2) 12 & 21 Jan 15	2	6
	Limit	0	0	0	0	0	0	0	0	0	0
SR6	Action	0	(1) 15 Aug14	0	(1) 15 Aug14	0	0	0	(1) 31 Mar 14; (1) 21 Jan 15	0	4
	Limit	0	0	0	0	0	0	0	(1) 23 Jan 15	0	1
SR7	Action	0	(1) 15 Aug14	0	0	0	0	0	(2) 23 Jan 15 & 23 Feb 15	0	3
	Limit	0	0	0	0	0	0	0	0	0	0
SR10A	Action	0	0	0	0	0	0	0	(1) 22 Oct 14	0	1
	Limit	0	0	0	0	0	0	0	(1) 23 Jan 15	0	1
SR10B (N)	Action	0	0	0	0	0	0	(1) 12 Sep 14	(2) 10 and 22 Oct 14; (1) 23 Jan 15	1	3
	Limit	0	0	0	0	0	0	0	0	0	0
<b>Total</b>	<b>Action</b>	<b>3</b>	<b>5</b>	<b>2</b>	<b>4</b>	<b>1</b>	<b>0</b>	<b>12</b>	<b>29</b>	<b>56</b>	
	<b>Limit</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>0</b>	<b>1</b>	<b>0</b>	<b>3</b>	<b>4</b>	<b>8</b>	

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

3.3.1.4 Please refer to the monthly EM&A report (March 2014 to February 2015) 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 64 exceedances were recorded during the entire construction period with 56 Action level exceedances and 8 Limit level exceedances.

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

3.3.4.1 Forty one (41) Action Level exceedances and seven (7) Limit Level exceedances were recorded at measured suspended solids (SS) values (in mg/L), one (1) Action Level exceedance was recorded at measured turbidity (in NTU), one (1) Limit Level exceedance was recorded at measured turbidity (in NTU), six (6) Action Level exceedance was recorded at measured DO (Bottom) (mg/L) and eight (8) Action Level exceedance was recorded at measured DO (S&M) (mg/L) during the reporting period. After investigation, all impact water quality exceedances were considered not related to this Contract except the Limit Level Exceedance of Turbidity, Limit Level Exceedance of Suspended Solids recorded at IS17 during ebb tide on 10 October 2014 and Action Level Exceedance of Suspended Solids recorded at IS17 during flood tide on 20 October 2014, which were considered related to this Contract. Recommendation has been given and rectification has been carried on by the Contractor on 28 October 2014.

3.3.4.2 Exceedances recorded at IS17 on 10 and 20 October 2014 are likely to be related to vessel movement at shallow water during ebb tide. The Contractor was further reminded to control the vessel traffic at this area and ensure swift provision of maintenance to the silt curtains once defect was found. As informed by the Contractor, traffic control such as vessel speed limit was implemented and operation of sand filling vessel at shallow water during ebb tide was avoided. Monitoring results show no recurrence of exceedance at IS17 on 13 Oct 2014 and 22-Oct-14 respectively. For details of investigation please refer to monthly EM&A Report October 2014.

3.3.4.3 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 14 to Feb 15), ambient conditions were considered to have effects on the water quality monitoring results. Exceedances were considered to be due to a combination of the following potential causes: 1. When exceedances of DO were recorded at monitoring stations, relatively low DO values were also recorded at corresponding upstream Control Stations during ebb tide or flood tides indicating these exceedances of DO were unlikely to be contributed by Contract works. This indicated these exceedances of DO were unlikely to be contributed by Contract works. 2. Local effects in the vicinity of the monitoring station where exceedance was recorded. 3. There are 2 occasions when exceedances were considered due to vessel movement at shallow water and defective silt curtain.

### 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 IS17, IS7, IS8 and IS10 were more fluctuated and a higher turbidity level were recorded from June 14 to October 14. The trend of turbidity levels of each monitoring station was shown in Appendix G. However, 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 August 2014 to February 2015. The trend of suspended solid levels of each monitoring station was shown in Appendix G.

**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 <sup>3</sup> /month	Depth averaged DO	Depth averaged Turbidity	Depth averaged SS	Total
Mar-14	1,111,998	0	1	9	10
Apr-14	1,291,808	0	0	0	0
May-14	1,181,417	0	0	0	0
Jun-14	752,771	0	0	0	0
Jul-14	1,252,437	0	0	0	0
Aug-14	1,427,973	14	0	0	14
Sep-14	1,370,511	0	0	4	4
Oct-14	1,750,755	0	1	17	18
Nov-14	1,788,611	0	0	1	1
Dec-14	1,608,665	0	0	2	2
Jan-15	1,774,785	0	0	13	13
Feb-15	1,120,668	0	0	2	2

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 7.9 mg/L in November 2014 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 5.7.

**Table 3.11 Comparison of depth averaged dissolved oxygen levels (Surface & Mid-depth, Bottom depth) during baseline and impact monitoring period (mgL<sup>-1</sup>)**

Sensitive Receiver in Baseline	Associated Location during Impact Monitoring	Monitoring Depth	Baseline mean		Impact mean (November 2014)		Depletion during Impact Monitoring	
			Mid-ebb	Mid-flood	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood
SR3	SR3*	Surface & mid	6.8	6.7	8.0	7.9	-1.2	-1.2
		Bottom	-	6.2	-	-	-	-
SR4 <sup>^</sup>	SR4(N)**	Surface & mid	6.1	6.3	8.4	8.4	-2.3	-2.1
		Bottom	6.0	6.2	8.3	8.3	-2.3	-2.1
SR5	SR5**	Surface & mid	6.4	6.3	8.0	7.8	-1.6	-1.5
		Bottom	6.1	6.1	8.0	7.7	-1.9	-1.6
SR6	SR6**	Surface & mid	6.6	6.5	8.1	8.2	-1.5	-1.7
		Bottom	6.2	6.1	8.1	8.2	-1.9	-2.1
SR7	SR7**	Surface & mid	6.3	6.0	7.9	7.9	-1.6	-1.9
		Bottom	6.1	5.9	7.8	7.8	-1.7	-1.9
SR10A	SR10A	Surface & mid	6.0	6.0	7.6	7.6	-1.6	-1.6
		Bottom	5.7	5.8	7.6	7.6	-1.9	-1.8
SR10B <sup>^</sup>	SR10B(N)**	Surface & mid	6.1	6.0	7.6	7.6	-1.5	-1.6
		Bottom	6.2	5.8	7.6	7.6	-1.4	-1.8

<sup>^</sup>Due to safety issue, the water quality monitoring location of SR4 has been changed to SR4(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<sup>-1</sup>) 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<sup>-1</sup>) 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<sup>-1</sup>)**

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 November 2014 were compared with the baseline levels are provided in Table 3.15.

**Table 3.15 Average suspended solids levels at sensitive receivers (mgL<sup>-1</sup>) in November 2014**

Sensitive Receiver in Baseline	Associated Location during Impact Monitoring	Impact SS Mean (in November 2014)			
		Mid-ebb	Elevation	Mid-flood	Elevation
SR3	SR3	4.7	-9.3	6.1	-10.2
SR4	SR4(N)*	6.4	-4.9	9.4	-2.8
SR5	SR5	4.9	-5.7	8.6	-3.3
SR6	SR6	5.3	-6.6	5.9	-6.0
SR7	SR7	6.3	-5.1	7.2	-3.2
SR10A	SR10A	4.2	-6.0	5.3	-4.9
SR10B	SR10B(N)*	4.4	-7.1	6.0	-5.1

\*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 November 2014, 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. A combination of the following potential causes: 1. When exceedances of DO were recorded at monitoring stations, relatively low DO values were also recorded at corresponding upstream Control Stations during ebb tide or flood tides indicating these exceedances of DO were unlikely to be contributed by Contract works. 2. Local effects in the vicinity of the monitoring station where exceedance was recorded. 3. There were two occasions when exceedances were considered due to vessel movement at shallow water and defective silt curtain.

### 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 dissolved oxygen, turbidity and suspended solids levels, a total of 63 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 to a combination of factors including 1. When exceedances of DO were recorded at monitoring stations, relatively low DO values were also recorded at corresponding upstream Control Stations during ebb tide or flood tides indicating these exceedances of DO were unlikely to be contributed by Contract works. 2. Local effects in the vicinity of the monitoring station where exceedance was recorded. 3. There were two occasions when exceedances were considered due to vessel movement at shallow water and defective silt curtain.
- 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 Manual, 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.
- 3.4.1.3 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 exceedances 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 2014- May 2014	NEL	0.0	0.0	Limit Level
	NWL	0.7	3.0	
June 2014- August 2014	NEL	0.5	2.7	Limit Level
	NWL	3.6	9.8	
September 2014- November 2014	NEL	0.0	0.0	Limit Level
	NWL	2.1	7.1	
December 2014- February 2015	NEL	0.0	0.0	Limit Level
	NWL	2.1	4.3	

\* 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 have been conducted monthly from March 2014 to February 2015, i.e., during the third year of the construction phase. A total of 48 survey days were completed between March 2014-February 2015 (Appendix H: Table 1). A total of 2641.7km were completed whereas 2637.1km were conducted under favourable conditions (defined as Beaufort Sea State 3 or better and with visibility of >1km) between March 2014-February 2015 (Appendix H: Table 2). Between March 2014-

February 2015, a total of 72 dolphin sightings were recorded, 46 as on effort and 26 as opportunistic<sup>2</sup> (Appendix H: Figure 1). In the first year of impact monitoring (2012-13), 49 survey days were completed, with a total of 2627.5km completed with 2601.4km were conducted under favourable conditions. In the second year of impact monitoring (2013-14), 50 survey days were completed, with a total of 2667.1 km completed with 2595.4km conducted under favourable conditions. In all three years, >97% of the total track length covered was under favourable conditions. 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. 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 area was most frequently used between June – August 2014 and the only sighting in NEL was recorded during this time. The lowest use was observed between December 2014 – February 2015 (Appendix H: Figure 2). (see this Projects reports, Annual Report 2012-13, Appendix H: Figure 6 and Annual Report 2013-14, Appendix H: Figure 2). In NEL, NWL and adjacent waters, dolphins are consistently distributed in areas of rocky, reefy shoreline or where there is a marked depth contour. These areas are the Sha Chau and Lung Kwu Chau Marine Protected Area (SCLKCMPA), adjacent to the maritime border of Hong Kong SAR and the Peoples Republic of China (PRC) and the Tai O area. Since long term monitoring was 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 2014 to February 2015 were calculated<sup>3</sup>. For NEL, only one sighting was noted, in June 2014. For NWL, dolphin encounter rate was highest between March – August, with a peak during the summer months (Appendix H: Figure 3). There is an increase in encounter rate from spring to summer with the lowest rates observed during the autumn and winter months. Within NWL, quarterly encounter rates range from 3 to 6 dolphin groups (Year 1) and 5 to 9 dolphin groups (Year 2) and 2 to 4 dolphin groups (Year 3) per 100km on effort (figures rounded).

#### 3.4.7. Group Size

3.4.7.1. The majority of all sightings recorded were of less than 5 individuals (79%). Larger groups concentrated throughout most of the year in southern NWL with a few larger groups sighted in the northern section of Sha Chau Lung Kwu Chau Marine Park between December 2014-February 2015. Mother and calves groups did not show a preference for any particular group size. Eight of the large groups sighted were noted as exhibiting multiple behavior which incorporated feeding behavior and two groups were recorded as feeding thus, the most prevalent behavior noted in larger group sizes incorporated feeding activities. The majority (66.6%) of large groups were recorded between summer and autumn (June – November 2014) (Appendix H: Figure 4).

#### 3.4.8. Habitat Use

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

<sup>2</sup> “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.

<sup>3</sup> 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.

reports (e.g., AFCD 2012<sup>4</sup>). 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<sup>2</sup> are included). For the period March 2014-February 2015, DPSE 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 (> 60 DPSE); 0% (NEL) and 13% (NWL) as moderate use (20.1-60 DPSE); and 100% (NEL) and 85% (NWL) as low use (< 20 DPSE). (Appendix H: Figure 5).

3.4.8.2. For the period March 2014-February 2015, SPSE was calculated in six categories, ranging from low use to high use. NEL and NWL have 0% and 3% of each respective area classified as high use (> 15 SPSE); 2% of NEL and 11% NWL and; as moderate use (5.1-15 SPSE); and 98% (NEL) and 86% (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 and March 2014-February 2015 (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 was only one sighting in NEL during March 2014-February 2015.

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.

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

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

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

### 3.4.9. Mother and Calf Pairs

<sup>4</sup> 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.

3.4.9.1. Sightings of mothers and calves and the offspring of females identified from the first year of impact monitoring (2012) were made throughout the year in the north of NWL and near Tai O (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. Calves and/or juveniles were sighted on 11 occasions and comprise a minimum of five individuals using the identity of the mothers to assign identity to the calves. Five known females, HZMB 023, HZMB 026, HZMB 044, HZMB 098 and HZMB 116 were all photographed with young dolphins. Only one very small calf was noted that was born in the year March 2014-February 2015, sighted in July 2014. The mother was not identifiable. HZMB 023 and her offspring, known as HZMB 022, have been sighted throughout impact monitoring. HZMB 023 must now be over three years old. The offspring of HZMB 026 was first photographed in January 2013 (outside this reporting year) and again in October 2014. HZMB 044 is a well-known individual and is recorded in AFCD records as NL98. She was first sighted with a calf in September 2012 (outside this reporting year) which was still with her in October 2014. Her offspring is now sufficiently marked to be included in the catalogue and is known as HZMB 125. HZMB 098 is a well known individual which also features in the AFCD photo identification catalogue (NL104). She was first sighted with a calf in March 2013 and has been seen with a young dolphin in August and December 2014 and February 2015. HZMB 116 was identified initially in December 2013 with a small calf and was seen in July and August 2014 still associated with a juvenile dolphin (Appendix H: Figure 9). HZMB 050, which was sighted with a large calf in February 2013 and again in January 2014 (outside this reporting year), was sighted in July 2014 but was no longer associated with an appropriately sized dolphin. It is not known if the offspring is deceased or has simply grown old enough to survive away from its mother.

#### **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 increased and travelling activities slightly decreased. When compared to the years Dec 2012-Feb 2013 and Dec 2013-Feb 2014, this third year of impact monitoring indicates that the overall frequency of foraging behaviours is decreasing and travelling times have increased (Appendix H: Figure 11).
- 3.4.10.2. During surveys conducted in 2011-12, specific behavioural information was only recorded for approximately 20% of all sightings made. In 2012-13, the area of Lung Kwu Chau in NWL is highlighted as an important feeding area as it is again in 2013-14 and 2014-15. The area to the south of NWL is also important for feeding/surface active behaviours. As the years progress during impact monitoring, decreases in dolphin sightings in NEL and mid NWL are becoming apparent (Appendix H: Figure 12).

#### **3.4.11. Photo-Identification Catalogue**

- 3.4.11.1. A total of 117 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 and/or pigmentation or with uniquely shaped fins can be included in the photo-identification catalogue. There are 14 dolphins which have been sighted six or more times, nine of which are known from the AFCD catalogue (HZMB 001 [WL46]; HZMB 002 [WL111]; HZMB 003 [NL179]; HZMB 011 [EL01]; HZMB 041 [NL24]; HZMB 044 [NL98]; HZMB 051 [NL213]; HZMB 054 [CH34]; HZMB 098 [NL104]). Of the 117 dolphins identified during impact monitoring, 57 individuals (just under half) were seen only once between March 2012 and February 2015.

#### **3.4.12 Dolphin Abundance**

- 3.4.12.1 It was not possible to calculate a meaningful abundance estimate for NEL as only 1 sighting was recorded. For NEL and NWL combined, the overall abundance estimate is 26 [95% CI 5.8, 72.9]).

### 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 Manual 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 and that several calves have survived throughout the reporting year and beyond. In 2013-14, an emerging trend for decreased use of NEL was noted and this is further confirmed in 2014-15. 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 HZMB5 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 objectives for water quality as described in the EIA report except where noted in Section 7.1.3 (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 20146). In light of this new information, the statements made in the EIA may need to be re-assessed and the allowable limits for water quality parameters revised.
- 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 this reporting year (2014-2015). AFCD data indicate that higher than usual dolphin mortality has continued in 2014-15. 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.

<sup>5</sup> Ove Arup & Partners Hong Kong Ltd 2009 HZMB – HKBCF & HKLR EIA Report. 24037-REP-125-01 Pages 83-5, 97, 115

<sup>6</sup> 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<sup>7</sup> 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<sup>8</sup>). 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 shows a significant decline in dolphins in NEL and adjacent areas occurred 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 as stated in the Marine Department statistics for SkyPier for the period January – December 2014 which show an increase from the same period in the previous year in both departures and arrivals to/from River Trade Ports as +6.4% and +11.4%, respectively, and an overall increase for all ports arrival and departures as +1.8% and +6.8%, respectively<sup>9</sup>. The route from SkyPier to River Trade Ports passes directly through both NEL and NWL habitat

#### 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 and 2013-14 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 2014 and February 2015, 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 2014 and February 2015 in accordance with EM&A Manual 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 reports have reported a significant

<sup>7</sup> 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)

<sup>8</sup> Marcotte, D., Hung, S. K., & Caquard, S. 2015. Mapping cumulative impacts on Hong Kong's pink dolphin population. *Ocean & Coastal Management*, 109, 51-63

<sup>9</sup> [http://www.mardep.gov.hk/en/publication/pdf/portstat\\_1\\_y\\_d2.pdf](http://www.mardep.gov.hk/en/publication/pdf/portstat_1_y_d2.pdf)

decline in this area prior to HKBCF construction activities, it is difficult to distinguish how much HKBCF activities may have influenced this existing decline.

- 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 Exposed soil observed fully loaded on barge at near Portion D and C2a. The Contractor was reminded to provide dust control measures and keep the surface of all exposed soil wet and the Contractor was reminded to use suitable barge to store public fill to prevent potential runoff to the surrounding. (Reminder)

4.1.1.4 Exposed earth/sand was observed at Works Area of Portion A. The Contractor was reminded to provide dust control measures such as to treat the exposed earth by compaction. The Contractor was also reminded to continue to provide dust control measures to exposed soil. The Contractor provided dust control measures such as to treat the exposed earth by compaction. (Closed)

4.1.1.5 It was observed that the water supply of the sprinkler system at Portion D was disconnected. The Contractor was reminded to provide effective dust control measures to the road at Portion D. The Contractor provided effective dust control measures to the road at Portion D. (Closed)

4.1.1.6 Dust control measure was not observed at the ramp of Portion D. The Contractor was reminded to provide dust control measure such to ramp with exposed soil which the water car has no access. (Reminder)

4.1.1.7 Dust control measures such as water car was observed. However the Contractor was reminded to review the need to enhance current dust control measures. (Reminder)

4.1.1.8 Vehicle equipped with watering system was observed implemented on exposed sand. The Contractor was reminded to continue to implement such dust control measures 8 times per day. (Reminder)

4.1.1.9 Dark smoke was observed emitted by a vessel, excavator and TSHD. The Contractor was reminded to regularly maintain the plants to avoid generation of dark smoke and dark smoke emission from plant/equipment should be avoided. The Contractor prevented generation of dark smoke by plant. (Closed)

4.1.1.10 Fugitive dust was observed generated on site at Portion D, when excavator was drove through road and when truck passed a slope. The Contractor provided dust suppression measures such a compaction and watering to exposed soil. The Contractor was reminded to review the effectiveness of the abovementioned mitigation measures and to review the need to provide enhancement on current measures. In addition, high pressure water jet was observed at site entrance at Portion D, Nonetheless, the Contractor was reminded to review the need to enhance the wheel washing facility to effectively prevent potential trail of mud outside site boundary cause by site vehicles. The Contractor was also reminded to provide dust control measures for preventing fugitive dust on road. Dust control measures such as watering was provided on the road. (Closed)

4.1.1.11 Filling was observed. The Contractor was reminded to ensure proper implementation of relevant mitigation measures for sand blanket filling or reclamation filling. (Reminder)

4.1.1.12 A material storage tank of an idle grout production facility was observed not fully enclosed. Please be advised that the material storage tanks of a grout production facility should be fully covered / enclosed. The Contractor enclosed the grout production facility (Closed).

- 4.1.1.13 Recycle glass cullet for earthwork was observed stored on Portion C2a with and it is fully covered with tarpaulin or impervious sheets. The Contractor was reminded to continue to provide effective dust suppression measures. (Reminder)

**Noise**

- 4.1.1.14 Generator was observed without acoustic decoupling measures on barge 天駿 3. The Contractor was reminded to install acoustic decoupling measure prior to leaving Portion A. (Reminder)
- 4.1.1.15 In general, please provide acoustic decoupling measures to air compressors and other noisy equipment when they are mounted on construction vessels. (Reminder)

**Water Quality**

- 4.1.1.16 Oil drum was observed not closed, the Contractor was reminded that every chemical waste containers should be securely closed, correctly placed and kept clean. The Contractor properly closed chemical waste containers. (Closed)
- 4.1.1.17 Oil drum was observed without label on barge SHB 209, the Contractor was reminded to provide proper labeling to oil drum. The Contractor provided labeling to oil drum on barge SHB 209.
- 4.1.1.18 Waste at waste collection point, generator and oil drums were observed partially submerged into sea water. The Contractor was advised to put the collected waste, generator and oil drums to higher ground to prevent the situation at near barge 天駿 3 and at near at Portion B. Waste at waste collection point, generator and oil drums were moved to higher ground. (Closed)
- 4.1.1.19 Bunding on barge SHB401 was not properly plugged. The Contractor should seal the bunding entirely to retain leakage, if any. The Contractor has sealed the bunding. (Closed)
- 4.1.1.20 It was observed that the drainage located next to the road of WA2 was blocked by material fallen off from the lid of the drainage, the Contractor was reminded to unblock the drainage. The Contractor unblocked the drainage. (Closed)
- 4.1.1.21 Oil stain has been observed inside the water of one steel cell when inspection conducted between steel cell 53 – 58. Oil stain was cleared by the Contractor using oil absorbent materials and used oil absorbent materials were disposed of as chemical waste. (Closed)
- 4.1.1.22 Oil stain was observed on sea area and the Contractor was reminded to take actions following the spill response plan and rectify the situation. The Contractor used absorption booms and pads as SOC to remove all the observed oil stain on 13 Nov 14 and the used booms and pads were treated and disposed of as chemical waste. (Closed)
- 4.1.1.23
- 4.1.1.24 Idle stone column installation was observed without localised silt curtain at barge AP2. The Contractor was reminded that active stone column installation shall be fully enclosed by localised silt curtain prior to operation. (Reminder)
- 4.1.1.25 Active stone column installation was observed not properly enclosed. The Contractor is reminded that sufficient silt curtain shall be installed to fully enclose the active stone column installation points. The Contractor is provided silt curtain to fully enclose the active stone column installation points. (Closed)
- 4.1.1.26 The Contractor was reminded that the chemical waste containers should be kept in good condition and free from damage or any other defects which may impair the performance of the containers (Closed)
- 4.1.1.27 Stockpile of soil was observed on barge AP3 at Portion D, the Contractor was reminded to provide measures to prevent potential runoff during rainstorm. (Reminder)

- 4.1.1.28 Defects such as disconnection and insufficient overlapping of the perimeter silt curtain have been observed. The Contractor was advised to rectify the defects such as disconnection and insufficient overlapping of the perimeter silt curtain as soon as possible. The Contractor rectified the defects such as disconnection and insufficient overlapping of the perimeter silt curtain as soon as possible. (Closed)
- 4.1.1.29 Muddy water was observed at land area where ground investigation works was conducted, the Contractor was reminded to prevent muddy water to be released out of the site boundary. (Reminder)
- 4.1.1.30 Public fill were observed on the edge of barge at Portion D. The Contractor was reminded to clear it to prevent potential runoff to the surrounding (Reminder)
- 4.1.1.31 Powered Mechanical Equipment (PME) was observed located close to sea. The Contractor was reminded to put the PME away from sea to prevent potential runoff. (Reminder)
- 4.1.1.32 Silty water was observed at both side of the northern part of the perimeter silt curtain. The Contractor was reminded to conduct necessary checking of the integrity of the silt curtain and swiftly carry out maintenance and repair once any defect is found. Photo record shows that the situation was not observed on 10 Oct 2014. (Closed)

#### ***Chemical and Waste Management***

- 4.1.1.33 General refuse was observed not properly allocated on 宏陽宮 106 and general refuse was observed at Portion A's waste collection point, access road of from Portion D to C2a; Portion B, Portion C, Portion E1 and works area WA2; at sea area at south part of the HKBCF reclamation works; unwanted band drain material were also observed at various locations of the reclamation work; general refuse was observed on cell cellular structures; area near barging point and on some part of the sea area near the reclamation site etc. The Contractor should keep the barge clean and tidy and collect the refuse on land and in the water within and adjacent to the works site. The refuse was cleared within the reporting period. The Contractor was reminded to provide proper storage for general refuse such as rubbish bin with lid. (The items were closed and reminder was given to the Contractor)
- 4.1.1.34 Rubbish bin was not observed or observed without cover/lid. The Contractor was reminded to regularly collect and store general refuse within a temporary refuse collection facility, in appropriate containers prior to collection and disposal. The Contractor provided regularly collect and store general refuse within a temporary refuse collection facility and general refuse was stored in containers prior to collection and disposal. (Closed)
- 4.1.1.35 Maintenance work of machine was observed. The Contractor was reminded to provide effective measures to contain potential oil spillage of leakage before handling oil on site and waste oil should be collected and dispose of as chemical waste. (Reminder)
- 4.1.1.36 Large rubbish bag was observed improperly stored on barge AP3. The Contractor was reminded to provide proper storage for general refuse such as rubbish bin with lid. The Contractor cleared the rubbish bag. The Contractor was reminded to provide proper storage for general refuse such as rubbish bin with lid. (Closed)
- 4.1.1.37 Bags of dry cement were observed on barge SHB 402, the Contractor was reminded to properly handle them or dispose of properly. The Contractor removed and cleared the bags of dry cement. (Closed)
- 4.1.1.38 Stone and gravel were observed inside drip tray containing oil drums. The Contractor was reminded to relocate the drip tray with the oil drums to avoid the situation. The situation has been rectified. (Closed)
- 4.1.1.39 Used band drains were observed stored on site at Portion A. The Contractor was reminded to regularly collect and dispose the used band drain materials. The Contractor cleared unwanted band drains regularly. Band drain material and general refuse were observed at the road side at Portion A.

The Contractor cleared general refuse stored on site. Nonetheless, the Contractor was reminded to clear unwanted band drain and other general refuse stored on site regularly. (Reminder)

- 4.1.1.40 Disconnected silt curtain were observed next to cellular structure, at Portion A's waste collection point and on the way from Portion D to C2a. The Contractor was reminded to collect the refuse and the disconnected silt curtain presented in the water within and adjacent to the works site. The Contractor collected the refuse presented in the water within and adjacent to the works site. The Contractor was reminded to review the need to increase frequency to clear and dispose of the waste at waste collection point to avoid accumulation. (Reminder)
- 4.1.1.41 Generators at Portion A and other area were placed on bare ground without the provision of drip tray. The Contractor should provide mitigation measures such as drip trays to prevent potential oil leakage. Drip tray was provided for some of the generators to retain potential leakage. However, a generator was still observed place on bare ground without the provision of drip tray. The Contractor should continue to provide mitigation measures such as drip trays to prevent potential oil leakage. (Closed)
- 4.1.1.42 Oil drum was not properly stored on barge 宏陽宮 106, Works Area of Portion A, barge 天駿 3 and on temporary rock bund. The Contractor should store oil drum within the chemical retaining bunding. Drip tray was provided within the reporting period for the oil drum to retain potential leakage. (Closed)
- 4.1.1.43 Battery and oil drum were placed on bare ground without drip tray; oil drum was observed without label and drip tray at Portion D. The Contractor was reminded to provide mitigation measures such as drip tray such that spillage/leakage can be easily collected. The Contractor provided mitigation measures such as drip tray so that spillage/leakage can be easily collected. (Closed)
- 4.1.1.44 Oil drum or PMEs were observed without drip tray on various portions of reclamation work, on barges and floating grout production facility. The Contractor was reminded to provide enough drip trays for oil drum at all works area. The Contractor provided enough drip trays for oil drum or PMEs or relocated them. (Closed)
- 4.1.1.45 Stack of cardboard paper and wave barriers were observed when inspection was conducted at area on cellular structure. The Contractor was reminded to stored general refuse within a temporary refuse collection facility, in appropriate containers prior to collection and disposal. (Reminder)
- 4.1.1.46 Oil water mixture was observed stored inside oil drums without cover/lid and drip tray ; accumulated in the drip tray on barge SHE7. The Contractor was reminded to provide cover/lid to tightly cover oil drums and provide drip tray to prevent spillage and runoff. The oil drum was removed by the Contractor. (Closed)
- 4.1.1.47 Water was observed accumulated inside the wheel washing facility; the Contractor was reminded to review and prevent potential overflow of silty water. (Reminder)
- 4.1.1.48 Water was observed accumulated inside car tyre on barge AP3 and inside drip tray at C2a near the blue conveyor belts and other areas. The Contractor was reminded to regularly clear water accumulated inside car tire drip tray at C2a near the blue conveyor belts and kept the site clean and tidy. The Contractor removed the car tyre and cleared the water inside drip tray at C2a and kept the site clean and tidy. (Closed)
- 4.1.1.49 Sand and equipment materials deposited inside the drip tray was observed at Portion C2A. The Contractor was reminded to clear the deposited sand and store the equipment materials properly. Contractor cleared the deposited materials and provided drip tray to the mechanical equipment. (Closed)
- 4.1.1.50 Tools were observed stored inside drip tray with oil drums on barge AP3. The Contractor was reminded to properly store the equipment at area outside drip tray. The Contractor removed the equipment from area inside drip tray. (Closed)

- 4.1.1.51 Defect (holes and deformed frame of drip tray) was observed within drip tray at area between Portion C1b and Portion A; a gap was observed within the frame of the drip tray on barge SHE7; drip tray with insufficient size or deformed frame on floating grout facility. The Contractor was reminded to provide proper mitigation measure such as drip tray without defect to oil drum and PMEs. The Contractor rectified large majority of the defects (holes and deformed frame of drip tray) observed within drip tray at area between Portion C1b and Portion A. The Contractor provided proper mitigation measure such as drip tray without defect to PME in September 2014. (Closed)

***Landscape and Visual Impact***

- 4.1.1.52 No adverse observation was identified in the reporting period.

***Others***

- 4.1.1.53 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, 1,643,539.8.4 m<sup>3</sup> of imported fill were imported for the Contract use in the reporting period. 342,669.5kg of metals, 1,649kg of paper/cardboard packaging, 6,403kg of plastics, 15,000kg of chemical waste and 1336.5m<sup>3</sup> 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.

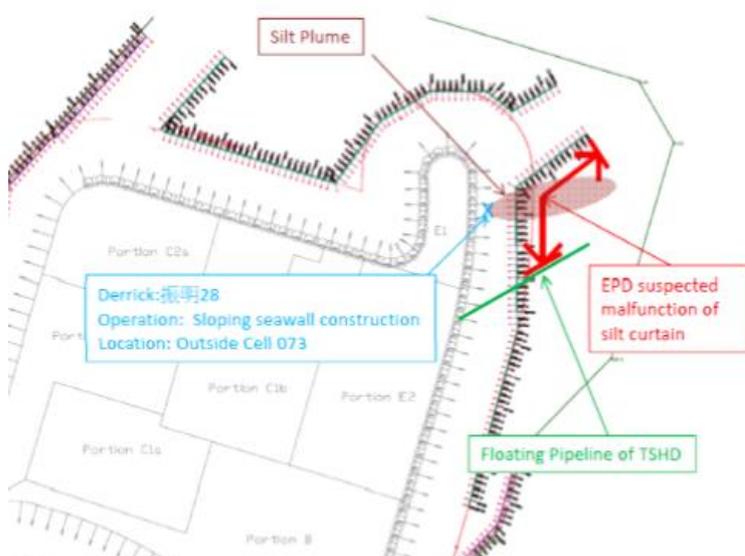
## 6. IMPLEMENTATION STATUS OF ENVIRONMENTAL MITIGATION MEASURES

### 6.1 Implementation Status of Environmental Mitigation Measures

- 6.1.1 As informed by the Contractor, further to the notification of summons received March 2014 due to works carried out on 6 October 13 contrary to conditions of NCO, Cap.400. The Contractor pledged guilty to the charge during the court appearance on 28 April 2014. The Contractor has established noise control management system on restricted hour works, to prevent future violation of conditions of NCOs, Cap. 400.
- 6.1.2 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.
- 6.1.3 Training of marine travel route for marine vessels operator was given to relevant staff and relevant records were kept properly.
- 6.1.4 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 checking were conducted by the experienced MMOs within the works area to ensure no dolphin was trapped by the enclosed silt curtain systems. Any dolphin spotted within the enclosed silt curtain systems was reported and recorded. Relevant procedures were followed and measures were well implemented. Silt curtain systems were also inspected timely in accordance to the submitted plan. All inspection records were kept properly.
- 6.1.5 Acoustic decoupling measures on noisy plants on construction vessels were checked regularly and these measures were implemented.
- 6.1.6 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.
- 6.1.7 The Contractor was reminded to strictly comply with the condition of the CNP.
- 6.1.8 EPD conducted inspection at HKBCF Reclamation Works at 11:36am on 23 October 2014, silt plume was observed spreading out from the Portion E1 of the construction site through the silt curtain when filling activities by derrick barge (振明 28) was undergoing.
- 6.1.8.1 EPD subsequently issued a yellow form and requested Contractor to report them via ET Leader and IEC within 7 days after issuing the yellow form for the remedial actions and preventive actions taken to improve the situation.
- 6.1.8.2 Insufficient Mitigation Measures: Silt plume was found spreading out from Portion E1 of the construction site through the silt curtain on 23 October 2014.
- 6.1.8.3 Review of Contractor's investigation report and rectifications.
- 6.1.8.4 Investigation actions:
- Review of monitoring data obtained 20, 22, 24 and 27 October 2014.
  - Investigation report provided by the Contractor on 29 October 2014 was reviewed:
  - Diver checking and rectification record for integrity of silt curtain has been checked.
  - Inspection condition of sea area near Portion E1 on 31 October 2014 around 1pm.

#### 6.1.8.5 Investigation results:

- Suspended Solids (SS) level and turbidity level recorded at IS(Mf)11, IS17 and IS(Mf)16 and IS8 on 20, 22, 24 and 27 October 2014 were reviewed. (for IWQM data, refer to Appendix J)
- Review of Suspended Solids (SS) level and turbidity level recorded at IS(Mf)11, IS17 and IS(Mf)16 and IS8 on 20 October 2014:
- Limit Level Exceedance of SS at IS8 during flood tide and Action Level Exceedance of IS17 during ebb tide was noted on 20 October 2014. After investigation, the exceedance recorded at IS8 are unlikely to be project related. However, exceedance recorded at IS17 is likely due to marine based construction activities of the Project. For details of investigation, please refer to investigation details section 4.7.3 to 4.7.4.
- Review of Suspended Solids (SS) level and turbidity level recorded at IS(Mf)11, IS17, IS(Mf)16 and IS8 on 22, 24 and 27 October 2014:
- Turbidity level and Suspended Solids recorded on 22, 24 and 27 October 2014 at IS(Mf)11, IS17, IS(Mf)16 and IS8 were below the action and limit level. This indicates the turbidity level and suspended solid at sea area close to portion E1 was not adversely affected on 22, 24 and 27 October 2014.
- Figure 3.2 of the investigation report showed that the silt plume was no longer observed at 02:09pm on 23 October 2014 after derrick barge (振明 28) ceased the work at 11:40am.
- The Contractor arranged diver to check the integrity of the concerned silt curtain. Minor damaged found on the concerned silt curtain and rectification works had been carried out by the Contractor.
- Diver checking and rectification record for integrity of silt curtain has been checked and it shows that the part of the silt curtain which was suspected to be malfunction (showed by red arrow in the diagram below) has been rectified by the Contractor.



- Subsequently, a rock placement trial was conducted by the Contractor on 28 October 2014. Silt plume was observed during the process but Figure 3.8 of the investigation report shows that spreading to the outside of the silt curtain was prevented by the silt curtain.
- Photo records taken on 31 October 2014 shows the sea condition at sea area near the northeast side of the HKBCF Reclamation Works and no silt plume was observed spreading out from Portion E1 of the construction site through the silt curtain:



- 6.1.8.6 As informed by the Contractor, rockfill materials would be placed more slowly by the derrick as well as the lowest dropping point to minimize the generation of silt plume. Daily site inspection in the area would be conducted so that any damaged parts of silt curtain can be observed and repaired promptly.
- 6.1.8.7 The Contractor was further reminded to ensure swift provision of maintenance to the perimeter silt curtains once defects of the perimeter silt curtain were observed and continue the preventive measures during rock filling and keep the site inspected at least daily to ensure compliance with respect to the recommendations in the EIA Report and EM&A Manual in particular on EIA Ref. Section 9.11.1.1
- 6.1.8.8 IWQM results on 29 and 31 October 2014 were review, no exceedance was recorded at IS17, IS(Mf)11 and IS(Mf)16 which indicates that no adverse water quality impact after the implementation of the preventive measures.
- 6.1.8.9 To prevent recurrence of the observed incident, inspection has been conducted by the Contractor on a daily basis to review if there is an impact to the water quality caused by rock filling activities using derrick barge and to promptly provide maintenance once any damaged parts of silt curtain is observed. The Contractor was further reminded to carry out swift rectification works to the situation once any adverse impact to the water quality is observed.
- 6.1.8.10 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.

## **7. SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT**

### **7.1 Summary of Exceedances of the Environmental Quality Performance Limit**

- 7.1.1 A total of Five (5) Action level exceedances were recorded during the 24-hr TSP impact monitoring period. No Limit level exceedance was recorded during 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.
- 7.1.2 For construction noise, no exceedance was recorded at all monitoring stations in the reporting period.
- 7.1.3 Forty one (41) Action Level exceedances and seven (7) Limit Level exceedances were recorded at measured suspended solids (SS) values (in mg/L), one (1) Action Level exceedance was recorded at measured turbidity (in NTU), one (1) Limit Level exceedance was recorded at measured turbidity (in NTU), six (6) Action Level exceedance was recorded at measured DO (Bottom) (mg/L) and eight (8) Action Level exceedance was recorded at measured DO (S&M) (mg/L) during the reporting period. After investigation, all impact water quality exceedances were considered not related to this Contract except the Limit Level Exceedance of Turbidity, Limit Level Exceedance of Suspended Solids recorded at IS17 during ebb tide on 10 October 2014 and Action Level Exceedance of Suspended Solids recorded at IS17 during flood tide on 20 October 2014, which were considered related to this Contract. Recommendation has been given and rectification has been carried on by the Contractor on 28 October 2014.
- 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 thirteen (13) environmental complaints were received in the reporting period. The Environmental Complaint Handling Procedure is annexed in Figure 5.
- 8.1.2 EPD referred a complaint on 17 March 2014 from complainant who advised that there was sea water colored in blue observed in vicinity of Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities (HKBCF) where stone column installation was taking place. The locations of stone column and impact water quality monitoring data recorded between 12 – 17 March 2014 were reviewed. In accordance with the monitoring records, no discoloration of sea water or silty plume appearance outside the seawall was observed during the water quality monitoring between 12 – 17 March 2014. Therefore the complaint is considered to be non-Contract related.
- 8.1.3 EPD referred a complaint from a complainant who advised that muddy water was found being discharged from the construction site of Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities (HKBCF) – Reclamation Works on 22 March 2014. With refer to the monitoring records on 21 March 2014 and the follow-up site inspection audit conducted with the representatives of the Contractor and Residential Engineer on 27 March 2014, since no discoloration of sea water or silty plume appearance outside the perimeter silt curtain was observed, the complaint is considered to be non-Contract related.
- 8.1.4 As informed by the Contractor, a complaint was received by the Contractor on 25 March 2014 concerning sand and dust emission from uncovered barges parking at the sea area off the Tuen Mun Ferry Pier. However, based on the available information, it cannot indicate that the air quality impact was caused by the vessel of this Contract and therefore the complaint could not be concluded as related to this Contract.
- 8.1.5 As informed by the Contractor on 7 May 2014, a complaint was received by the Contractor on 17 April 2014 concerning sand and dust emission from uncovered barges parking at the sea area off the Tuen Mun Ferry Pier. However, because no extra information was received for this complaint after the release of the latest investigation report, it is unable to conclude whether the complaint is related to this Contract.
- 8.1.6 As informed by the Contractor on 30 May 2014, an environmental complaint had been received on 28 May 2014. The complainant mentioned that waste such as earth and concrete were being felled into the sea everyday at the Hong Kong-Zhuhai-Macao Bridge at location where construction works are being conducted, causing pollution to the marine environment. The construction programme and waste flow record provided by the Contractor has been reviewed. With refer to the available information provided, it is concluded that the complaint is unlikely to be related to this Contract.
- 8.1.7 As informed by the Contractor on 3 July 2014, there was an environmental complaint received on 13 June 2014. The complainant who lived at Caribbean Coast complained that there were night time noise and visual impact (strong lighting) from the overnight construction works/plants of HKBCF Island. After investigation, the part of the complaint which is related to visual impact is likely to be related to the construction works of this contract. However, with referred to the available information, it is concluded that the part of the complaint which is related to night time noise is unlikely to be related to this Contract.
- 8.1.8 As informed by the Contractor on 23 July 2014, a complaint has been received from Oriental Daily Newspaper on 22 July 2014. In the complaint, Oriental Daily Newspaper stated that Miss Cheung, who is a resident of Miami Beach Towers (Tuen Mun), pointed out that construction was being conducted at the sea area in front of the estate, a lot of sand delivery barges were moored at sea area between Castle Peak Beach (Tuen Mun Typhoon Shelter) and Tuen Mun Ferry Pier. She discovered on several occasions that there were leakage of soil from sand delivery barges causing discoloration of sea water and sometimes, leaking of sand from more than two sand delivery barges at a time was

observed. After investigation, there is no adequate information to conclude the observed impact is related to this Contract.

- 8.1.9 As informed by the Contractor on 22 Aug 2014, EPD referred a complainant to this Contract on 21 August 2014, the complainant raised concern about uncovered sand barges at the sea area outside Melody Garden, Tuen Mun, sand were brought to inside of houses by wind and also causing the vicinity to be covered with sand and dust. After investigation, there is no adequate information to conclude the observed impact is related to this Contract.
- 8.1.10 As informed by the Contractor on 15 Sept 14, there is an environmental complaint received on 29 August 14 by HyD. The complainant who lives at Tower 4, Melody Garden, Tuen Mun called reflecting environmental issues arisen from many sand barges in the waters facing her apartment. According to the complainant, sand was blown into her apartment because the barges were not covered and it was worse when sand was transferred from one vessel to another on conveyor belts. After investigation, there is no adequate information to conclude the observed impact is related to this Contract.
- 8.1.11 As informed by the Contractor, a public complaint has been received by ICC on 9 September 2014 and it was referred to this Contract, the complainant raised concern about a large amount of general refuse such as food container and plastic bottles were observed on sea area off the Gold Coast, Tuen Mun. After investigation, there is no adequate information to conclude the observed impact is related to this Contract.
- 8.1.12 An air quality complaint has been received by the Contractor on 29 September 2014 via email. The complaint was first received by EPD via email on 5 September 2014 and it was referred by EPD to the HZMB HK Project Management Office (Management Office) to handle the complaint directly on 10 September 2014 following the request of the complainant. The Management Office responded to the complainant directly on 17 September 2014. Subsequently, the complainant followed up with the response given by the Management Office and complained again on 26 September 2014. This follow up complaint was referred to the Project team to investigate. The complainant complained that many of the sand barges did not stay at area of reclamation works near Chek Lap Kok or at the sea area near Tuen Mun River Trade Terminal but moored in the sea area close to Melody Garden. Sand were easily blown to the inside house during days with moderate wind. The complainant suggested that, sand barges should be requested to move away from residential areas and sand barges should be provided with cover fabric and sprinkling to minimise environmental pollution caused by sand. After investigation, there is no adequate information to conclude the observed impact is related to this Contract.
- 8.1.13 As informed by the Contractor on 14 October 2014, a follow up air quality complaint has been received by this Contract (same case to environmental complaint reported in the last reporting month). The complainant complained that about 20-30 sand barges always moor at the sea area opposite to tower 4 of Melody Garden and Richland Garden. This problem has affected the air quality. After investigation, there is no adequate information to conclude the observed impact is related to this Contract.
- 8.1.14 With reference to RSS's letter ref.: 211036/(HY2010/02)/M05/432/B07605 dated on 30 September 2014 pertaining the performance on barges operations at the sea area off the Tuen Mun Ferry Pier. A complaint concerning leakage of sand filling material from vessels at sea area off Tuen Mun Ferry Pier was first received by EPD from Tuen Mun District Council (TM DC) on 19 September 2014 and it was subsequently referred by EPD to the Highways Department to handle on 23 September 2014 through EPD's memo ref.: EP/RW/0000362128. Referring to EPD's Memo, it is also noted that some local residents at Tuen Mun expressed their concern that the stockpile of dusty sand material on the barges should be covered with impervious sheeting to avoid causing fugitive dust emissions of sand and dust. Subsequently, TM DC followed up their complaint with Highways Department on 17 October 2014. The follow up complaint concerning water quality impact at sea area off Tuen Mun area was referred to the Project team to response on 17 October 2014. After investigation, there is no adequate information to conclude the observed impact is related to this Contract.

- 8.1.15 As informed by the Contractor, further to the notification of summons received March 2014 due to works carried out on 6 October 13 contrary to conditions of NCO, Cap.400. The Contractor pledged guilty to the charge during the court appearance on 28 April 2014. The Contractor has established noise control management system on restricted hour works, to prevent future violation of conditions of NCOs, Cap. 400.
- 8.1.16 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 A total of Five (5) Action level exceedances were recorded during the 24-hr TSP impact monitoring in the reporting period and it was considered not related to the Contract works. 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 64 water quality monitoring exceedances were recorded in the reporting period and it was considered not related to the Contract works except the Limit Level Exceedance of Turbidity, Limit Level Exceedance of Suspended Solids recorded at IS17 during ebb tide on 10 October 2014 and Action Level Exceedance of Suspended Solids recorded at IS17 during flood tide on 20 October 2014, which were considered related to this Contract. Recommendation has been given and rectification has been carried on by the Contractor on 28 October 2014. As rectification was provided by the Contractor and recurrence of Contract related exceedance was not observed in the subsequent monitoring events. 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 EPD conducted inspection at HKBCF Reclamation Works at 11:36am on 23 October 2014, silt plume was observed spreading out from the Portion E1 of the construction site through the silt curtain when filling activities by derrick barge (振明 28) was undergoing.
- 10.4 EPD subsequently issued a yellow form and requested Contractor to report them via ET Leader and IEC within 7 days after issuing the yellow form for the remedial actions and preventive actions taken to improve the situation.
- 10.5 The Contractor subsequently rectified the situation and 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.

## **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

## **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 A total of five (5) Action level exceedances were recorded during the 24-hr TSP impact monitoring period. No Limit level exceedance was recorded during 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 Forty one (41) Action Level exceedances and seven (7) Limit Level exceedances were recorded at measured suspended solids (SS) values (in mg/L), one (1) Action Level exceedance was recorded at measured turbidity (in NTU), one (1) Limit Level exceedance was recorded at measured turbidity (in NTU), six (6) Action Level exceedance was recorded at measured DO (Bottom) (mg/L) and eight (8) Action Level exceedance was recorded at measured DO (S&M) (mg/L) during the reporting period.
- 12.8.5 Exceedances were considered to be due to a combination of the following potential causes A combination of the following potential causes: 1. When exceedances of DO were recorded at monitoring stations, relatively low DO values were also recorded at corresponding upstream Control Stations during ebb tide or flood tides indicating these exceedances of DO were unlikely to be contributed by Contract works. 2. Local effects in the vicinity of the monitoring station where exceedance was recorded. 3. There were two occasions when exceedances were considered due to vessel movement at shallow water and defective silt curtain.
- 12.8.6 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.
- 12.8.7 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.
- 12.8.8 Thirteen (13) environmental complaints were received in the reporting period.
- 12.8.9 No summons was received in the reporting period and one (1) successful prosecution was received in the reporting period.
- 12.8.10 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.
- 12.8.11 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.
- 12.8.12 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.

- 12.8.13 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.