

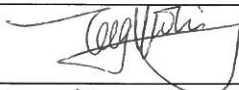
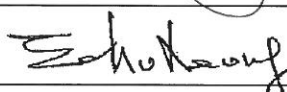
China Harbour Engineering Company Limited

Contract No. HY/2010/02

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

Monthly EM&A Report for March 2012

[04/2012]

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

Version:	Rev. 0	Date: 18 March 2012
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Disclaimer

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_0062L.12

18 April 2012

Engineer's Representative
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Hong Kong

By Fax (2268 3970) and By Post

Attention: Mr. Michael Lo

Dear Mr. Lo,

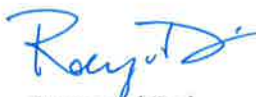
Re: Contract No. HY/2010/02
Hong Kong – Zhuhai – Macao Bridge
Hong Kong Boundary Crossing Facilities – Reclamation Work
Monthly Environmental Monitoring & Audit Report for March 2012

Reference is made to the Environmental Team's submission of the Monthly Environmental Monitoring & Audit Report for March 2012 (letter ref. 60249820/C/LCHC12041813 dated 18 April 2012) copied to us by E-mail on 18 April 2012.

We are pleased to inform you that we have no adverse comment on the captioned Monthly EM&A Report. We write to verify the captioned report in accordance with Condition 5.4 of EP-353/2009/D and Condition 4.4 of EP-354/2009/A (for TM-CLKL Southern Landfall Reclamation only).

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. Philip Lam (By Fax: 3188 6614)
AECOM – Ms. Echo Leong (By Fax: 2317 7609)
CHEC – Mr. C M Wong (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 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 7 March 2012 (EP-353/2009/D) and 8 December 2011 (EP-354/2009/A) (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 Highways Department (HyD) as the Contractor to undertake the construction work of the Project and ENVIRON Hong Kong Ltd. was employed as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO) for the Project.

AECOM Asia Co. Ltd. (AECOM) was appointed by China Harbour Engineering Company Limited to undertake the role of Environmental Team for the Project for carrying out the EM&A works.

The construction phase of the Project under the EPs was commenced on 12 March 2012 and will be tentatively completed by the end of 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 and 31 March 2012. As informed by the Contractor, major activities in the reporting period were:-

Marine-based Works

- Cone penetration test;
- Geotextile laying;
- Stone column trial;
- Installation of silt curtain; and
- Stone blankets laying.

Land-based Works

- Site office erection and construction at Works Area WA2;
- Constructing site access at area WA2 to Ying Hei Road, Tung Chung; and
- Public Works Regional Laboratory erection and construction at Works Area WA3.

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

24-hour TSP monitoring	3 sessions
1-hour TSP monitoring	3 sessions
Day, evening and night time noise monitoring	3 sessions
Impact water quality monitoring	9 sessions
Impact dolphin monitoring	2 sessions
Joint Environmental site inspection	3 sessions

Breaches of Action and Limit Levels for Air Quality

No exceedance of Action and Limit Level was recorded for 1-hour and 24-hour TSP monitoring in the reporting month.

Breaches of Action and Limit Levels for Noise

No Action/Limit Level exceedance of construction noise was recorded in the reporting month.

Breaches of Action and Limit Levels for Water Quality

One (1) Limit Level exceedance was recorded in the reporting month. Investigation results show that the exceedance was not due to the Project works. Nevertheless, the Contractor was reminded to ensure provision of ongoing maintenance to the silt curtains.

Impact Dolphin Monitoring

A total of seven dolphin sightings were recorded during the two surveys, five on 29th March 2012 and two on 31st March 2012. Of the seven sightings, four were “on effort” and three were “opportunistic”. The predominant behavior of the dolphin observed was feeding, as defined by deep dives or association with a fishing vessel at the time of the sighting. There is no indication that construction activities from the Project have caused disturbance or direct damage to the marine mammals which were observed.

No other active construction sites were noted during the two survey periods within Hong Kong waters. Marine construction work was noted close to the Hong Kong–China maritime border in Chinese waters and dolphins were observed in this area (near Tai O). Large numbers of shipping vessels from other parties were noted close to the dolphins recorded near CLP Power Station.

Complaint, Notification of Summons and Successful Prosecution

No complaint was followed up by Environmental Team in the reporting month.

No notification of summons and successful prosecution was received in the reporting month.

Reporting Change

There was no reporting change required in the reporting period.

Future Key Issues

Key issues to be considered in the coming month included:-

- Site runoff should be properly collected and treated prior to discharge;
- Minimize loss of sediment from filling works;
- Regular review and maintenance of silt curtain systems, drainage systems and desilting facilities;
- Exposed surfaces/soil stockpiles should be properly treated to avoid generation of silty surface run-off during rainstorm;
- Regular review and maintenance of wheel washing facilities provided at all site entrances/exits;
- Conduct regular inspection of various working machineries and vessels within works areas to avoid any dark smoke emission;
- Suppress dust generated from work processes with use of bagged cements, earth movements, excavation activities, exposed surfaces/soil stockpiles and haul road traffic;
- Quieter powered mechanical equipment should be used;
- Provision of proper and effective noise control measures for operating equipment and machinery on-site, such as erection of movable noise barriers or enclosure for noisy plants;
- Closely check and replace the sound insulation materials regularly;
- Better scheduling of construction works to minimize noise nuisance;
- Properly store and label oil drums and chemical containers placed on site;
- Proper chemicals, chemical wastes and wastes management;
- Maintenance works should be carried out within roofed, paved and confined areas;
- Collection and segregation of construction waste and general refuse on land and in the sea should be carried out properly and regularly; and
- Proper protection and regular inspection of existing trees, transplanted/retained trees.

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 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 Subsequent to EIA Study Brief of TMCLKL being prepared and based upon the proposed schemes for the Hong Kong-Zhuhai-Macao Bridge (HZMB) and HKBCF, it was decided to integrate the TMCLKL southern landfall reclamation with the HKBCF reclamation. It was considered that this arrangement would also provide a cost-effective connection between the HKBCF and North Lantau.
- 1.1.3 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.
- 1.1.4 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) and March 2012 (EP-353/2009/D). 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).
- 1.1.5 The Project is a designated project and is governed by the current permits for the Project, i.e. the amended 1.1.5 EPs issued on 7 March 2012 (EP-353/2009/D) and 8 December 2011 (EP-354/2009/A) (for TMCLKL Southern Landfall Reclamation only).
- 1.1.6 A Project Specific EM&A Manual, which included all project-relation contents from the original EM&A Manuals for the Project, was issued in March 2012.
- 1.1.7 The Project comprises of seawall construction and reclamation works at the northeast waters off the Airport Island to provide land platform (about 130ha of area) for the construction of an artificial island for the development of the boundary crossing facilities, and about 19-hectare for the southern landfall of the Tuen Mun - Chek Lap Kok Link.
- 1.1.8 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).
- 1.1.9 China Harbour Engineering Company Limited (CHEC) was awarded by Highways Department (HyD) as the Contractor to undertake the construction work of the Project and ENVIRON Hong Kong Ltd. was employed as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO) for the Project.
- 1.1.10 AECOM Asia Co. Ltd. (AECOM) was appointed by China Harbour Engineering Company Limited to undertake the role of Environmental Team for the Project for carrying out the EM&A works.
- 1.1.11 The construction phase of the Project under the EPs was commenced on 12 March 2012 and will be tentatively completed by the end of Year 2016.
- 1.1.12 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

1.2.1 This is the first monthly EM&A 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 in March 2012.

1.3 Project Organization

1.3.1 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	Michael Lo	2528 3031	2668 3970
IEC / ENPO (ENVIRON Hong Kong Limited)	Independent Environmental Checker	Raymond Dai	3743 0788	3548 6988
	Environmental Project Office	Marcus Ip	3743 0788	3548 6988
Contractor (China Harbour Engineering Company Limited)	General Manager (S&E)	Daniel Leung	3157 1086	2578 0413
	Environmental Officer	C. M. Wong	3157 1086	2578 0413
ET (AECOM Asia Company Limited)	ET Leader	Echo Leong	3922 9280	2371 7609

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 this reporting period are listed below:-

Marine-based Works

- Cone penetration test;
- Geotextile laying;
- Stone column trial;
- Installation of silt curtain; and
- Stone blankets laying.

Land-based Works

- Site office erection and construction at Works Area WA2;
- Constructing site access at area WA2 to Ying Hei Road, Tung Chung; and
- Public Works Regional Laboratory erection and construction at Works Area WA3.

1.4.3 The 3-month rolling construction programme of the Project is shown in Appendix B.

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

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

1.5 Summary of EM&A Programme Requirements

1.5.1 The EM&A programme required environmental monitoring for air quality, noise, water quality, marine ecology and environmental site inspections for air quality, noise, water quality, waste management, marine ecology, and landscape and visual impact. The EM&A requirements for each parameter described in the following sections include:-

- All monitoring parameters;
- Monitoring schedules for the reporting month and forthcoming month;
- Action and Limit levels for all environmental parameters;
- Event / Action Plan;
- Environmental mitigation measures, as recommended in the Project EIA reports; and
- Environmental requirement in contract documents.

2 AIR QUALITY MONITORING

2.1 Monitoring Requirements

2.1.1 In accordance with the Project Specific EM&A Manual, baseline 1-hour and 24-hour TSP levels at 3 air quality monitoring stations were established. Impact 1-hour 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. The Action and Limit level of the air quality monitoring is provided in Appendix D.

2.2 Monitoring Equipment

2.2.1 24-hour TSP air quality monitoring was performed using High Volume Sampler (HVS) located at each designated monitoring station. The HVS meets all the requirements of the Project Specific EM&A Manual. Portable direct reading dust meters were used to carry out the 1-hour TSP monitoring. Brand and model of the equipment is given in Table 2.1.

Table 2.1 Air Quality Monitoring Equipment

Equipment	Brand and Model
Portable direct reading dust meter (1-hour TSP)	Sibata Digital Dust Monitor (Model No. LD-3 and LD-3B)
High Volume Sampler (24-hour TSP)	Tisch Environmental Mass Flow Controlled Total Suspended Particulate (TSP) High Volume Air Sampler (Model No. TE-5170)

2.3 Monitoring Locations

2.3.1 Monitoring locations AMS2 and AMS7 were set up at the proposed locations in accordance with Project Specific EM&A Manual. However, 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.

2.3.2 Figure 2 shows the locations of monitoring stations. Table 2.2 describes the details of the monitoring stations.

Table 2.2 Locations of Impact Air Quality Monitoring Stations

Monitoring Station	Location	Description
AMS2	Tung Chung Development Pier	Rooftop of the premise
AMS3A	Site Boundary of Site Office Area at Works Area WA2	On ground at the area boundary
AMS7	Hong Kong SkyCity Marriott Hotel	On ground at boundary of the premise

2.4 Monitoring Parameters, Frequency and Duration

2.4.1 Table 2.3 summarizes the monitoring parameters, frequency and duration of impact TSP monitoring.

Table 2.3 Air Quality Monitoring Parameters, Frequency and Duration

Parameter	Frequency and Duration
1-hour TSP	Three times every 6 days while the highest dust impact was expected
24-hour TSP	Once every 6 days

2.5 Monitoring Methodology

2.5.1 24-hour TSP Monitoring

- (a) The HVS was installed in the vicinity of the air sensitive receivers. The following criteria were considered in the installation of the HVS.
- (i) A horizontal platform with appropriate support to secure the sampler against gusty wind was provided.
 - (ii) The distance between the HVS and any obstacles, such as buildings, was at least twice the height that the obstacle protrudes above the HVS.
 - (iii) A minimum of 2 meters separation from walls, parapets and penthouse for rooftop sampler.
 - (iv) No furnace or incinerator flues nearby.
 - (v) Airflow around the sampler was unrestricted.
 - (vi) Permission was obtained to set up the samplers and access to the monitoring stations.
 - (vii) A secured supply of electricity was obtained to operate the samplers.
 - (viii) The sampler was located more than 20 meters from any dripline.
 - (ix) Any wire fence and gate, required to protect the sampler, did not obstruct the monitoring process.
 - (x) Flow control accuracy was kept within $\pm 2.5\%$ deviation over 24-hour sampling period.
- (b) Preparation of Filter Papers
- (i) Glass fibre filters, G810 were labelled and sufficient filters that were clean and without pinholes were selected.
 - (ii) All filters were equilibrated in the conditioning environment for 24 hours before weighing. The conditioning environment temperature was around 25 °C and not variable by more than ± 3 °C; the relative humidity (RH) was < 50% and not variable by more than $\pm 5\%$. A convenient working RH was 40%.
 - (iii) All filter papers were prepared and analysed by ALS Technichem (HK) Pty Ltd., which is a HOKLAS accredited laboratory and has comprehensive quality assurance and quality control programmes.
- (c) Field Monitoring
- (i) The power supply was checked to ensure the HVS works properly.
 - (ii) The filter holder and the area surrounding the filter were cleaned.
 - (iii) The filter holder was removed by loosening the four bolts and a new filter, with stamped number upward, on a supporting screen was aligned carefully.
 - (iv) The filter was properly aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter.
 - (v) The swing bolts were fastened to hold the filter holder down to the frame. The pressure applied was sufficient to avoid air leakage at the edges.
 - (vi) Then the shelter lid was closed and was secured with the aluminum strip.
 - (vii) The HVS was warmed-up for about 5 minutes to establish run-temperature conditions.
 - (viii) A new flow rate record sheet was set into the flow recorder.
 - (ix) On site temperature and atmospheric pressure readings were taken and the flow rate of the HVS was checked and adjusted at around 1.1 m³/min, and complied with the range specified in the updated EM&A Manual (i.e. 0.6-1.7 m³/min).

- (x) The programmable digital timer was set for a sampling period of 24 hrs, and the starting time, weather condition and the filter number were recorded.
 - (xi) The initial elapsed time was recorded.
 - (xii) At the end of sampling, on site temperature and atmospheric pressure readings were taken and the final flow rate of the HVS was checked and recorded.
 - (xiii) The final elapsed time was recorded.
 - (xiv) The sampled filter was removed carefully and folded in half length so that only surfaces with collected particulate matter were in contact.
 - (xv) It was then placed in a clean plastic envelope and sealed.
 - (xvi) All monitoring information was recorded on a standard data sheet.
 - (xvii) Filters were then sent to ALS Technichem (HK) Pty Ltd. for analysis.
- (d) Maintenance and Calibration
- (i) The HVS and its accessories were maintained in good working condition, such as replacing motor brushes routinely and checking electrical wiring to ensure a continuous power supply.
 - (ii) 5-point calibration of the HVS was conducted using TE-5025A Calibration Kit prior to the commencement of baseline monitoring. Bi-monthly 5-point calibration of the HVS will be carried out during impact monitoring.
 - (iii) Calibration certificate of the HVSs are provided in Appendix E.

2.5.2 1-hour TSP Monitoring

(a) Measuring Procedures

The measuring procedures of the 1-hour dust meter were in accordance with the Manufacturer's Instruction Manual as follows:-

- (i) Turn the power on.
 - (ii) Close the air collecting opening cover.
 - (iii) Push the "TIME SETTING" switch to [BG].
 - (iv) Push "START/STOP" switch to perform background measurement for 6 seconds.
 - (v) Turn the knob at SENSI ADJ position to insert the light scattering plate.
 - (vi) Leave the equipment for 1 minute upon "SPAN CHECK" is indicated in the display.
 - (vii) Push "START/STOP" switch to perform automatic sensitivity adjustment. This measurement takes 1 minute.
 - (viii) Pull out the knob and return it to MEASURE position.
 - (ix) Push the "TIME SETTING" switch the time set in the display to 3 hours.
 - (x) Lower down the air collection opening cover.
 - (xi) Push "START/STOP" switch to start measurement.
- (b) Maintenance and Calibration
- (i) The 1-hour TSP meter was calibrated at 1-year intervals against a continuous particulate TEOM Monitor, Series 1400ab. Calibration certificates of the Laser Dust Monitors are provided in Appendix E.
 - (ii) 1-hour validation checking of the TSP meter against HVS is carried out on half-year basis at the air quality monitoring locations.

2.6 Monitoring Schedule for the Reporting Month

2.6.1 The schedule for air quality monitoring in March 2012 is provided in Appendix F.

2.7 Results and Observations

2.7.1 The monitoring results for 1-hour TSP and 24-hour TSP are summarized in Table 2.4 and 2.5 respectively. Detailed impact air quality monitoring results are presented in Appendix G.

Table 2.4 Summary of 1-hour TSP Monitoring Results in the Reporting Period

	Average ($\mu\text{g}/\text{m}^3$)	Range ($\mu\text{g}/\text{m}^3$)	Action Level ($\mu\text{g}/\text{m}^3$)	Limit Level ($\mu\text{g}/\text{m}^3$)
AMS2	84.9	80.1 – 88.8	374	500
AMS3A	88.5	83.2 – 92.6	368	500
AMS7	82.8	78.1 – 85.5	370	500

Table 2.5 Summary of 24-hour TSP Monitoring Results in the Reporting Period

	Average ($\mu\text{g}/\text{m}^3$)	Range ($\mu\text{g}/\text{m}^3$)	Action Level ($\mu\text{g}/\text{m}^3$)	Limit Level ($\mu\text{g}/\text{m}^3$)
AMS2	63.3	28.6 – 85.1	176	260
AMS3A *	54.0	38.6 – 69.5	167	260
AMS7	71.0	46.1 – 83.7	183	260

Remarks: *Due to power supply to HVS at AMS3A during the scheduled 24-hour impact monitorings, the measured TSP levels were less/more than 24-hour sampling period and they are presented herewith as for reference. Data was missing on 26 March 2012.

- 2.7.2 The major dust source in the reporting period included construction activities from the Project, as well as nearby traffic emissions.
- 2.7.3 All 1-hour and 24-hour TSP results were below the Action and Limit Level at all monitoring locations in the reporting month.
- 2.7.4 The event action plan is annexed in Appendix L.
- 2.7.5 Meteorological information collected from the wind station, as shown in Figure 2, including wind speed and wind direction, is annexed in Appendix H.

3 NOISE MONITORING

3.1 Monitoring Requirements

3.1.1 In accordance with the Project Specific EM&A Manual, impact noise monitoring was conducted for at least once per week during the construction phase of the Project. The Action and Limit level of the noise monitoring is provided in Appendix D.

3.2 Monitoring Equipment

3.2.1 Noise monitoring was performed using sound level meter at each designated monitoring station. The sound level meters deployed comply with the International Electrotechnical Commission Publications (IEC) 651:1979 (Type 1) and 804:1985 (Type 1) specifications. Acoustic calibrator was deployed to check the sound level meters at a known sound pressure level. Brand and model of the equipment is given in Table 3.1.

Table 3.1 Noise Monitoring Equipment

Equipment	Brand and Model
Integrated Sound Level Meter	B&K 2238 & 2250L Rion NL-31
Acoustic Calibrator	Rion NC-73

3.3 Monitoring Locations

3.3.1 Monitoring locations NMS2 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 air quality 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.

3.3.2 Figure 2 shows the locations of the monitoring stations. Table 3.2 describes the details of the monitoring stations.

Table 3.2 Locations of Impact Noise Monitoring Stations

Monitoring Station	Location	Description
NMS2	Seaview Crescent Tower 1	Free-field on the rooftop of the premise
NMS3A	Site Boundary of Site Office Area at Works Area WA2	1m from the exterior façade of the container office on ground at the area boundary

3.4 Monitoring Parameters, Frequency and Duration

3.4.1 Table 3.3 summarizes the monitoring parameters, frequency and duration of impact noise monitoring.

Table 3.3 Noise Monitoring Parameters, Frequency and Duration

Parameter	Frequency and Duration
30-mins measurement at each monitoring station between 0700 and 1900 on normal weekdays (Monday to Saturday). L_{eq} , L_{10} and L_{90} would be recorded.	At least once per week

3.5 Monitoring Methodology

3.5.1 Monitoring Procedure

- (a) 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) shall be made to the free field measurements.
- (b) Façade measurements were made at NMS3A.
- (c) The battery condition was checked to ensure the correct functioning of the meter.
- (d) Parameters such as frequency weighting, the time weighting and the measurement time were set as follows:-
 - (i) frequency weighting: A
 - (ii) time weighting: Fast
 - (iii) time measurement: $L_{eq(30\text{-minutes})}$ during non-restricted hours i.e. 07:00 – 1900 on normal weekdays; $L_{eq(5\text{-minutes})}$ during restricted hours i.e. 19:00 – 23:00 and 23:00 – 07:00 of normal weekdays, whole day of Sundays and Public Holidays.
- (e) Prior to and after each noise measurement, the meter was calibrated using the acoustic calibrator for 94dB(A) at 1000 Hz. If the difference in the calibration level before and after measurement was more than 1 dB(A), the measurement would be considered invalid and repeat of noise measurement would be required after re-calibration or repair of the equipment.
- (f) During the monitoring period, the L_{eq} , L_{10} and L_{90} were recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.
- (g) Noise measurement was paused during periods of high intrusive noise (e.g. dog barking, helicopter noise) if possible. Observations were recorded when intrusive noise was unavoidable.
- (h) Noise monitoring was cancelled in the presence of fog, rain, wind with a steady speed exceeding 5m/s, or wind with gusts exceeding 10m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

3.5.2 Maintenance and Calibration

- (a) The microphone head of the sound level meter was cleaned with soft cloth at regular intervals.
- (b) The meter and calibrator were sent to the supplier or HOKLAS laboratory to check and calibrate at yearly intervals.
- (c) Calibration certificates of the sound level meters and acoustic calibrators are provided in Appendix E.

3.6 Monitoring Schedule for the Reporting Month

3.6.1 The schedule for construction noise monitoring in March 2012 is provided in Appendix F.

3.7 Monitoring Results

3.7.1 The monitoring results for construction noise are summarized in Table 3.4 and the monitoring data is provided in Appendix I.

Table 3.4 Summary of Construction Noise Monitoring Results in the Reporting Period

	Average, dB(A), L_{eq} (30 mins)	Range, dB(A), L_{eq} (30 mins)	Limit Level, dB(A), L_{eq} (30 mins)
NMS2	68.6*	67.6 – 69.1*	75
NMS3A	63.5	60.8 – 64.7	75

*+3dB(A) Façade correction included

- 3.7.2 No noise Action Level and Limit Level exceedance was recorded at all monitoring stations in the reporting month.
- 3.7.3 Major noise sources during the noise monitoring included construction activities of the Project and nearby traffic noise.
- 3.7.4 The event action plan is annexed in Appendix L.

4 WATER QUALITY MONITORING

4.1 Monitoring Requirements

4.1.1 Impact water quality monitoring was carried out to ensure that any deterioration of water quality was detected, and that timely action was taken to rectify the situation. For impact water quality monitoring, measurements were taken in accordance with the Project Specific EM&A Manual. Appendix D shows the established Action/Limit Levels for the environmental monitoring works.

4.2 Monitoring Equipment

4.2.1 Table 4.1 summarises the equipment used in the impact water quality monitoring programme.

Table 4.1 Water Quality Monitoring Equipment

Equipment	Brand and Model
DO and Temperature Meter, Salinity Meter, Turbidimeter and pH Meter	YSI Model 6820 V2
Positioning Equipment	JRC DGPS 224 Model JLR-4341 with J-NAV 500 Model NWZ4551
Water Depth Detector	Eagle Cuda-168
Water Sampler	Kahlsio Water Sampler (Vertical) 2.2 L with messenger

4.3 Monitoring Parameters, Frequency and Duration

4.3.1 Table 4.2 summarises the monitoring parameters, frequency and monitoring depths of impact water quality monitoring as required in the Project Specific EM&A Manual.

Table 4.2 Impact Water Quality Monitoring Parameters and Frequency

Monitoring Stations	Parameter, unit	Frequency	No. of depth
<p><i>Impact Stations:</i> IS5, IS(Mf)6, IS7, IS8, IS(Mf)9, IS10, IS(Mf)11, IS(Mf)16, IS17</p> <p><i>Control/Far Field Stations:</i> CS(Mf)3, CS(Mf)5, CS4, CS6, CSA</p> <p><i>Sensitive Receiver Stations:</i> SR3-SR7, SR10A&SR10B</p>	<ul style="list-style-type: none"> • Depth, m • Temperature, °C • Salinity, ppt • DO, mg/L • DO Saturation, % • Turbidity, NTU • pH • Suspended Solids (SS), mg/L 	<p>Three times per week during mid-ebb and mid-flood tides (within ± 1.75 hour of the predicted time)</p>	<p>3 (1 m below water surface, mid-depth and 1 m above sea bed, except where the water depth is less than 6 m, in which case the mid-depth station may be omitted. Should the water depth be less than 3 m, only the mid-depth station will be monitored).</p>

4.4 Monitoring Locations

- 4.4.1 In accordance with the Project Specific EM&A Manual, twenty-one stations (9 Impact Stations, 7 Sensitive Receiver Stations and 5 Control/Far Field 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.
- 4.4.2 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.
- 4.4.3 Due to safety concern and permitting requirement 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.
- 4.4.4 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.
- 4.4.5 The locations of these monitoring stations are summarized in Table 4.3 and depicted in Figure 3.

Table 4.3 Impact Water Quality Monitoring Stations

Station	Description	East	North
IS5	Impact Station (Close to HKBCF construction site)	811579	817106

Station	Description	East	North
IS(Mf)6	Impact Station (Close to HKBCF construction site)	812101	817873
IS7	Impact Station (Close to HKBCF construction site)	812244	818777
IS8	Impact Station (Close to HKBCF construction site)	814251	818412
IS(Mf)9	Impact Station (Close to HKBCF construction site)	813273	818850
IS10	Impact Station (Close to HKBCF construction site)	812577	820670
IS(Mf)11	Impact Station (Close to HKBCF construction site)	813562	820716
IS(Mf)16	Impact Station (Close to HKBCF construction site)	814328	819497
IS17	Impact Station (Close to HKBCF construction site)	814539	820391
SR3	Sensitive receivers (San Tau SSSI)	810525	816456
SR4(N)	Sensitive receivers (Tai Ho)	814705	817859
SR5 ^[1]	Sensitive receivers (Artificial Reef in NE Airport)	811489	820455
SR5(N) ^[1]	Alternative Location for SR5	821258	811555
SR6	Sensitive receivers (Sha Chau and Lung Kwu Chau Marine Park)	805837	821818
SR7	Sensitive receivers (Tai Mo Do)	814293	821431
SR10A	Sensitive receivers (Ma Wan FCZ)1	823741	823495
SR10B(N)	Sensitive receivers (Ma Wan FCZ)2	823683	823187
CS(Mf)3	Control Station	809989	821117
CS(Mf)5	Control Station	817990	821129
CS4	Control Station	810025	824004
CS6	Control Station	817028	823992
CSA	Control Station	818103	823064

Note [1]: Due to safety concern and permitting requirement 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.

4.5 Monitoring Methodology

4.5.1 Instrumentation

- (a) The in-situ water quality parameters, viz. dissolved oxygen, temperature, salinity and turbidity, pH were measured by multi-parameter meters (i.e. Model YSI 6820 CE-C-M-Y).

4.5.2 Operating/Analytical Procedures

- (a) Digital Differential Global Positioning Systems (DGPS) were used to ensure that the correct location was selected prior to sample collection.
- (b) Portable, battery-operated echo sounders were used for the determination of water depth at each designated monitoring station.
- (c) All in-situ measurements were taken at 3 water depths, 1 m below water surface, mid-depth and 1 m above sea bed, except where the water depth was less than 6 m, in which case the mid-depth station was omitted. Should the water depth be less than 3 m, only the mid-depth station was monitored.
- (d) At each measurement/sampling depth, two consecutive in-situ monitoring (DO concentration and saturation, temperature, turbidity, pH, salinity) and water sample for SS. The probes were retrieved out of the water after the first measurement and then re-deployed for the second measurement. Where the difference in the value between the first and second readings of DO

or turbidity parameters was more than 25% of the value of the first reading, the reading was discarded and further readings were taken.

- (e) Duplicate samples from each independent sampling event were collected for SS measurement. Water samples were collected using the water samplers and the samples were stored in high-density polythene bottles. Water samples collected were well-mixed in the water sampler prior to pre-rinsing and transferring to sample bottles. Sample bottles were pre-rinsed with the same water samples. The sample bottles were then be packed in cool-boxes (cooled at 4°C without being frozen), and delivered to ALS Technichem (HK) Pty Ltd. for the analysis of suspended solids concentrations. The laboratory determination work would be started within 24 hours after collection of the water samples. ALS Technichem (HK) Pty Ltd. is a HOKLAS accredited laboratory and has comprehensive quality assurance and quality control programmes. For QA/QC procedures, one duplicate samples of every batch of 20 samples was analyzed.
- (f) The analysis method and reporting and detection limit for SS is shown in Table 4.4.

Table 4.4 Laboratory Analysis for Suspended Solids

Parameters	Instrumentation	Analytical Method	Reporting Limit	Detection Limit
Suspended Solid (SS)	Weighting	APHA 2540-D	0.5mg/L	0.5mg/L

- (g) Other relevant data were recorded, including monitoring location / position, time, water depth, tidal stages, weather conditions and any special phenomena or work underway at the construction site in the field log sheet for information.

4.5.3 Maintenance and Calibration

- (a) All in situ monitoring instruments would be calibrated and calibrated by ALS Technichem (HK) Pty Ltd. before use and at 3-monthly intervals throughout all stages of the water quality monitoring programme. Calibration details are provided in Appendix E.
- (b) The dissolved oxygen probe of YSI 6820 was calibrated once per monitoring day by wet bulb method. Before the calibration routine, the sensor for dissolved oxygen was thermally equilibrated in water-saturated air. Calibration cup is served as a calibration chamber and it was loosened from airtight condition before it is used for the calibration. Calibration at ALS Technichem (HK) Pty Ltd. was carried out once every three months in a water sample with a known concentration of dissolved oxygen. The sensor was immersed in the water and after thermal equilibration, the known mg/L value was keyed in and the calibration was carried out automatically.
- (c) The turbidity probe of YSI 6820 is calibrated two times a month. A zero check in distilled water was performed with the turbidity probe of YSI 6820 once per monitoring day. The probe will be calibrated with a solution of known NTU at ALS Technichem (HK) Pty Ltd. once every three months.

4.6 Monitoring Schedule for the Reporting Month

4.6.1 The schedule for impact water quality monitoring in March 2012 is provided in Appendix F.

4.7 Results and Observations

4.7.1 Impact water quality monitoring was conducted at all designated monitoring stations in the reporting month. Impact water quality monitoring results and graphical presentations are provided in Appendix J.

4.7.2 Exceedances were recorded for turbidity and suspended solids in the reporting month. Number of exceedances recorded in the reporting month at each impact station are summarised in Table 4.5.

Table 4.5 Summary of Water Quality Exceedances

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	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS7	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS8	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS(Mf)9	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS10	Action	0	0	0	0	0	0	0	0	0	0
	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
IS(Mf)16	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
IS17	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR3	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR4(N)	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR5 ^[1]	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR6	Action	0	0	0	0	0	0	0	0	0	0
	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	0	1	0
SR10A	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
SR10B(N)	Action	0	0	0	0	0	0	0	0	0	0
	Limit	0	0	0	0	0	0	0	0	0	0
Total	Action	0	0	0	0	0	0	0	0	0	
	Limit	0	0	0	0	0	0	1	0	1	

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.

4.7.3 One (1) Limit Level exceedance was recorded in the reporting month. Investigation works show that only preparation works, like geotextile laying and stone blanket laying, which are not likely to cause water quality impact, were carried out on the monitoring date. Turbidity levels recorded at SR7 and all other impact stations (stations closer to the Project site) were below the Action and Limit Levels. SS levels recorded at all other impact stations (stations closer to the Project site) were lower than those recorded at SR7, which suggested that exceedance at SR7 was not due to the Project works. The exceedance was considered as non-Project related.

Nevertheless, the Contractor was reminded to ensure provision of ongoing maintenance to the silt curtains.

4.7.4 Generally, water quality impact sources during the water quality monitoring were potentially activities of the Project and nearby operating vessels by other parties.

4.7.5 The event action plan is annexed in Appendix L.

5 DOLPHIN MONITORING

5.1 Monitoring Requirements

5.1.1 Impact dolphin monitoring is required to be conducted by a qualified dolphin specialist team to evaluate whether there have been any effects on the dolphins.

5.2 Monitoring Equipment

5.2.1 Table 5.1 summarises the equipment used for the impact dolphin monitoring.

Table 5.1 Dolphin Monitoring Equipment

Equipment	Model
Global Positioning System (GPS)	Garmin 18X-PC Geo One Phottix
Camera	Nikon D90 300m 2.8D fixed focus Nikon D90 20-300m zoom lens
Laser Binoculars	Infinitor LRF1000
Marine Binocular	Bushnell 7 × 50 marine binocular with compass and reticules
Vessel for Monitoring	65 foot single engine motor vessel with viewing platform 4.5m above water level
Acoustic Monitoring	Hydrophone array (2 element, 50m) incorporating automated whistle detection functionality and AIS logging

5.3 Monitoring Parameter, Frequencies and Duration

5.3.1 Dolphin monitoring is required twice per month. The monitoring data should be compatible with, and should be made available for, long-term studies of small cetacean ecology in Hong Kong. In order to provide a suitable long-term dataset for comparison, identical methodology and line transects employed in baseline dolphin monitoring was followed in the impact dolphin monitoring.

5.4 Monitoring Location

5.4.1 The impact dolphin monitoring adopted line-transect vessel survey method, and cover the following line-transect survey areas as in AFCD annual marine mammal monitoring programme:

- Northeast Lantau survey area;
- Northwest Lantau survey area; and

5.4.2 The co-ordinates for the transect lines and layout map were provided by AFCD and are shown in Table 5.2 and Figure 4.

Table 5.2 Impact Dolphin Monitoring Line Transect Co-ordinates (Provided by AFCD)

ID	HK Grid System		Long Lat in WGS84	
	X	Y	Long	Lat
1	804671	814577	113.870308	22.269741
1	804671	831404	113.869975	22.421696
2	805475	815457	113.878087	22.277704
2	805477	826654	113.877896	22.378814
3	806464	819435	113.887615	22.313643
3	806464	822911	113.887550	22.345030
4	807518	819771	113.897833	22.316697
4	807518	829230	113.897663	22.402113
5	808504	820220	113.907397	22.320761

5	808504	828602	113.907252	22.396462
6	809490	820466	113.916965	22.323003
6	809490	825352	113.916884	22.367128
7	810499	820690	113.926752	22.325043
7	810499	824613	113.926688	22.360464
8	811508	820847	113.936539	22.326475
8	811508	824254	113.936486	22.357241
9	812516	820892	113.946329	22.326894
9	812516	824254	113.946279	22.357255
10	813525	818270	113.956156	22.303225
10	813525	824657	113.956065	22.360912
11	814556	818449	113.966160	22.304858
11	814556	820992	113.966125	22.327820
12	815542	818807	113.975726	22.308109
12	815542	824882	113.975647	22.362962
13	816506	819480	113.985072	22.314192
13	816506	824859	113.985005	22.362771
14	817537	820220	113.995070	22.320883
14	817537	824613	113.995018	22.360556
15	818568	820735	114.005071	22.325550
15	818568	824433	114.005030	22.358947
16	819532	821420	114.014420	22.331747
16	819532	824209	114.014390	22.356933
17	820451	822125	114.023333	22.338117
17	820451	823671	114.023317	22.352084
18	821504	822371	114.033556	22.340353
18	821504	823761	114.033544	22.352903
19	822513	823268	114.043340	22.348458
19	822513	824321	114.043331	22.357971
20	823477	823402	114.052695	22.349680
20	823477	824613	114.052686	22.360610
21	805476	827081	113.877878	22.382668
21	805476	830562	113.877811	22.414103
22	806464	824033	113.887520	22.355164
22	806464	829598	113.887416	22.405423
23	814559	821739	113.966142	22.334574
23	814559	824768	113.966101	22.361920

5.5 Monitoring Procedures

- 5.5.1 Line transect surveying techniques have now been standardised in Hong Kong Special Administrative Region Waters, in order to ensure that data from all surveys are directly comparable.
- 5.5.2 The study area incorporated the areas defined by the AFCD annual marine mammal monitoring programme as; “Northeast Lantau” and “Northwest Lantau” which were surveyed twice per month for a minimum of 9 hours per day.
- 5.5.3 On each survey day, the survey vessel departed from Tung Chung Development Pier/ Tsing Yi Public Pier or nearest safe and convenient boarding locations. On arrival at the survey areas, the survey vessel, containing four vessel-based survey personnel proceeded along transects in the vicinity of the works area and on effort sighting began immediately at the beginning of the transect lines as defined by AFCD monitoring programme.
- 5.5.4 The vessel had an elevated viewing platform (4.5m above waterline) and should be 15m in length. The vessel was licensed in accordance with new rulings by the Hong Kong Marine Department. The transect line was surveyed at a speed of 13-15 kmph. There were a total of four observers, working shifts in two teams of two (data recorder and primary observer) who rotated every 30 minutes. The data recorder searched with naked eye and the primary observer continuously with binoculars (7x35) between 90° and 270° abeam (bow being 0°). During on-effort survey periods, records were kept of

time, position (using HK1980 Grid System), weather conditions (Beaufort sea state and viz.) and distance travelled (using a GPS). When a group of Chinese white dolphin (CWD) was sighted, position, bearing and distance data were recorded immediately and, after a short observation, an estimate made of group size. These data were subsequently data-based in a format suitable for use with DISTANCE software. The vessel was then be deemed to be off-effort and left the transect line to approach the dolphins with the purpose of taking high resolution photo-ID pictures. A digital SLR camera with 100mm – 400mm lens (or superior) was used to photograph both left and right hand sides of the dorsal fin area of each dolphin. Attempts to photograph all dolphins in the group were made. On finishing photographing, the vessel returned to the transect line at the point of departure and “effort” was resumed. If another group of dolphins was sighted while travelling back to the transect line, this shall either be treated as a secondary sighting or as an off effort sighting and noted accordingly. Time and location data of ‘on’ and ‘off effort’ were carefully noted.

- 5.5.5 While with groups of CWD, acoustic data were gathered using calibrated broadband/high frequency hydrophones. Simultaneous recordings of underwater noise and voice over of visual observations could be streamed directly onto a computer hard drive. Various software programmes are available to characterise recorded sounds. Further, at the end of each transect, the vessel would stop and short acoustic recordings could be made. For the purposes of this project, a minimum of 10 minutes acoustic data were recorded every month.
- 5.5.6 During periods of poor weather, e.g. when visibility is hindered (e.g., below 1km), when a Beaufort Sea State in excess of 4, dense haze or fog or thunder storm/typhoon warnings in force, all survey effort should normally be stopped.
- 5.5.7 A global positioning system was used during the surveys.
- 5.5.8 All surveys were accurately recorded the sighting effort. Sighting records were filled out at the initial sighting with time, position, distance and angle data filled in immediately and verified between primary observer and recorder. To do this, details of km travelled, sea state, weather and visibility must be noted and time/GPS linked. A purpose built software system called LOGGER was used to collect these parameters. LOGGER automatically collected and stored GPS data and contained a user configurable interface for the manual entry of the data required for line transect and other cetacean research studies. Logger displays real-time maps of the ships track and any other collected data, e.g. range and bearing to cetacean sightings. All data were stored in a Microsoft Access database. All other information on sea state, weather conditions (Beaufort Scale), as well as notes on dolphin group size, appearance, age classes, behaviour, association with fishing boat, direction of movement, response to boat and any other information were completed at the end of the sighting.

5.6 Monitoring Schedule for the Reporting Month

- 5.6.1 The schedule for dolphin monitoring in March 2012 is provided in Appendix F.

5.7 Results and Observations

- 5.7.1 Dolphin surveys were conducted on 29th and 31st March 2012. All weather recorded was Beaufort Sea State 3.5 or less. No rain or haze was present. On 29th March 2012, a total of 106.9km of transect line was travelled, of which 74.68km was “on effort”. On 31st March 2012, a total of 100.70km of transect line was travelled, of which 54.7km was “on effort”. The effort summary is shown Table 5.3.

Table 5.3 Impact Dolphin Monitoring Survey Effort Summary

Date	Status	Sea State (on effort)	Distance on effort (km)	Time on effort (hh:mm:ss)
29-Mar-12	ON	1	6.8	0:29:17
29-Mar-12	ON	1.5	-	-
29-Mar-12	ON	2	2.7	0:11:58
29-Mar-12	ON	2.5	29.8	2:09:57
29-Mar-12	ON	3	25.3	1:50:34

29-Mar-12	ON	3.5	10.3	0:45:17
31-Mar-12	ON	1	28.8	2:11:05
31-Mar-12	ON	1.5	15	1:06:33
31-Mar-12	ON	2	3.1	0:13:38
31-Mar-12	ON	2.5	7.8	0:34:34

- 5.7.2 A total of seven dolphin sightings were recorded during the two surveys, five on 29th March 2012 and two on 31st March 2012. Of the seven sightings, four were “on effort” and three were “opportunistic”. Details on the sightings are summarised in Appendix K and Figure 5.
- 5.7.3 Behaviour: the predominant behaviour observed was feeding, as defined by deep dives or association with a fishing vessel.
- 5.7.4 Noteworthy Observations: one new born calf was observed at CLP Power Station in Northwest Lantau survey block. A dolphin displaying extensive rake mark scarring and associated fungal infection was observed in the Northeast Lantau survey block. Relevant photo records are shown in Figure 6.
- 5.7.5 Acoustic monitoring occurred throughout line transect surveys and both shipping noise and dolphin vocalizations were recorded. These data will be analysed when the dataset is larger.
- 5.7.6 Of the observation made and images examined, there is no indication that construction activities from the Project have caused disturbance or direct damage to the marine mammals which were observed.
- 5.7.7 No other active construction sites were noted during the two survey periods within Hong Kong waters. Marine construction work was noted close to the Hong Kong–China maritime border in Chinese waters and dolphins were observed in this area (near Tai O). Large numbers of shipping vessels from other parties were noted close to the dolphins recorded near CLP Power Station.
- 5.7.8 Potential impact sources observed during March 2012 dolphin monitoring included construction activities of the Project, observed construction activities in adjacent aquatic habitat and shipping.
- 5.7.9 Taking into account of natural seasonal change in distribution patterns, which is also observed in baseline monitoring, it is suggested that a longer period of impact monitoring data should be obtained for comparison.
- 5.7.10 The event action plan is annexed in Appendix L.

6 ENVIRONMENTAL SITE INSPECTION AND AUDIT

6.1 Site Inspection

6.1.1 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 month, 3 site inspections were carried out on 15, 23 and 29 March 2012 .

6.1.2 Particular observations during the site inspections are described below:

Air Quality

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

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

Noise

6.1.5 No adverse observation was identified in the reporting month.

Water Quality

6.1.6 The Contractor was recommended to review the drainage system and provide wastewater treatment facilities, especially for silty surface run-off during rainfall, if necessary, at Works Area WA3.

Chemical and Waste Management

6.1.7 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.

Landscape and Visual Impact

6.1.8 No adverse observation was identified in the reporting month.

Miscellaneous

6.1.9 No adverse observation was identified in the reporting month.

6.1.10 The Contractor has rectified most of the observations as identified during environmental site inspection in the reporting month. 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.

6.2 Advice on the Solid and Liquid Waste Management Status

- 6.2.1 The Contractor had submitted application form for registration as a chemical waste producer for the Project. Sufficient numbers of receptacles were available for general refuse collection and sorting.
- 6.2.2 As advised by the Contract, 380 tonnes of general refuse were generated and disposed of in the reporting period. Monthly summary of waste flow table is detailed in Appendix M.
- 6.2.3 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.
- 6.2.4 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 Practise on the Packaging, Labelling and Storage of Chemical Wastes.

6.3 Environmental Licenses and Permits

- 6.3.1 The environmental licenses and permits for Stage 1 of the Project and valid in the reporting month is summarized in Table 6.1.

Table 6.1 Summary of Environmental Licensing and Permit Status

Statutory Reference	License/ Permit	License or Permit No.	Valid Period		License/ Permit Holder	Remarks
			From	To		
EIAO	Environmental Permit	EP-353/2009/D	07/03/2012	N/A	HyD	Hong Kong – Zhuhai – Macao Bridge Hong Kong Boundary Crossing Facilities
		EP-354/2009/A	08/12/2010	N/A		Tuen Mun – Chek Lap Kok Link (TMCLKL Southern Landfall Reclamation only)
APCO	NA notification	--	30/12/2011	--	CHEC	Works Area WA2 and WA3
APCO	NA notification	--	17/01/2012	--	CHEC	Works Area WA4
WPCO	Discharge License	N/A	Application in process	N/A	CHEC	Discharge of Construction Runoff
WDO	Chemical Waste Producer Registration	N/A	Application in process	N/A	CHEC	Chemical waste produced in Contract HY/2010/02
WDO	Billing Account for Disposal of Construction Waste	7014181	05/12/2011	N/A	CHEC	Waste disposal in Contract HY/2010/02
NCO	Construction Noise Permit	GW-RS0125-12	28/2/2012	27/08/2012	CHEC	Marine-based areas in Contract HY/2010/02

6.4 Implementation Status of Environmental Mitigation Measures

- 6.4.1 In response to the site audit findings, the Contractors carried out corrective actions.
- 6.4.2 A summary of the Implementation Schedule of Environmental Mitigation Measures (EMIS) is presented in Appendix C. Most of the necessary mitigation measures were implemented properly.

6.5 Summary of Exceedances of the Environmental Quality Performance Limit

- 6.5.1 All 1-hour and 24-hour TSP monitoring results complied with the Action / Limit Levels in the reporting period.
- 6.5.2 For construction noise, no Action and Limit Level exceedance was recorded at all monitoring stations in the reporting period.
- 6.5.3 One (1) Limit Level exceedance was recorded in the reporting month. Investigation works show that only preparation works, like geotextile laying and stone blanket laying, which are not likely to cause water quality impact, were carried out on the monitoring date. Turbidity levels recorded at SR7 and all other impact stations (stations closer to the Project site) were below the Action and Limit Levels. SS levels recorded at all other impact stations (stations closer to the Project site) were lower than those recorded at SR7, which suggested that exceedance at SR7 was not due to the Project works. The exceedance was considered as non-Project related.

Nevertheless, the Contractor was reminded to ensure provision of ongoing maintenance to the silt curtains.

- 6.5.4 Cumulative statistics on exceedances is provided in Appendix M.

6.6 Summary of Complaints, Notification of Summons and Successful Prosecutions

- 6.6.1 The Environmental Complaint Handling Procedure is annexed in Figure 7.
- 6.6.2 There was no environmental complaint followed up by Environmental Team in the reporting period.
- 6.6.3 No notification of summons and prosecution was received in the reporting period.
- 6.6.4 Statistics on complaints, notifications of summons and successful prosecutions are summarized in Appendix M.

7 FUTURE KEY ISSUES

7.1 Construction Programme for the Coming Months

- 7.1.1 As informed by the Contractor, the major works for the Project in April and May 2012 will be:-

Marine-based Works

- Cone penetration test;
- Geotextile laying;
- Installation of silt curtain;
- Stone blankets laying; and
- Stone column installation.

Land-based Works

- Site office erection and construction at Works Area WA2;
- Constructing site access at area WA2 to Ying Hei Road, Tung Chung; and
- Public Works Regional Laboratory erection and construction at Works Area WA3.

7.2 Key Issues for the Coming Month

7.2.1 Key issues to be considered in the coming months:-

- Site runoff should be properly collected and treated prior to discharge;
- Minimize loss of sediment from filling works;
- Regular review and maintenance of silt curtain systems, drainage systems and desilting facilities;
- Exposed surfaces/soil stockpiles should be properly treated to avoid generation of silty surface run-off during rainstorm;
- Regular review and maintenance of wheel washing facilities provided at all site entrances/exits;
- Conduct regular inspection of various working machineries and vessels within works areas to avoid any dark smoke emission;
- Suppress dust generated from work processes with use of bagged cements, earth movements, excavation activities, exposed surfaces/soil stockpiles and haul road traffic;
- Quieter powered mechanical equipment should be used;
- Provision of proper and effective noise control measures for operating equipment and machinery on-site, such as erection of movable noise barriers or enclosure for noisy plants;
- Closely check and replace the sound insulation materials regularly;
- Better scheduling of construction works to minimize noise nuisance;
- Properly store and label oil drums and chemical containers placed on site;
- Proper chemicals, chemical wastes and wastes management;
- Maintenance works should be carried out within roofed, paved and confined areas;
- Collection and segregation of construction waste and general refuse on land and in the sea should be carried out properly and regularly; and
- Proper protection and regular inspection of existing trees, transplanted/retained trees.

7.3 Monitoring Schedule for the Coming Month

7.3.1 The tentative schedule for environmental monitoring in April 2012 is provided in Appendix F.

8 CONCLUSIONS AND RECOMMENDATIONS

8.1 Conclusions

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

8.1.2 1-hour TSP, 24-hour TSP, noise, water quality and dolphin monitoring were carried out in the reporting period.

8.1.3 All 1-hour and 24-hour TSP monitoring results complied with the Action / Limit Levels in the reporting period.

8.1.4 For construction noise, no Action and Limit Level exceedance was recorded at all monitoring stations in the reporting period.

8.1.5 One (1) Limit Level exceedance was recorded in the reporting month. Investigation works show that the exceedance was not due to the Project works. Nevertheless, the Contractor was reminded to ensure provision of ongoing maintenance to the silt curtains.

8.1.6 A total of seven dolphin sightings were recorded during the two surveys, five on 29th March 2012 and two on 31st March 2012. Of the seven sightings, four were "on effort" and three were "opportunistic". The predominant behavior of the dolphin observed was feeding, as defined by deep dives or association with a fishing vessel at the time of the sighting. There is no indication that construction activities from the Project have caused disturbance or direct damage to the marine mammals which were observed.

8.1.7 No other active construction sites were noted during the two survey periods within Hong Kong waters. Marine construction work was noted close to the Hong Kong–China maritime border in Chinese

waters and dolphins were observed in this area (near Tai O). Large numbers of shipping vessels from other parties were noted close to the dolphins recorded near CLP Power Station.

8.1.8 Environmental site inspection was carried out 3 times in March 2012. Recommendations on remedial actions were given to the Contractors for the deficiencies identified during the site audits.

8.1.9 No environmental complaint was followed up by Environmental Team in the reporting period.

8.1.10 No notification of summons and prosecution was received in the reporting period.

8.2 Recommendations

8.2.1 According to the environmental site inspections performed in the reporting month, the following recommendations were provided:-

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 mixing operations.
- Provide water spraying to suppress fugitive dust for any dusty construction activity.

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.

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.

Chemical and Waste Management

- All types of wastes, both on land and floating in the sea, should be collected and sorted properly and removed timely. 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.

Landscape and Visual Impact

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