


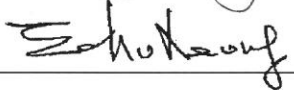
China Harbour Engineering Company Limited

Contract No. HY/2010/02

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

**Annual Review Report for
March 2012- February 2013**

[06/2014]

	Name	Signature
Prepared & Checked:	Y T Tang	
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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.

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Ref.: HYDHZMBEEM00_0_2023L.14

23 June 2014

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

By Fax (3698 5999) and By Post

Attention: Mr. Roger Marechal

Dear Mr. Marechal,

**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
Hong Kong – Zhuhai – Macao Bridge
Hong Kong Boundary Crossing Facilities – Reclamation Work
Annual Environmental Monitoring & Audit Report for March 2012 to Feb 2013**

Reference is made to the Environmental Team's submission of the Annual Environmental Monitoring & Audit Report for March 2012 to February 2013 (letter ref. 60249820/C/RMKY14062001 dated 20 June 2014) copied to us by E-mail on 20 June 2014. Please be advised that we have no further comment at this stage.

We would, however, like to draw your attention that the ET shall supplement the Annual EM&A Report with respect to the following observations:

1. Detailed review, analysis and evaluation of dolphin monitoring data covering annual period as per section 12.9.1.1 (vi) of the EM&A Manual for TM-CLKL with level of details not less than the same part in your submitted quarterly EM&A report and AFCD's annual marine mammal monitoring reports applicable to the dolphin monitoring.
2. Data/evidence about distribution and activity of fishing trawlers correlated to dolphin habitat use and behavioural activities to support your review on the environmental acceptability of the project with reference to specific impact hypotheses and the predicted scenario as per section 12.9.1.1 (xv) of the EM&A Manual for TM-CLKL.

Thank you very much for your kind attention and please do not hesitate to contact the undersigned should you have any queries.

Yours sincerely,



Raymond Dai
Independent Environmental Checker

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

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EXECUTIVE SUMMARY

Contract No. HY/2010/02 – Hong Kong-Zhuhai-Macao Bridge Hong Kong Boundary Crossing Facilities – Reclamation Work (here below, known as “the Project”) mainly comprises seawall construction and 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 06 August 2013 (EP-353/2009/G) and 28 January 2014 (EP-354/2009/B) (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 Project).

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

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 Project for carrying out the environmental monitoring and audit (EM&A) works.

The construction phase of the Project under the EPs was commenced on 12 March 2012 and will be tentatively completed by early Year 2016. 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 12 March 2012 and 28 February 2013. As informed by the Contractor, major activities in the reporting quarter were:-

Marine-based Works

- Cone penetration test;
- Geotextile laying and fabrication;
- Stone column installation trial;
- Silt curtain fabrication and deployment; and
- Stone column installation
- Maintenance of Silt curtain
- Silt curtain deployment and repairing
- Sand blanket trial
- Stone blankets laying.
- Band drain installation trial
- Construction of cellular structure
- Backfill cellular structure

Land-based Works

- Site office erection and construction at Works Area WA2;
- Public Works Regional Laboratory erection and construction at Works Area WA3;
- Maintenance works of Public Works Regional Laboratory at Works Area WA3
- Constructing site access at Works Area WA2 to Ying Hei Road, Tung Chung;
- Drainage works at Works Area WA2 and WA3;
- Geotextile fabrication at Works Area WA2 and WA4; and
- Stone column installation barges setup and their maintenance works at Works Area WA4.
- Silt curtain fabrication at Works Area WA2 and WA4;
- Hoarding erection at Work Areas Portion D and Works Area WA2
- Sign board erection at Works Area WA2

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

24-hour Total Suspended Particulates (TSP) monitoring	61 sessions
1-hour TSP monitoring	61 sessions
Noise monitoring	51 sessions
Impact water quality monitoring	149 sessions
Impact dolphin monitoring	24 surveys
Joint Environmental site inspection	51 sessions

Breaches of Action and Limit Levels for Air Quality

No exceedance of Action and Limit Level was recorded for 1-hour TSP monitoring in the reporting quarter. However, one (1) Action Level exceedance and four (4) Limit Level exceedance was recorded for 24-hour TSP results in the reporting period. Investigation results show that the exceedances were not due to the Project works. The Contractor was recommended to continue implementing existing dust mitigation measures

Breaches of Action and Limit Levels for Noise

One (1) Limit Level exceedance of impact noise monitoring was recorded in the reporting period. Investigation into the possible causes of each exceedance was undertaken and reported in the respective monthly EM&A reports. Investigation results show that the exceedance was not due to the Project works. The Contractor was recommended to continue implementing existing noise mitigation measures.

Breaches of Action and Limit Levels for Water Quality

Thirty (30) Action Level exceedances and (2) Limit Level exceedances were recorded at measured suspended solids (SS) values (in mg/L), three (3) Action Level exceedances were recorded at measured turbidity (in NTU) and one (1) Action Level exceedance was recorded at measured DO (Bottom) (mg/L) during the reporting period. Investigation result show that the exceedances were not due to the Project works. Investigation results show that the exceedances were not due to the Project works. Nevertheless, the Contractor was reminded to ensure provision of ongoing maintenance to the silt curtains.

Triggering of Event and Action Plan for Impact Dolphin Monitoring

No triggering of Event and Action Plan for impact dolphin monitoring was noted in the reporting period.

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.

The recommended environmental mitigation measures effectively minimize the potential environmental impacts from the Project. 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

Four (4) environmental complaints were received in the reporting period.

No notification of summons and 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 Project”) mainly comprises seawall construction and 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) and August 2013 (EP-353/2009/G). 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) and January 2014 (EP-354/2009/B).
- 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 24 April 2013 (EP-353/2009/F) and 8 December 2011 (EP-354/2009/A) (for TMCLKL Southern Landfall Reclamation only).
- 1.1.5 A Project Specific EM&A Manual, which included all project-relation contents from the original EM&A Manuals for the Project, 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 Project).
- 1.1.7 China Harbour Engineering Company Limited (CHEC) was awarded by HyD as the Contractor to undertake the construction work of the Project.
- 1.1.8 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 Project for carrying out the EM&A works.
- 1.1.10 The construction phase of the Project under the EPs was commenced on 12 March 2012 and will be tentatively completed by early Year 2016.
- 1.1.11 According to the Project 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

- 1.3.1 This is the first 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 Project from 12 March 2012 and 28 February 2013.

1.3 Project Organization

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

Table 1.1 Contact Information of Key Personnel

Party	Position	Name	Telephone	Fax
Engineer's Representative (ER) (Ove Arup & Partners Hong Kong Limited)	Chief Resident Engineer	Roger Marechal	2528 3031	2668 3970
	Independent Environmental Checker	Raymond Dai	3743 0788	3548 6988
IEC / ENPO (ENVIRON Hong Kong Limited)	Environmental Project Office Leader	Y.H. Hui	3743 0788	3548 6988
	General Manager (S&E)	Daniel Leung	3157 1086	2578 0413
Contractor (China Harbour Engineering Company Limited)	Environmental Officer	C. M. Wong	3157 1086	2578 0413
	24-hour Hotline	Alan C.C. Yeung	9448 0325	--
	ET Leader	Echo Leong	3922 9280	2317 7609
ET (AECOM Asia Company Limited)				

1.4 Summary of Construction Works

1.4.1 The construction phase of the Project 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

- Cone penetration test;
- Geotextile laying and fabrication;
- Stone column installation trial;
- Silt curtain fabrication and deployment; and
- Stone column installation
- Maintenance of Silt curtain
- Silt curtain deployment and repairing
- Sand blanket trial
- Stone blankets laying.
- Band drain installation trial
- Stone column installation
- Construction of cellular structure
- Backfill cellular structure

Land-based Works

- Site office erection and construction at Works Area WA2;
- Public Works Regional Laboratory erection and construction at Works Area WA3;
- Maintenance works of Public Works Regional Laboratory at Works Area WA3
- Constructing site access at Works Area WA2 to Ying Hei Road, Tung Chung;
- Drainage works at Works Area WA2 and WA3;
- Geotextile fabrication at Works Area WA2 and WA4; and
- Stone column installation barges setup and their maintenance works at Works Area WA4.
- Silt curtain fabrication at Works Area WA2 and WA4;
- Hoarding erection at Work Areas Portion D and Works Area WA2
- Sign board erection at Works Area WA2

The construction programme of the Project is shown in Appendix B.

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

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 Project 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 Project 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 Project 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.
- 2.1.3 For impact noise monitoring, monitoring locations NMS2 (Seaview Crescent Tower 1) was set up at the proposed locations in accordance with Project Specific EM&A Manual. However, for monitoring location NMS3 (Ho Yu College), as proposed in the Project 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.
- 2.1.4 In accordance with the Project 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 Project/ ambient water quality conditions.
- 2.1.5 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.
- 2.1.6 The monitoring locations used during the reporting period are depicted in Figures 2, 3 and 4 respectively.
- 2.1.7 The Project 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 and water quality 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 and water 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/G and EP-354/2009/B) (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 Project 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, AMS3A, AMS6 and AMS7).
- 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. Conditional omission of the AMS6 was approved by EPD in November 13.
- 3.1.1.3. The weather was mostly sunny, with occasional cloudy and occasional rainy in the reporting period. The major dust source in the reporting period included construction activities from the Project, as well as nearby traffic emissions.
- 3.1.1.4. 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.
- 3.1.1.5. 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 12 – Feb 13
1-hr TSP	AMS2	183
	AMS3A	183
	AMS7	183
24-hr TSP	AMS2	61
	AMS3A	61
	AMS7	61

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 12 – Feb 13
1-hr TSP	AMS2	Action	0
		Limit	0
	AMS3A	Action	0
		Limit	0
	AMS7	Action	0
		Limit	0
Total			0
24-hr TSP	AMS2	Action	0
		Limit	0
	AMS3A	Action	1
		Limit	4
	AMS7	Action	0
		Limit	0
Total			5

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 AMS3A and the Hong Kong Boundary Crossing Facilities - reclamation works could be established for all non-compliances and therefore no action was required to be taken.

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

3.1.4.1 A total of 1 Action level and 4 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 Project

3.1.5.1 Trend of 1-hour and 24-hour TSP

3.1.5.1.1 Other than a few isolated events, the 24-hour TSP monitoring results were well below the Action and Limit levels. The trend of TSP at AMS2, AMS3A and AMS7 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 Project 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	78	67.9

*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, the average 24-hour TSP levels recorded in the EM&A programme were in similar magnitude as the Daily dust level predicted in the EIA.

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

- 3.1.6.1 Monitoring and auditing of air quality was recommended for the construction phase of the Project in the EIA to ensure no exceedance of the TSP standard at the sensitive receiver.
- 3.1.6.2 The air quality monitoring methodology was effective in monitoring the air quality impacts of the Project. 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 Project caused unacceptable air quality impacts on the sensitive receiver. As the scope of the Project 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 Project.
- 3.1.6.3 All recommended mitigation measures were applicable to the Project. As discussed above, the Project did not cause unacceptable air quality impacts. However, as the nature of the Project 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 Project. 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 Project 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 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 AMS3A 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 NMS3A) 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 Project and nearby traffic noise.

3.2.1.4 The number of impact noise monitoring events and exceedances are summarized in Table 3.3 and Table 3.4 respectively.

Table 3.4 Summary of Number of Monitoring Events for Impact Noise

Monitoring Parameter	Location	No. of monitoring events
		Mar 12 - Feb 13
Noise	NMS2	51
	NMS3A	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
	NMS3A	Action	1
		Limit	0
	Total		

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

3.2.2 Environmental Mitigation Measures

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

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

3.2.3.1 Summary of Non-compliance (Exceedances)

3.2.3.1.1 Table 3.5 summarised the number exceedance recorded at each monitoring station throughout the impact monitoring period. There was one (1) limit level exceedance recorded at NMS3A. 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 limit level exceedance was not related to project.

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

3.2.3.2.1 Investigation was carried out within three working days of identification of non-compliance. Assessments showed that all exceedances were not due to the works and therefore no action was required to be taken and these were verified by the IEC.

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

- 3.2.3.3.1 There was one (1) limit level exceedance recorded at NMS3A. Investigation into the possible causes of each exceedance was undertaken and reported in the respective monthly EM&A reports.
- 3.2.3.3.2 In summary, the average impact noise levels recorded in the reporting quarter were generally within the range of the predicted construction noise levels in the Project EIA.

3.2.4 Environmental Acceptability of the Project

3.2.4.1 Trend of Measured Noise Level (Leq)

- 3.2.4.1.1 Other than an isolated event, the noise monitoring results for all monitoring stations were below the Limit levels. The trend showed no noticeable noise impact from the Project during the impact monitoring period.

3.2.4.2 Correlation between exceedances with possible noise generating activities

- 3.2.4.2.1 Exceedances were rarely recorded for all monitoring stations. However, exceedance was recorded at monitoring station NMS3A.
- 3.2.4.2.2 For exceedance recorded at NMS3A, it exceeded the limit level. trench excavation (near access road) and general site clearance were the major land-based construction activity being undertaken at Works Area WA2 during the monitoring period. Stone blanket laying at Portion B and Portion E1 was the major marine-based construction activities being undertaken during the monitoring period. Field observations indicated that construction activities, like sheet piling, percussive piling and excavation, were carrying out in other private developments (which are located at eastern and southern side of the Works Area WA2) during the course of monitoring, which are close to the monitoring station NMS3A and contribute to the measured noise level. Therefore, noise generating activities of the Project 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.

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 Project, one (1) noise complaints were received in the impact monitoring period. The measured impact noise levels of the Project 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	61 - 74 [^]	75
NMS3A	Site Boundary of Site Office Area at Works Area WA2	65	57 - 75*	70

[^] The sound level meter was set on a tripod at a height of 1.2 m above the ground for free-field measurements at NMS2. A correction of +3 dB(A) was made to the free field measurements.

* Façade measurements were made at NMS3A on or before 5 September 2012. Free field measurements were made on all monitoring after 5 September 2012 due to removal of site office located at NMS3A. A correction of +3 dB(A) was made to all free field measurements.

3.2.5.3 The average impact noise levels recorded in EM&A during impact monitoring were mostly within the range of the predicted construction noise levels in the EIA Report. ET's assessment had shown that exceedances recorded were not due to the works of Reclamation Works and this had been verified by the IEC.

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

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

3.2.6.2 The noise monitoring methodology was effective in monitoring the noise impacts of the Project. 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 Project caused adverse noise impacts on the sensitive receivers. The monitoring methodology which focus on L_{eq30} _{minute} therefore considered to be cost effective for the Project.

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 Project. As discussed above, the Project 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 Project. 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

3.2.6.5 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 mostly 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 12 - Feb 13	
Water Quality	Mid-Ebb	147*	
	Mid-Flood	148*	

*Due to adverse weather condition during the impact water quality monitoring periods, three (3) water quality monitoring sessions scheduled on mid flood tide of 05, 20 Apr 12 and 23 Jul 12 and four (4) water quality monitoring sessions scheduled on mid ebb tide of 20 Apr 12, 18 May 12, and 23, 27 July 12 were cancelled.

Table 3.9 Summary of Water Quality Exceedances in Mar 12-Feb 13

Station	Exceedance Level	DO (S&M)		DO (Bottom)		Turbidity		SS		Total	
		Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood	Ebb	Flood
IS5	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)6	Action	0	0	0	0	0	1 (23 Apr 12)	3 (28 Nov 12; 5 and 10 Dec 12)	4 (23 Apr 12; 26 Nov 12; 5 and 14 Dec, 12)	3	5
	Limit	0	0	0	0	0	0	0	0	0	0
IS7	Action	0	0	0	0	0	1 (23 Apr 12)	3 (26, 28 Nov 12; 10 Dec, 12)	3 (23 Apr 12; 18 Jun 12; 16 Nov 12)	3	4
	Limit	0	0	0	0	0	0	0	0	0	0
IS8	Action	0	0	0	0	0	0	0	1 (16 Nov 12)	0	1
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)9	Action	0	0	0	0	0	0	1 (26 Nov 12)	0	1	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS10	Action	0	0	0	0	0	0	0	2 (9 Apr 12; 2 Jan13)	0	2
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)11	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
IS(Mf)16	Action	0	0	0	0	0	0	1 (30 Nov 12)	2 (3 Dec 12; 4 Jan13)	1	2
	Limit	0	0	0	0	0	0	0	0	0	0
IS17	Action	0	0	1 (21 May 12)	0	0	0	0	0	1	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR3	Action	0	0	0	0	0	0	0	1 (10 Dec 12)	0	1
	Limit	0	0	0	0	0	0	0	0	0	0
SR4 (N)	Action	0	0	0	0	0	0	0	2 (16 Nov 12; 3 Dec 12)	0	2
	Limit	0	0	0	0	0	0	0	0	0	0
SR5[1]	Action	0	0	0	0	0	1 (29 Oct 12)	0	4 (5 and 10 Dec 12; 11 and Jan 13)	1	4
	Limit	0	0	0	0	0	0	0	1 (29 Oct 12)	0	1
SR6	Action	0	0	0	0	0	0	1 (4 Jun 12)	2 (2 and 14 Jan 13)	1	2
	Limit	0	0	0	0	0	0	0	0	0	0
SR7	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	1 (12 Mar 12)	0	0	1
SR10A	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR10B (N)	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
Total	Action	0	0	1	0	0	3	9	21	34	
	Limit	0	0	0	0	0	0	1	1	2	

Note: S: Surface;
 M: Mid-depth;
 [1]: Due to safety concern and presence of Airport Approach Restricted Areas, alternative impact water quality monitoring station SR5(N) was adopted, which is in vicinity of SR5 and could be reachable, for the period from 12 to 28 March 2012.

- 3.3.1.4 Please refer to the monthly EM&A report (March 2012 to February 2013) 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

- 3.1.2.1 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)

3.3.4.1 Summary of Non-compliance (Exceedances)

- 3.3.4.1.1 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 36 exceedances were recorded during the entire construction period with 34 Action level exceedances and 2 Limit level exceedances.

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

- 3.3.4.1 Thirty (30) Action Level exceedances and (2) Limit Level exceedances were recorded at measured suspended solids (SS) values (in mg/L), three (3) Action Level exceedances was recorded at measured turbidity (in NTU) and one (1) Action Level exceedance was recorded at measured DO (Bottom) (mg/L) during the reporting period. Investigation result show that the exceedances were not due to the Project works.
- 3.3.4.2 After review of the investigation results on the incident for water quality exceedances (for detail of investigations please refer to section 4 of monthly EM&A report (Mar 12 to Feb 13), 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. Non-Project related vessel activities such as trawling of fishing vessels near the monitoring station 2. Rough sea condition caused by adverse weather and relatively strong current experienced during the monitoring period and 3. During the time 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 Project works.. This indicated these exceedances of DO were unlikely to be contributed by Project works. 4. Local effects in the vicinity of the monitoring station where exceedance was recorded.

3.3.5 Environmental Acceptability of the Project

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 F did not show any noticeable deterioration of dissolved oxygen levels.

Turbidity

3.3.5.1.2 The turbidity levels trend showed fairly distributed at all monitoring station during the reporting period. No obvious trend of turbidity levels of each monitoring station was shown. The trend of turbidity levels of each monitoring station was shown in Appendix G. Moreover, the trend did not show any noticeable deterioration of turbidity.

Suspended Solids

3.3.5.1.3 The trend of suspended solid levels of each impact monitoring station was shown similar with the control stations of each tide, i.e , slightly fluctuated between the period from September to December 2012. The trend of suspended solid levels of each monitoring station was shown in Appendix G. Moreover, the trend did not show any noticeable deterioration of Suspended Solids.

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 Project 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	Sand Filling Rate m ³ /month	Depth averaged DO	Depth averaged Turbidity	Depth averaged SS	Total
Mar-12	0	0	1	0	1
Apr-12	0	0	2	3	5
May-12	0	1	0	0	1
Jun-12	0	0	0	2	2
Jul-12	0	0	0	0	0
Aug-12	28,053	0	0	0	0
Sep-12	12,769	0	0	0	0
Oct-12	28,882	0	1	1	2
Nov-12	2,276	0	0	9	9
Dec-12	0	0	0	10	10
Jan-13	0	0	0	6	6
Feb-13	2,608	0	0	0	0

- 3.3.6.2 As shown in Table 3.10, there was no apparent correlation between the dredging and 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 turbidity, the numbers of turbidity 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 Project 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 and overage ranges between 5.7 – 6.8 mg/L and depletion will not be detrimental to the ecological systems of the area. The average Depth averaged DO record at SR5 is 6.5 mg/L in October 2012 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⁻¹)

Sensitive Receiver in Baseline	Associated Location during Impact Monitoring	Monitoring Depth	Baseline mean		Impact mean (October 2012)		Depletion during Impact Monitoring	
			Mid-ebb	Mid-flood	Mid-ebb	Mid-flood	Mid-ebb	Mid-flood
SR3	SR3*	Surface & mid	6.8	6.7	7.0	7.3	-0.2	-0.6
		Bottom	-	6.2	-	-	-	-
SR4 [^]	SR4(N)**	Surface & mid	6.1	6.3	6.9	7.0	-0.8	-0.7
		Bottom	6.0	6.2	6.9	6.9	-0.9	-0.7
SR5	SR5**	Surface & mid	6.4	6.3	6.2	6.6	0.2	-0.3
		Bottom	6.1	6.1	6.0	6.4	0.1	-0.3
SR6	SR6**	Surface & mid	6.6	6.5	6.3	6.2	0.3	0.3
		Bottom	6.2	6.1	6.2	6.0	0	0.1
SR7	SR7**	Surface & mid	6.3	6.0	6.2	6.4	0.1	-0.4

		Bottom	6.1	5.9	6.1	6.2	0	-0.3
SR10A	SR10A	Surface & mid	6.0	6.0	6.0	6.1	0	-0.1
		Bottom	5.7	5.8	6.0	6.0	-0.3	-0.2
SR10B^	SR10B(N)**	Surface & mid	6.1	6.0	5.9	6.0	0.2	0
		Bottom	6.2	5.8	6.0	5.9	0.2	-0.1

^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 Project as the depleted dissolved oxygen concentrations did not breach the Water Quality Objectives nor did they exceed the AL levels adopted for the Project.

Suspended solids (SS)

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

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

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

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

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

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

- 3.3.7.7 For suspended solids, as the baseline monitoring was conducted in a November 2012 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 Project was conducted during the transitional season. The mean baseline suspended solids level at each sensitive receiver and 30 percent of the baseline mean are presented in Table 3.14.

Table 3.14 Baseline suspended solids levels and 30% of baseline mean (mgL⁻¹)

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

3.3.7.9 The average elevations in suspended solids concentrations of the same month which baseline monitoring was conducted (October 2012) were compared with the baseline levels are provided in Table 3.15.

Table 3.15 Average suspended solids levels at sensitive receivers (mgL⁻¹) in October 2012

Sensitive Receiver in Baseline	Associated Location during Impact Monitoring	Impact SS Mean (in October 2012)			
		Mid-ebb	Elevation	Mid-flood	Elevation
SR3	SR3	8.8	-5.1	12.0	-4.3
SR4	SR4(N)*	8.8	-2.4	12.0	-0.2
SR5	SR5	12.0	1.5	13.4	1.4
SR6	SR6	7.2	-4.7	8.6	-3.3
SR7	SR5	9.3	-2.1	10.8	0.4
SR10A	SR10A	7.4	-2.8	9.4	-0.8
SR10B	SR10B(N)*	8.5	-3.0	13.6	2.5

*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 October 2012, 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. Non-Project related vessel activities such as trawling of fishing vessels near the monitoring station 2. Rough sea condition caused by adverse weather and relatively strong current experienced during the monitoring period and 3. During the time 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 Project works.. This indicated these exceedances of DO were unlikely to be contributed by Project works. 4. Local effects in the vicinity of the monitoring station where exceedance was recorded.

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

- 3.3.9.1. Monitoring and audit of water quality was recommended for the construction phase of the Project 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.
- 3.3.9.2. 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 Project would cause unacceptable water quality impacts on the sensitive receivers. Post-project water quality monitoring upon completion of all marine construction activities helped to demonstrate the return of ambient conditions that existed prior to commencement of the construction works.
- 3.3.9.3. 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 Project. 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 Project 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.
- 3.3.9.4. 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-project monitoring

periods also demonstrated the environmental acceptability of the Project. 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 Project was conducted during the baseline and impact monitoring periods. For dissolved oxygen, turbidity and suspended solids levels, a total of 36 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. Non-Project related vessel activities such as trawling of fishing vessels near the monitoring station 2. Rough sea condition caused by adverse weather and relatively strong current experienced during the monitoring period and 3. During the time 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 Project works.. This indicated these exceedances of DO were unlikely to be contributed by Project works. 4. Local effects in the vicinity of the monitoring station where exceedance was recorded which might have been contributed to the local impacts in the vicinity of the receivers.
- 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 Project 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 Due to the presence of deployed silt curtain systems at the site boundaries of the Project, line 10 was shortened from 6.4km to 3.6km in length. Therefore, the total transect length for NEL and NWL combined is reduced to approximately 111km as of June 2012.
- 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).
- 3.4.1.4 The mitigation measures for dolphins are included in the Environmental Permit for this project are included in Appendix C.

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 Monitoring Summary

- 3.4.3.1 Vessel-based surveys have been conducted monthly from March 2012 to February 2013, i.e., during the first year of the construction phase. A total of 49 survey days were completed between March 2012-February 2013.
- 3.4.3.2 During any one month, it is a requirement to survey both NEL and NWL twice. During March, April and May 2012, inclement weather conditions resulted in a short fall survey track being completed under favourable conditions, as such supplementary surveys were conducted between June and August 2012. A total of 2627.5km were completed whereas 2601.4km were conducted under favourable conditions (defined as Beaufort Sea State 3 or better and with visibility of >1km) between March 2012-February 2013.
- 3.4.3.3 Between March 2012-February 2013, a total of 203 dolphin sightings were recorded, 145¹ as on effort and 58 as opportunistic². The detailed effort and sighting breakdown is shown in Table 1 and Table 2 of Appendix H. The location of all sightings is shown in Figure 1 of Appendix H.
- 3.4.3.4 A total of 94 dolphins (one deceased adult was included in the photo-ID catalogue) were added to the photo-identification catalogue established specifically for the HZMB Project (Table 3 of Appendix H). 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. Of the identifiable dolphins recorded, the most often sighted dolphins (HZMB052 and HZMB011) were seen on eight separate days, however, just over half the individuals recorded, 47 in total, were seen only once between March 2012 and February 2013 (Table 3 of Appendix H).

¹ The total number of includes 1 on effort sighting made of a recovered dead dolphin. This dolphin sighting is not used in the calculation of density, distribution, encounter rate, behavior analyses.

² The vessel is classified as "on effort" when it is traveling the transect lines and sightings made while on the transect line are recorded as "on effort". When traveling between transect lines or when off the transect line for photo-identification, the vessel is classified as "off effort" although the survey team will still observe the area and will record any additional sightings made. These sightings will be recorded as "opportunistic" sightings.

- 3.4.3.6 Two deceased dolphins have been recovered during impact surveys; a neonate in July 2012 and an adult in September 2012. The adult was included in the photo-ID catalogue. Both carcasses were necropsied by AFCD/Ocean Park Corporation who hold detailed information on causes of death. Site reports concluded that neither incident was related to the Project.

3.4.4 Environmental Acceptability of the Project

Table 3.16 Comparison of low, moderate and high habitat utilisation in NEL and NWL between years 2011-12 and 2012-13

	Advanced	2012-13	Advanced	2012-13
Frequency of Use	NWL		NEL	
	DPSE			
<20	69	58	71	72
20-60	16	30	22	11
> 60	17	11	4	16
	SPSE			
<5	52	40	65	65
5-15	27	46	31	13
>15	22	14	9	22

Distribution, Habitat Use and Behaviour of Marine Mammals

- 3.4.4.1 The EM&A Manual stipulated that surveys be conducted in such a way as to be comparable to the baseline survey for this project (September -November 2011) and to the long term annual monitoring conducted by AFCD. As such, analyses of density per survey effort (DPSE) and sightings per survey effort (SPSE) were calculated in accordance with the methodology detailed in AFCD reports (e.g., AFCD 2012³). 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 0.75km² are included)
- 3.4.4.2 For the period March 2012-February 2013, DPSE was calculated in six categories, ranging from low use to high use. NEL and NWL have 16% and 11% of each respective area classified as high use (> 60 DPSE); 11% (NEL) and 30% (NWL) as moderate use (20.1-60 DPSE); and 72% (NEL) and 58% (NWL) as low use (< 20 DPSE) (Figure 2 of Appendix H).
- 3.4.4.3 For the period March 2012-February 2013, SPSE was calculated in six categories, ranging from low use to high use. NEL and NWL have 22% and 14% of each respective area classified as high use (> 15 SPSE); 13% (NEL) and 46% (NWL) as moderate use (5.1-15 SPSE); and 65% (NEL) and 40% (NWL) as low use (< 5 SPSE) (Figure 3 of Appendix H).
- 3.4.4.4 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); 22% (NEL) and 16% (NWL) as moderate use (20.1-60 DPSE); and 71% (NEL) and 69% (NWL) as low use (< 20 DPSE) (provided by ENPO, Figure 4 of Appendix H). These figures were compared to impact monitoring data for March 2012-February 2013 (Table 3.16 of Appendix H). For DPSE in NWL, there was a decrease in low use grid cells, an increase in moderate use cells and a decrease in high use cells. As the geographical location of the cells remained similar between years, however, (see Figures 2 and 4 of Appendix H) this is an indication that preferred habitat has not changed over the NWL area rather that the habitat utilisation is more dispersed. In NEL, where low use cells have stayed at the same proportion and geographical location, the number of moderate use cells has halved and high use cells has increased dramatically. This indicates that dolphin groups occurred at a higher density in their preferred geographical area. Thus, when comparing the

³ 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.

year prior to Project commencement and the first year of HKBCF construction, a higher density of dolphins occurred in the area immediately adjacent to the Project site. This would indicate that the HKBCF did not cause any negative impacts, e.g., disturbance from habitat, during the first year of operation.

- 3.4.4.5 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 65% (NEL) and 52% (NWL) as low use (< 5 SPSE) during the year February 2011-January 2013 (Figure 5 of Appendix H). These figures were compared to impact monitoring data for March 2012-February 2013 (Table 3.16 of Appendix H). For SPSE in NWL, there has been an increase in moderate use grid cells but a reduction in low use and a slight reduction in high use cells. This correlates with that observed for DPSE, unsurprisingly as they are derived from interrelated data (see Figures 3 and 4 of Appendix H). This is also true for SPSE and DSPE in NEL, indicating that use has remained consistent across the NEL habitat use during the first year of impact monitoring year when compared to the year preceding construction activities at HKBCF.
- 3.4.4.6 Encounter rates per area per quarter for the year March 2012 to February 2013 were calculated. Variability in encounter rate is indicated by the SE which, with the exception of the first quarter of the year (March – May 2012) that had no encounters, shows that there is an overlap of variation in both areas for each quarter thus making it difficult to discern any differences in encounter rate that may be present (Figure 5 of Appendix H).
- 3.4.4.7 Sightings of dolphins were divided into quarterly periods and an increase then decrease in the number of sightings is depicted as the year progresses through each quarter, i.e., lowest use in March – May 2012, high use in June – November 2012 and, again, lower use in December 2012-February 2013 (Figure 6 of Appendix H).
- 3.4.4.8 Sightings of mothers and calves were made throughout the year (Figure 7 of Appendix H). Although it is often difficult to identify calves, using high resolution images and the identity of mothers, it has been possible to identify a minimum 14 individual calves (Figure 8 of Appendix H). One dead calf was recovered during impact surveys in July (see 3.4.3.5).
- 3.4.4.9 Mother and calves were often associated with large groups (5 or more individual dolphins) except during the quarter December 2012 and February 2013 (Figure 9 of Appendix H).
- 3.4.4.10 Four distinctive behavioural categories were defined; “associated with fishing trawler”, “feeding”, “travelling” and “surface active”. Three other categories were also defined; “multiple” (more than one behavior was observed at one time), “other” and “unknown”. Dolphins were most often engaged in foraging activities (both feeding and associated with fishing trawlers) in both NEL and NWL (Figure 10 and Figure 11 of Appendix H).
- 3.4.4.11 During surveys conducted in 2011-12, behavioural information was only recorded for approximately 20% of all sightings made. Although it is difficult to compare these limited data quantitatively with the data from 2012-13, plotting of behaviours by year (Figure 12 of Appendix H) highlights the consistency of the Lung Kwu Chau area of NWL as an important feeding area.
- 3.4.4.12 Abundance estimates were calculated for every month in 2012-13 using the programme Distance. Due to the variable spatial and temporal survey conduct during the year preceding the first year of impact monitoring (advanced plus baseline surveys), only the baseline period was used in abundance calculations as the survey coverage was relatively consistent. Surface abundance estimates (abundance is not corrected for availability) show that there is monthly variation in habitat use during 2012-13 with no definitive trend. The month of lowest abundance is April at 12.9 dolphins (95% CI = 6-29) and the highest is November 202.6 dolphins (95% CI = 147-286). The baseline period (Sept-Nov 2011) had an abundance of 113 dolphins (95% CI = 53-193). Apart from the months of lowest abundance (March and April 2012: it is noted that these months had less survey effort than following months) there is considerable overlap between nearly all abundance estimates and associated confidence intervals. These type of data alone rarely allow any clear perspective of significant

differences between any baseline and impact period due to the inherent monthly and seasonal variation in habitat use as well as the small, sparsely dispersed nature of the population. Further, NEL and NWL incorporate only a small proportion of the dolphins known distribution and abundance estimates are only relevant to the surveyed areas. What these data do show is that the abundances estimated for the impact monitoring period fall within the bounds of the baseline abundance estimate, with the exception of March and April 2012 when fewer dolphins occurred in both NEL and NWL (Figure 13 of Appendix H)

- 3.4.4.13 Feeding activities comprise approximately 50% of all observed behavior. This has remained consistent throughout the year. Between March 2012 – February 2013, dolphins were often recorded following fishing trawlers, often for hours. It is noted that the Hong Kong trawl ban commenced on 31 December 2012 and that dolphins have been sighted across the western maritime border following active fishing trawlers. This is not part of the impact monitoring designated area, however, it is known that dolphins freely travel across this area and dolphins which “normally” reside in Hong Kong may be spending more than usual amounts of time in adjacent waters feeding behind trawlers. “Surface active” behavior was seen throughout the year but decreased between September 2012 and February 2013 (Figure 10 of Appendix H).
- 3.4.4.14 As stated in the reports compiled for each quarter, the variation in distribution, habitat use, groups size, behavior, mother and calf occurrence and encounter rates varied throughout the year but no particular difference was noted from data recorded historically (in AFCD annual monitoring reports) or the baseline data with perhaps the exception of limited on effort sightings during March-May 2012. Nonetheless, very few and no sightings have also been recorded in AFCD data sets for this period. The breakdown in individual distribution, use and behavioural categories therefore do not show any changes which can be defined as significant. This is largely due to the variation in these traits as demonstrated in AFCD reports and typical of small cetacean populations in general.
- Correlation between Marine Mammal Presence and Construction Activities***
- 3.4.4.15 Construction activities at HKBCF have steadily increased since March 2012. Based on the pattern of habitat use, using both DSPE and SPSE, there has been consistent high use of those areas directly adjacent to HKBCF. This would indicate that the level of disturbance caused by HKBCF is either insufficient to cause disturbance or that the area serves as either critical habitat or supports a vital activity therefore, a degree of disturbance is tolerated.
- 3.4.4.16 It was recognised that HKBCF is located in an area of importance to the dolphin population of Hong Kong. As such, it was required in the EM&A Manual that a suitable analytical technique be proposed and implemented so that significant changes attributable to construction activities could be detected with a degree of certainty and in a timely manner. Single parameter analyses are unable to detect impact as the influence of additional and co-correlated factors are not accounted for. As such, a multi-parameter model was proposed and reviewed by management authorities. This analysis is currently underway and shall be reported in full in a separate report immediately on its completion.
- 3.4.4.17 Successful foraging is a vital activity for marine mammals and in Hong Kong, feeding often occurs in association with active fishing trawlers. As such, the distribution and activity of fishing trawlers is directly correlated to dolphin habitat use and behavioural activities. In January 2013, all commercial trawling ceased in Hong Kong waters. As such, patterns of association which were significant in the first year of impact monitoring (March 2012-February 2013) will no longer exist in subsequent quarters and years of monitoring and dolphin distribution and behavior may be fundamentally changed. This has occurred in other areas where fishing activities have changed (Ansmann et al. 2012⁴) There are no predictions in the EIA as to what these changes may be and subsequent reporting should consider any effect the trawler ban may have on dolphins and separate it from potential impacts from construction activities.
- 3.4.4.18 The silt curtain and Project related working vessels within the NEL area do not take up a significant proportion of the dolphins habitat nor does the footprint of HKBCF itself incorporate any high density habitat for dolphins (according to the EIA). As such, although the reclamation will result in habitat loss, it is a small proportion of habitat that was historically not often used by dolphins.

⁴ Ansmann, I., Parra, G.J., Chilvers, B. and Lanyon, J. (2012). Dolphins restructure social system after reduction of commercial fisheries. *Animal Behaviour*, 84(3), pp.575-581.

3.4.5 Verification of Impact Statements Stated in EIA and Supporting Documentation

- 3.4.5.1 The Statements made in the EIA and supporting documents are descriptive and do not provide a quantitative framework against which to compare data gathered through the first year of the 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 the first year of construction activities at HKBCF.
- 3.4.5.2 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:
- 3.4.5.2.1 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*”
- 3.4.5.2.2 This Project has consistently maintained water quality objectives as described in the EM&A Manual except where noted in Section 7.1.5. These exceptions, however, were subsequently found to be unrelated to Project works.
- 3.4.5.3 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)”
- 3.4.5.3.1 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.
- 3.4.5.4 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 with dolphin hotspot. 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)”
- 3.4.5.4.1 At HKBCF, moderate impact is anticipated but the degree or type of impact is not quantified in any numerical, spatial or temporal scale. After only one year of construction activities at HKBCF there is no clear pattern of any sudden or trending change in density, mortality, behaviour or school size associated with construction activities (see monthly surface abundance estimates and comparison with baseline study). Indeed, in NEL there is an increase in the percentage of high density usage cells. The impact of “permanent habitat loss” as a result of the HKBCF reclamation Section 10.7.4. of the EIA), is stated to be fully mitigated by the establishment of a Marine Protected Area after the construction phase of the Project is completed. This predication cannot be assessed until the HZMB operational phase starts and the Marine Park Area is established.

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

⁶ Gui, D., Yu, R., He, X., Tu, Q., Chen, L. and Wu, Y. Bioaccumulation and biomagnification of persistent organic pollutants in Indo-Pacific humpback dolphins (*Sousa chinensis*) from the Pearl River Estuary, China. *Chemosphere* 114:106-113

- 3.4.5.4.2 The Ecological Baseline Survey⁷ 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”.
- 3.4.5.5 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”*.
- 3.4.5.5.1 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 project. 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.
- 3.4.5.5.2 As a rigorous cumulative assessment has not yet been conducted, there is little quantitative information against which impact survey observations can be made. Further, there are no predictions which deal specifically with the activities at HKBCF and no predictions of direct, temporary or residual impacts on CWD. As such, it is anticipated that impacts to the CWD population which have not been defined in the original EIA. will occur as construction activities progress at HKBCF

3.4.6 Practicality and Effectiveness of the EM&A Programme

- 3.4.6.1 Monitoring and auditing of marine mammals was recommended for the construction phase of HKBCF to evaluate impact on marine mammals.
- 3.4.6.2 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.
- 3.4.6.3 The AFCD annual monitoring report for the period 2011-2012 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.
- 3.4.6.4 Significant declines in abundance cannot be detected in the short term, i.e., month by month, by using the combined line transect and photo-identification methodologies described in the EM&A Manuel. For a project of this scale in an area of importance to the Hong Kong dolphin population, the EM&A Manuel required that new analyses be proposed to detect any potential impacts in a timely manner. The proposed method which correlates a suite of biological, physical and environmental variables is able to detect short term significant change and is used by management authorities elsewhere for marine mammal monitoring during construction activities.

3.4.7 Conclusion

- 3.4.6.1 Between March 2012 and February 2013, dolphins have not been deterred from the area immediately adjacent to HKBCF although variation in seasonal and annual differences make it problematic to quantify statistical significance. Nonetheless, dolphins have occurred in this area consistently throughout the first year of impact monitoring.
- 3.4.6.2 Marine mammal monitoring was conducted between March 2012 and February 2013 in accordance with EM&A Manuel methodologies. These methodologies have been invaluable in the past in determining both broad scale and long term patterns of distribution, abundance, association, habitat use and behavioral activities. There is historically much variation in these parameters and all observations to date have fallen within patterns and trends documented previously.

⁷ Agreement No. MW 01/2003. Hong Kong- Zhuhai- Macao Bridge: Hong Kong Section and the North Lantau Highway Connection: Ecological Baseline Survey. Final 9 Month Ecological Baseline Survey Report the (p 42 – 43)

- 3.4.6.3 The surface abundance estimates calculated to date indicate that the density of dolphins using Hong Kong waters coincides with that estimated for baseline estimates and confidence intervals. A more qualitative approach to detecting fine scale and short term changes associated with HKBCF should use a multi-parameter analyses approach. Currently, survey and environmental data from other sources have been requested to complete these analyses so that any impacts can be discerned with a degree of certainty and in a timely manner so that current mitigation measures can be evaluated and strengthened if required.

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 Project. In the reporting period, 51 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:

4.1.2 Air Quality

4.1.2.1 The Contractor was reminded to provide vehicle washing facility at Works Area WA3.

4.1.2.2 The Contractor was reminded to implement dust suppression measures, especially on water spraying on haul road, at Works Area WA3.

4.1.2.3 Bags of cement were found debagged at open area. The Contractor was reminded that de-bagging, batching and mixing process of cement should be carried out in an area sheltered on top and the 3 sides.

4.1.2.4 Soil stockpiles placed at Work Area WA4 were covered with tarpaulin sheet incompletely. The Contractor was reminded to cover up the soil stockpiles completely with tarpaulin sheet if no works was carrying out temporarily.

4.1.2.5 The Contractor was reminded to check the operating plants on barge regularly and carry out maintenance /repair (if necessary), to avoid any dark smoke emission.

4.1.3 Noise

4.1.3.1. Noise Emission Labels (NELs) were found missing from the air compressors employed on barge FTP19 at Portion A. The Contractor was reminded to affix the NELs to the air compressor employed.

4.1.3.2. Air compressors on barge Sun Moon Kee were observed without valid noise emission label. The contractor was reminded to fit air compressors with valid noise emission label prior to operation. (Reminder

4.1.4 Water Quality

4.1.4.1 The Contractor was recommended to review the drainage system regularly and provide wastewater treatment facilities, especially for silty surface run-off during rainfall, if necessary, at Works Area WA3. Although concrete u-channels and sand bag bundings were provided at part of the site boundaries and provision of temporary drainage system was undergoing, The Contractor was recommended to provide sand bag bundings at the site boundaries temporarily prior to completion of u-channels.

4.1.4.2 Rubbish and accumulated rainwater was found inside the u-channel at Works Area WA4. The Contractor should clear up the rubbish and accumulated rainwater, especially after rainstorm.

4.1.4.3 Broken sand bags were observed at site boundary at Works Area WA4. The Contractor should remove and replace the broken sand bags.

4.1.4.4 Although it was rainy during the inspection, the Contractor was reminded to enhance the pumping system provided at U-channels at Work Area WA4 in order to avoid accumulation of run-off inside the channels.

- 4.1.4.5 Parts of the curtains were found distorted. Distorted silt curtains were noted at boundaries of the works areas, at Portion C2a and Portion A and parts of the silt curtain system at Portion B, D and E2. The Contractor was informed to rectify the situation swiftly.
- 4.1.4.6 Debris and wastes were found inside the drainage channel at Works Area WA4. The Contractor was reminded to clear the debris and wastes regularly and maintain the drainage channels properly.
- 4.1.4.7 Silt curtain installed for stone column installation works on barge FTB18 was found damaged. The Contractor was reminded to keep monitor and well maintain of the silt curtain more frequently to ensure the silt curtain are fully functional. The damaged silt curtain found on barge FTB18 was fixed in the reporting period. (Closed)
- 4.1.4.8 Defects noticed at parts of the perimeter silt curtain at portions E1, C2a, C2c were observed and under maintenance. The Contractor was reminded to swiftly rectify the perimeter silt curtain in particular the portions where defects were observed to ensure the sediment plume generated by construction activities could be prevented from discharging to areas outside the site boundary. The adverse situation was rectified by the Contractor in March 2013. (Closed)
- 4.1.4.9 It was noticed that a localised silt curtain was readily adjacent to Barge AP4 but was not deployed to enclose the active stone column installation at Portion A. The Contractor rectified the situation by enclosing the active stone column installation with localised silt curtain in the reporting period. (Closed)
- 4.1.4.10 Silty plume was noted around the stone column installation areas of FTP19 at Portion C2c. The Contractor was advised to check the condition of the silt curtain systems installed regularly and review the arrangement of localized primary silt curtains to minimize any leakage from works. (Under follow-up status)
- 4.1.4.11 Distortion of part of silt curtain system at site boundaries at Portion D, B, C2a and silt curtain system installed around the stone column installation area of FTB19 at Portion C2c were rectified. (Closure of item from previous reporting month)
- 4.1.4.12 Silty plume was noted around the stone column installation areas of FTB16 at Portion D and around the silt curtain system when the stone column installation was carried out by FTB23 when site inspection was conducted on FTB 19. The Contractor was advised to check the silt curtain systems installed regularly and review the arrangement of localized primary silt curtains to minimize any leakage from works. Also the Contractor was reminded to fix the primary silt curtain prior to stone column installation works. Such conditions were rectified within the reporting period and the contractor was reminded to keep checking the silt curtains systems regularly. (Closure of item in reporting period)

4.1.5 Chemical and Waste Management

- 4.1.5.1 Floating wastes were observed within the silt curtain confined areas of the stone blanket installation works area in Portion A of the Site. The Contractor was reminded to clear the floating wastes within works areas regularly.
- 4.1.5.2 Oil drums were found stored improperly at FTP19 in Portion E1. The Contractor was reminded to provide drip trays to oil drum stored on site to retain any leaked oil if there is such case.
- 4.1.5.3 Accumulation of oily water and materials were observed inside the drip trays employed on barge FTP19 at Portion A. The Contractor was reminded to clear the materials and oily water. The oily mixture should be treated and disposed of as chemical waste.
- 4.1.5.4 It is noted that few trucks of construction wastes were not transferred to designated disposal ground. The Contractor was reminded to provide measures to ensure construction wastes were sorted, transferred and disposed of properly. Toolbox talks and trainings should be provided to workers and dump truck drivers on waste management issues.

- 4.1.5.5 Battery packs were found improperly placed on the barge Ever Shine 18 at Portion C2c, the Contractor was reminded to provide drip trays to the battery packs used on site to retain any leaked chemical, if there is such case.
- 4.1.5.6 Chemical container was found improperly stored on the barge FTP23 at Portion A and on barge FTB 16 at Portion D. The Contractor was reminded to properly store chemical container in works area with provision of drip tray.
- 4.1.5.7 Oil drums were found improperly stored on barge San Hang Bo 601 at Portion C2a, San Hang Bo 208 (at Portion E2), San Hang Bo 402 (at Portion B) and FTB 17 (at Portion C2a) and Works Area WA4., and used oil drums on barge San Hang Bo 208 at Portion C2a were found improperly treated. Oil drums were also found improperly stored on barge Ever Shine 668 at Portion C2a and FTB 20 at Portion A. Drip trays should be provided to oil drums stored within works areas to retain any leaked oil if there is such case. On the other hand, used oil drums should be properly cleaned and labeled.
- 4.1.5.8 Oil drums, chemical containers and batteries were found improperly stored on barge San Hang Bo 401 at Portion C2a. Drip trays should be provided to oil drums, chemical containers and batteries stored within works areas to retain any leaked chemicals/oil if there is such case.
- 4.1.5.9 Moreover, oil stains were noted on the barge San Hang Bo 208 (where power pack where vibratory clamp placed), on the barge Ever Shine 668 at Portion C2a (where power pack and vibratory clamp placed) and on the barge deck of barge FTB 17 at Portion C2a. Also, similar case was noted near the wire bundle at the barge FTB19. Proper measures like drip trays/tarpaulin sheets should be provided to retain any leaked oil and oil stains should be cleared and disposed of as chemical wastes.
- 4.1.5.10 Power packs, generators and vibratory clamp were found improperly stored on barge San Hang Bo 208 (at Portion E2) and 402 (at Portion B). The Contractor should provide proper measures, like drip trays and tarpaulin sheet coverage, to retain any leaked oil from the plants. Oil stains on barge decks should be cleared and the absorbents should be treated as chemical wastes.
- 4.1.5.11 Waste skip placed at Works Area WA4 was full and stockpile of C&D wastes was also noted. The Contractor was reminded to sort the C&D wastes properly and dispose of the C&D wastes timely.
- 4.1.5.12 General refuse was stockpiled on barge San Hang Bo 208, 601 at Portion C2a and on barge FTB 16 at Portion D. The Contractor was reminded to remove the general refuse in a timely manner, designate areas and provide proper containers to store general refuse generated in works areas. The Contractor was reminded to clear and sort the general refuse within works areas regularly and properly.
- 4.1.5.13 Oily mixtures accumulated in the bunding area and drip tray were observed at barge Ever Shine 668 at Portion A, barge San Hang Bo 401 at Portion C2a, barge FTB20 at Portion D, inside the drip trays provided at ring-type sheetpile installation frame (type B) at Portion B and the bunded areas and bin on barge FTP19 at Portion C2c. The Contractor was reminded to clear the oily mixture within works area regularly and disposal of as chemical waste. Regular review should be conducted for working barges to ensure sufficient measures and spill control kits were provided on working barges to avoid any spreading of leaked oil/chemicals. Tarpaulin sheet coverage was recommended to minimize the chance of water accumulation inside drip trays during rainstorm. Regular checking of the drip tray conditions should be carried out.
- 4.1.5.14 As a reminder, the Contractor should maintain patrol boats with Spill Kits, for control of any spills and collection of any floating waste, within marine works area.
- 4.1.5.15 It was noted that provision of drip tray to the power pack at barge San Hang Bo 209 at Portion E2 was undergoing, the Contractor was reminded to complete the drip tray construction work swiftly in order to retain any leaked oil if there is such case.
- 4.1.5.16 Open holes was found in the bunding for storage oil drums and power pack at Barge San Hang Bo 208 and between barge surface and the bunding on barge Sang Hang Qi 7. The Contractor was reminded to seal the open holes to retain any oil leakage. Open holes found in the bunding for

storage oil drums and power pack at Barge Sang Hang Bo 208 and barge Sang Hang Qi 7 were sealed to prevent any leakage of oil. Also, an opening at the bottom of a drip tray was observed on FTB 19. The Contractor was reminded to seal the opening at the bottom of the drip tray. The opening at the bottom of a drip tray was sealed in the reporting period. (Closure of item in the reporting period)

- 4.1.5.17 Oily water accumulated in drip trays were cleared on Barge FTB 20 and Barge Kiu Chi and disposed of as chemical waste in the reporting period. (Closed)
- 4.1.5.18 General refuses accumulated on Barge Kiu Chi were disposed of properly in the reporting period. (Closed)
- 4.1.5.19 Oil leakage was noted from a plant on FTB16 at Portion D. Oily mixture was accumulated inside the bunded area, at FTB19 at Portion C2a and accumulated inside the power pack on Barge San Hang Bo 305, too. The Contractor was recommend to repair the plant and clear the mixture and treat them as chemical wastes. Such conditions were rectified within the reporting period. (Closed)
- 4.1.5.20 Oil stains were found on barge and near power pack at barge San Hang Qi 7, near two roll of wire on barge Sang Hang Qi 7, near oil drum on barge Sun Moon Kee, on barge near powerpack on barge Sang Hang Bo 210 and on Barge San Hang Bo 401. The contractor was reminded to clean the oil stain and the absorbents should be treated as chemical wastes. The Contractor was reminded to provide mitigation measure such as drip tray or tarpaulin sheet to retain any oil leakage. The Contractor provided mitigation measure such as tarpaulin sheet to retain any oil leakage and bunding was provided to retain leaked oil from the power pack on Barge San Hang Qi 7. (Closed)
- 4.1.5.21 Empty oil drums were found improperly stored on barge Sun Moon Kee. The contractor was reminded to provide mitigation measures such as providing drip trays to waste oil drums or to place the waste oil drum to a proper storage area for temporary storage. Empty oil drums on barge Sun Moon Kee were removed. Also, oil drums were stored inside the drip trays to retain any oil leakage at Works Area WA4. (Closed)
- 4.1.5.22 Oil drums were found improperly stored on barge San Hang Qi 7, barge Sun Moon Kee, FTB19 at Portion C2a and Sang Hang Bo 205. Drip trays should be provided to oil drums stored within works areas to retain any leaked oil. Oil drums were stored inside the bunding on barge within the reporting period. (Closure of item in the reporting period) A drum of waste oil was found improperly stored on barge Sun Moon Kee. The Contractor was reminded to place the waste oil drum to designated chemical waste storage area for temporarily storage. The chemical waste container should also be labelled. A proper lid should be provided to the opened drum. Such condition was rectified within the reporting period. (Closed)
- 4.1.5.23 Drip tray was provided to the power pack on barge San Hang Bo 402 at Portion B. Measure was provided to vibratory clamp on barge San Hang Bo 208 and oil stains on barge deck were cleared. The Contractor was reminded that measures like drip trays and tarpaulin sheet coverage should be provided to plants to retain any leakage. Oil stains on barge deck should be cleared and absorbents should be treated as chemical wastes. (Closed)
- 4.1.5.24 Power pack without drip trap was observed. The contractor was reminded to provide proper measure such as drip tray to power pack to retain leaked oil. Power pack was found improperly stored on Barge San Hang Bo 401. The Contractor was reminded that proper measures like drip trays/tarpaulin sheets should be provided to retain any leaked oil from power pack on the barge. Power pack improperly stored on Barge San Hang Bo 401 was removed within the reporting period. (Closed).
- 4.1.5.25 Drip tray was provided to the power pack on barge San Hang Bo 402 at Portion B. Measure was provided to vibratory clamp on barge San Hang Bo 208 and oil stains on barge deck were cleared. The Contractor was reminded that measures like drip trays and tarpaulin sheet coverage should be provided to plants to retain any leakage. Oil stains on barge deck should be cleared and absorbents should be treated as chemical wastes. (Closed).
- 4.1.5.26 The contractor was reminded to disposal the oil absorbent materials of as chemical wastes and provide a proper chemical waste storage area on Barge San Hang Bo 208. (Reminder)

- 4.1.5.27 General refuse collection bin on FTB16 at Portion D was found placed inside the bunded area for oil drums storage. The Contractor was recommended to relocate the general refuse collection area. Such condition was rectified within the reporting period. (Closed)
- 4.1.5.28 The containers placed for containing the dripping water from air-conditioner were found full of water and debris at Barge SHA HANG QI 6. Immediate actions of clearing up the containers were taken by the Contractor. The Contractor was reminded to keep the barge clean and tidy. (Closed)
- 4.1.5.29 Oil drum was found improperly stored at FTB24, FTB18, FTB16, FTB19, SHB208, Sun Moon Kee. The Contractor rectified the situation by removing the oil drums from the area without bunding and/or relocating the oil drum inside the bunded area to prevent oil leakage (Closed).
- 4.1.5.30 Oil drums were provided with bunding on barge Sang Hang Qi 7 and the Contractor properly labelled the oil drum on barge Sang Hang Qi 7 and barge Sang Hang Bo 205 to enclose the oil drums stored within works areas to retain any leaked oil within the reporting period (Closed).
- 4.1.5.31 Oil drums were found without proper labelling at barge Ever Shine. The Contractor was advised to label all oil drums properly and oil drums were provided with proper labelling at barge Ever Shine within the reporting period (Closed).
- 4.1.5.32 Bucket of waste water was found near at a location without bunding/drip tray on Sang Han Bo 209. The Contractor immediately rectified the situation by relocated the bucket of waste water inside the bunded area to prevent potential waste water runoff into nearby water system. The Contractor was reminded to place buckets of waste water inside bunded area on barge (reminder).
- 4.1.5.33 The oil stain found near the power pack on barge Sang Hang Qi 7 and Sang Hang Bo 210, underneath a pack of cable and on the floor of barge Fai Yue 3228 and near a vibration clamp on barge Fai Yue 3228 were cleared and the absorbents were treated as chemical wastes. Mitigation measure such as tarpaulin sheet was placed underneath a pack of cable and on the floor of barge Fai Yue 3228 to retain any potential oil leakage. (Closed).
- 4.1.5.34 The Contractor provided mitigation measure such as tarpaulin sheet and bunding to retain potential leaked oil near the machine on barge Sun Moon Kee to power pack on Sang Hang Bo 205 to retain leaked oil respectively within the reporting period (Closed).
- 4.1.5.35 Gap was observed between barge surface and the bunding on barge Sun Moon Kee. The Contractor was reminded to seal the gap to prevent oil leakage. Gaps between barge surface and the bunding on barge Sun Moon Kee were sealed within the reporting period (Closed).
- 4.1.5.36 Uncovered open holes in the bundings and drip trays were found on barge FTB18 and on barge Sun Moon Kee. Oil leakage was found on barge Sun Moon Kee leaked through a bunding. The leaked oil was immediately cleared by the Contractor using absorbents and the Contractor was reminded to dispose the absorbents as chemical waste. The Contractor was reminded to seal/cover the open holes properly to prevent oil leakage. Open holes in the bundings and drip trays found on barge FTB18 were covered in the reporting period (Closed)
- 4.1.5.37 Incident of oil spillage was observed on barge FTB 20. The spilled oil was immediately cleared by the Contractor using spill kit and the Contractor was reminded to dispose the absorbents as chemical waste. The Contractor was reminded to maintain proper oil spill cleanup procedure for oil spillage (Reminder).
- 4.1.5.38 Oil was found accumulated inside the drip tray on barge FTB20. The Contractor rectified the situation by clearing the waste oil inside the drip tray, the Contractor is reminded to dispose the waste oil as chemical waste. (Reminder)
- 4.1.5.39 Water was observed dripping from the pipe connected to the air conditioner. The Contractor provided mitigation measures by placing a bucket to collect water that dripped from the air conditioner. (Closed)

- 4.1.5.40 Stagnant water accumulated inside the car tire on barge Sang Han Bo 205 and inside the drip tray on barge Sang Han Bo 210 were observed. The Contractor was reminded to clear the water or open a hole on the tire on Sang Han Bo 205 to prevent mosquito breeding and to clear the water accumulated inside the drip tray on barge Sang Han Bo 210 respectively. Stagnant water accumulated inside the wheel tire on barge Sang Han Bo 205 and inside the drip tray on barge Sang Han Bo 210 were removed in the reporting period. (Closed)
- 4.1.5.41 Garbages accumulated on barge Kiu Chi was observed and food waste was observed left outside of the bin on barge SHB 402. The Contractor was reminded to clear up the garbages/food waste frequently to keep site clean and tidy. Garbages accumulated on barge Kiu Chi was cleared in the reporting period. (Closed)
- 4.1.5.42 Although the content of the stockpile on barge Fu Tat was dampened, however, the Contractor was reminded to dampen the stockpile frequently to suppress fugitive dust generated. (Reminder)

4.1.6 Landscape and Visual Impact

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

4.1.7 Others

- 4.1.7.1 No adverse observation was identified in the reporting period.
- 4.1.7.2 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 project. Sufficient numbers of receptacles were available for general refuse collection and sorting.
- 5.1.2 As advised by the Contractor, 779,097.5 m³ of imported fill were imported for the Project use in the reporting period. 7,618kg of chemical waste were generated and disposed of in the reporting period. 825.5 m³ of 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 Insufficient dolphin survey efforts due to inclement weather conditions in March and April 2012 and inability of setting up and carrying out impact air quality monitoring at AMS6 (Dragonair/CNAC (Group) Building) were noted in the reporting period. Supplementary dolphin surveys have been conducted during June and July 2012 to ensure that adequate survey efforts will be maintained. (March – May 12)
- 6.1.2 Two (2) Non-Compliance dated on 31 Oct 2012 and 6 Nov 2012 was noted during the reporting period.
- 6.1.3 For the Non-Compliance dated on 31 Oct 2012, as informed by the Contractor on 30 November 2012, a noise complaint was received by EPD on the 18 Oct 2012 and on one of the two complaint follow up inspection conducted by EPD on 19 and 31 October 2012, operation of a powered mechanical equipment after 19:00 without valid CNP was observed on 31 Oct 12 at WA4. One worker was carrying out emergency maintenance for machinery with generator after 19:00, while no construction noise permit was in force, which is suspected that the Noise Control Ordinance (Cap.400) was violated. A “Pink Form” (inspection record) was subsequently issued by EPD on the 14 November 2012 regarding the suspected violation of Noise Control Ordinance (Cap.400).
- 6.1.3.1 The Contractor was recommended to implement the following noise mitigation measures in case any construction activities involving the use of Powered Mechanical Equipment (PME) is conducted in the concerned area:
- Work involves Powered Mechanical Equipment (PME) should be stopped before 7 pm
 - Review the need to increase the frequency of Construction Noise and Suppression training, provide extra training if deemed necessary.
 - Install notice sign on site to notice workers that Powered Mechanical Equipment (PME) and Prescribed Construction Work (PCW) (e.g. 1. Erection or dismantling of formwork or scaffolding. 2. Loading, unloading or handling of rubble, wooden boards, steel bars, wood or scaffolding material and 3. Hammering) are not allowed from 7pm to 7am on the next day or anytime on public holidays, including Sundays.
 - The noise mitigation measures should be maintained and the effectiveness of noise mitigation measures deployed within works area should be enforced and reviewed onsite regularly in order to provide sufficient noise screening effect properly.
- 6.1.3.2 A follow-up site inspection was conducted on 3 January 2013 by ET and with representative from the Contractor. During the inspection, follow up actions taken by the Contractor to improve the situation was observed. No Powered Mechanical Equipment (PME) was in operation and it was observed that notice signs were installed on site by the Contractor to notice workers that work involves Powered Mechanical Equipment (PME) is prohibited from 19:00 to 07:00 on all days and whole day on public holiday.
- 6.1.3.3 Prior to any confirmation of any possible summon and prosecution. ET will continue to monitor the mitigation actions carried out by the Contractor and provide appropriate assistance and advice whenever necessary.
- 6.1.4 For the Non-Compliance dated 6 Nov 2012 there was an incident of trial filling of sand blanket by conveyor without full enclosure observed and reported. The condition was rectified and the wind board was installed on 8 Nov 2012.
- 6.1.4.1 Defects were noticed at parts of the perimeter silt curtain at portions E1, C2a. C2c and those defective parts are yet to be rectified. Although maintenance works were noted during site inspections and on the records provided by the Contractor. However, there is still parts of the silt curtain were found defective in the reporting period therefore the Contractor was reminded again to swiftly complete the rectification works of the perimeter silt curtain in particular the portions where defects were observed to ensure the sediment plume generated by construction activities could be prevented from discharging to areas outside the site boundary. Meanwhile, ET followed up the situation and closely monitored the progress of the maintenance work and reported the progress accordingly during the reporting period.

- 6.1.4.2 In response to the site audit findings, the Contractors carried out corrective actions.
- 6.1.4.1 A summary of the Implementation Schedule of Environmental Mitigation Measures (EMIS) is presented in Appendix C. Most of the recommended mitigation measures, as included in the EM&A programme, were implemented properly in the reporting period, except inability of setting up and carrying out impact air quality monitoring at AMS6 (Dragonair/CNAC (Group) Building) were noted. Liaison with relevant parties for permission on access to the premise for setting up and carrying out impact air quality monitoring works at AMS6 was continued until 19 November 2012. Reference is made to ET's proposal of the omission of air monitoring station (AMS 6) dated on 1st November 2012 and EPD's letter dated on 19th 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 will be effective since 19th November 2012. 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. .
- 6.1.4.3 Training of marine travel route for marine vessels operator was given to relevant staff and relevant records were kept properly.
- 6.1.4.4 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.
- 6.1.4.5 Acoustic decoupling measures on noisy plants on construction vessels were checked regularly and these measures were well implemented.
- 6.1.4.6 As informed by the Contractor, insufficient mitigation measures were noted during a joint site inspection with the representative of the Contractor and the Resident Engineer in the after from 14:30 to 16:00 of 28 Jan 2013.
- 6.1.4.7 It was noticed that part of the demarcation for Zone F was missing; being contrary to the other condition 3.d.16 of the above CNP. In addition , Some generators and air compressors on barge FTB-16 in Zone S4 were not completely screened by the acoustic baffles and parts of those powered mechanical equipment (PME) were visible from Hong Kong SkyCity Marriott Hotel (noise sensitive receiver); being contrary to other condition of the CNP. It is understood that the set up of acoustic baffles for FTB-20 in Zone S5 was identical to FTB-16 in Zone S4. Therefore the Contractor was advised to inspect and rectify (if necessary) the acoustic baffles so as to comply with other condition 3.d.13 of the CNP.
- 6.1.4.8 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.
- 6.1.4.9 As informed by the Contractor on 9 February 2013, the deficiencies were rectified. 7 nos. of demarcation (were no more visible) for Zone F have been re-deployed.
- 6.1.4.10 Extra noise barriers were installed onto barge FTB-16 in Zone S4 and FTB-20 in S5. generators and air compressors on barge FTB-16 in Zone S4 and FTB-20 in S5 were completely screened by the acoustic baffles and parts of those powered mechanical equipment (PME) were no more visible from Hong Kong SkyCity Marriott Hotel (noise sensitive receiver).
- 6.1.4.11 The Contractor was reminded to strictly comply with the condition of the CNP.

7 SUMMARY OF EXCEEDANCES OF THE ENVIRONMENTAL QUALITY PERFORMANCE LIMIT

7.1 Summary of Exceedances of the Environmental Quality Performance Limit

- 7.1.1. No exceedance of Action and Limit Level was recorded for 1-hour TSP monitoring in the reporting quarter. However, one Action Level exceedance and four (4) Limit Level exceedance was recorded for 24-hour TSP results in the reporting period. Investigation results show that the exceedances were not due to the Project works. The Contractor was recommended to continue implementing existing dust mitigation measures
- 7.1.2. One (1) Limit Level exceedance of impact noise monitoring was recorded in the reporting period. Investigation into the possible causes of each exceedance was undertaken and reported in the respective monthly EM&A reports. Investigation results show that the exceedance was not due to the Project works. The Contractor was recommended to continue implementing existing noise mitigation measures.
- 7.1.3. The Contractor was recommended to continue implementing existing noise mitigation measures.
- 7.1.4. Thirty (30) Action Level exceedances and (2) Limit Level exceedances were recorded at measured suspended solids (SS) values (in mg/L), three (3) Action Level exceedances was recorded at measured turbidity (in NTU) and one (1) Action Level exceedance was recorded at measured DO (Bottom) (mg/L) during the reporting period. Investigation result show that the exceedances were not due to the Project works. Nevertheless, the Contractor was reminded to ensure provision of ongoing maintenance to the silt curtains.
- 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 Compliants, Notification of Summons and Successful Prosecutions

- 8.1.1 The Environmental Complaint Handling Procedure is annexed in Figure 5.
- 8.1.2 As informed by the Contractor on the 28 Dec 2012, a night time noise at Works Area WA4 related complain (after 7 pm) was received by EPD on 18 Oct 2012. After investigation, the Contractor was reminded to implement necessary mitigation measures.
- 8.1.3 A complaint was referred by EPD on 24 Oct 12 regarding the blackish water (suspected oil spillage) observed outside the construction site near the Hong Kong International Airport and the new development pier in Tung Chung. Photos were taken by the complainant on 19, 22 and 24 October 2012. The investigation results show that the complaint was non-project related. However the Contractor was reminded to continue to implement necessary mitigation measures.
- 8.1.4 EPD referred a complaint from a complainant on 18 Jan 2013 who advised that turbid water and concrete/cement was arising from the Hong Kong-Zhuhai-Macao Bridge Hong Kong Projects to marine water. The source of turbid water and concrete/cement was not specified by the complainant. After investigation, it could not be concluded whether the complaint was considered as project related or not. However the Contractor was reminded to continue to implement necessary mitigation measures.
- 8.1.5 One (1) complaint was referred to the HyD by the Islands District Council (IDC) on the 6 February 2013 regarding a resident from Phase 1 Caribbean Coast who complained the nuisance brought by construction along Ying Hei Road, Tung Chung. Complaint investigation was conducted by the HyD and written reply were subsequently given to IDC by HyD on 4 March 13. The investigation results show that the complaint was non-project related. Nevertheless, the Contractor was reminded by HyD to continue to keep the site and its nearby area clean and tidy.
- 8.1.6 No notification of summons and prosecution was received in the reporting period.
- 8.1.7 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 Only five (5) 24-hour TSP monitoring exceedances were recorded in the reporting period and it was considered not related to the Project 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 Only one (1) construction 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 Project 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 36 water quality monitoring exceedances were recorded in the reporting period and it was considered not related to the Project works. 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.

11 REVIEW OF EM&A PROGRAMME

- 11.1 The environmental monitoring methodology was considered well established as the monitoring results were found in line with the EIA predictions.
- 11.2 As effective follow up actions were promptly taken once exceedances were recorded, no further exceedance occurred for each case. The EM&A programme was considered successfully and adequately conducted during the course of the reporting period.

12 COMMENTS, RECOMMENDATIONS AND CONCLUSIONS

12.1 Comments on mitigation measures

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

12.2 Air Quality Impact

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

12.3 Construction Noise Impact

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

12.4 Water Quality Impact

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

12.5 Chemical and Waste Management

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

12.6 Landscape and Visual Impact

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

12.7 Recommendations on EM&A Programme

- 12.7.1. The impact monitoring programme for air quality, noise, water quality and dolphin ensured that any deterioration in environmental condition was readily detected and timely actions taken to rectify any non-compliance. Assessment and analysis of monitoring results collected demonstrated the environmental impacts of the Project. With implementation of recommended effective environmental mitigation measures, the Project'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 Project. 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 Project commenced on 12 March 2012.
- 12.8.2 For air quality monitoring, no Action/Limit Level exceedance of 1-hour TSP results was recorded in the reporting period. However, one (1) Action Level and Four (4) Limit Level exceedances of 24-hour TSP results were recorded at monitoring location AMS3A in the reporting period. Investigation results show that both the Action and Limit Level exceedance of 24-hour TSP results were not project-related. Possible dust generating activities of the Project did not cause any noticeable deterioration in air quality at the area. The average 24-hour TSP level recorded at AMS7 in EM&A programme was lower than the daily dust level predicted in the EIA.
- 12.8.3 There was (1) one limit level exceedance recorded at NMS3A. Noise generating activities of the Project 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 Thirty (30) Action Level exceedances and (2) Limit Level exceedances were recorded at measured suspended solids (SS) values (in mg/L), three (3) Action Level exceedances was recorded at measured turbidity (in NTU) and one (1) Action Level exceedance was recorded at measured DO (Bottom) (mg/L) during the reporting period. Investigation result show that the exceedances were not due to the Project works. After review of investigation results of water quality exceedances (for detail of investigations please refer to section 4 of monthly EM&A report (Mar 12 to Feb 13), 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. Non-Project related vessel activities such as trawling of fishing vessels near the monitoring station 2. Rough sea condition caused by adverse weather and relatively strong current experienced during the monitoring period and 3. During the time 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 Project works.. This indicated these exceedances of DO were unlikely to be contributed by Project works. 4. Local effects in the vicinity of the monitoring station where exceedance was recorded. Furthermore, no correlation between the filling rates and the number of water quality exceedances recorded per monitoring day was found. With proper implementation of water quality mitigation measures, marine construction activities of the Project did not cause any unacceptable water quality impacts to the receivers.
- 12.8.5 No triggering of Event and Action Plan for impact dolphin monitoring was noted in the reporting period.
- 12.8.6 Environmental site inspection was carried out forty eight times in the reporting period. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audits.
- 12.8.7 Four (4) environmental complaints were received in the reporting period.
- 12.8.8 No notification of summons and successful prosecution was received in the reporting period.
- 12.8.9 As discussed in the above sections, the Project did not cause unacceptable environmental impacts or disturbance to air quality, noise, water quality in the vicinity near the reclamation works.
- 12.8.10 Apart from the above mentioned monitoring, most of the recommended mitigation measures, as included in the EM&A programme, were implemented properly in the reporting period, except inability of setting up and carrying out impact air quality monitoring at AMS6 (Dragonair/CNAC (Group) Building) were noted. Liaison with relevant parties for permission on access to the premise for setting up and carrying out impact air quality monitoring works at AMS6 was continued until 19 November 2012. 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 will be effective since 19 November 2012.

- 12.8.11 The recommended environmental mitigation measures effectively minimize the potential environmental impacts from the Project. The EM&A programme effectively monitored the environmental impacts from the construction activities and ensure the proper implementation of mitigation measures. No particular recommendation was advised for the improvement of the programme.
- 12.8.12 Moreover, regular review and checking on the construction methodologies, working processes and plants were carried out to ensure the environmental impacts were kept minimal and recommended environmental mitigation measures were implemented effectively.