


**Dragages -China Harbour-VSL JV**

**Contract HY/2011/09**  
**Hong Kong-Zhuhai-Macao Bridge**  
**Hong Kong Link Road-Section between**  
**HKSAR Boundary and Scenic Hill**

**Monthly EM&A Report**

**February 2013**  
**(Version 2.0)**

Certified By 

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(Date: 14 March 2013)

REMARKS:

The information supplied and contained within this report is, to the best of our knowledge, correct at the time of printing.

CINOTECH accepts no responsibility for changes made to this report by third parties

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## EXECUTIVE SUMMARY

### Introduction

1. This is the 1<sup>st</sup> monthly Environmental Monitoring and Audit (EM&A) Report prepared by Cinotech Consultants Limited for the project “Contract No. HY/2011/09 – Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road – Section between HKSAR Boundary and Scenic Hill” (hereinafter called the “Contract”). This report documents the findings of EM&A Works conducted between 22<sup>nd</sup> and 28<sup>th</sup> February 2013 as the Contract commenced on 22 February 2013.

### Environmental Monitoring and Audit Progress

2. A summary of the monitoring activities in this reporting period is listed in **Table I** below:

**Table I Summary Table for Monitoring Activities in the Reporting Period**

Parameter(s)	Date(s)
1-hr TSP Monitoring	22 <sup>nd</sup> and 28 <sup>th</sup> February 2013
24-hr TSP Monitoring	22 <sup>nd</sup> and 28 <sup>th</sup> February 2013
Noise Monitoring	23 <sup>rd</sup> February 2013
Water Quality Monitoring	22 <sup>nd</sup> , 25 <sup>th</sup> and 27 <sup>th</sup> February 2013
Dolphin Monitoring (Line-transect Vessel Surveys)	19 <sup>th</sup> and 25 <sup>th</sup> February 2013
Construction-phase underwater Noise Monitoring	*N/A
Dolphin Behaviour Monitoring	*N/A
Land-based Dolphin Behaviour and Movement Monitoring	*N/A
Environmental Site Inspection	26 <sup>th</sup> February 2013

\*N/A: No monitoring was conducted in the reporting period as the bored piling activities have not been started. (The tentative commencement date of bored piling activities is 18 March 2013)

### Breaches of Action and Limit Levels

3. Summary of the environmental exceedances of the reporting period is tabulated in **Table II**.

**Table II Summary Table for Events Recorded in the Reporting Period**

Environmental Monitoring	Parameter	No. of Exceedance		No. of Exceedance related to the Construction Activities of this Contract	
		Action Level	Limit Level	Action Level	Limit Level
Air Quality	1-hr TSP	0	0	0	0
	24-hr TSP	0	0	0	0
Noise	L <sub>eq(30min)</sub>	0	0	0	0
Water Quality	Dissolved Oxygen (DO) (Surface & Middle)	7	6	0	0
	Dissolved Oxygen (DO) (Bottom)	10	0	0	0
	Turbidity	7	26	0	0
	Suspended Solids (SS)	5	30	0	0

*1-hour TSP Monitoring*

- All 1-hour TSP monitoring was conducted as scheduled in the reporting period. No Action/Limit Level exceedance was recorded.

*24-hour TSP Monitoring*

- All 24-hour TSP monitoring was conducted as scheduled in the reporting period. No Action/Limit Level exceedance was recorded.

*Construction Noise*

- All construction noise monitoring was conducted as scheduled in the reporting period. No Action/Limit Level exceedance was recorded.

*Water Quality*

- All water quality monitoring was conducted as scheduled in the reporting period. There are seventeen Action Level exceedances and six Limit Level exceedances were recorded for dissolved oxygen. Seven Action Level exceedances and twenty-six Limit Level exceedances for turbidity were recorded. Five Action exceedances and thirty Limit Level exceedances for suspended solids were recorded.
- According to the investigation, no major marine construction activities were conducted during the monitoring period. Therefore, all exceedances are considered not due to the Contract.

**Complaint Log**

9. No environmental complaint was received in the reporting period.

**Notification of Summons and Successful Prosecutions**

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

**Reporting Changes**

11. This report has been developed in compliance with the reporting requirements for the first monthly EM&A Report as required by the EM&A Manual for Hong Kong Link Road (EM&A Manual). There are no reporting changes.

**Future Key Issues**

12. Major site activities for the coming reporting month will include:
- Continue erection of hoarding & fence and site office area set up in Portion C;
  - Carry out slewing work for CLP 11kVA and 132kVA power cable between P108, P109 & P113;
  - Construction of the concrete cable trough for CLP cable slewing;
  - Slewing of the tele-communication cable;
  - Continue pre-drilling work at western water, along slopping seawall and at Portion C;
  - Protection work to the fuel pipes along the access road at Portion C;
  - Complete the piling platform for the Kelly method at P48, P0 and P49 and commence bored piling work;
  - Erection of platform at P50 and P52 for preparation of RCD bored piling;
  - Continue the setup of casting yard;
  - Set-up facilities for marine delivery of concrete from land plants.
  - Setting up of silt-curtain. (dolphin exclusion zone and dolphin watching plan will be implemented in accordance with EP condition 3.4 and 3.5)

## 1 INTRODUCTION

- 1.1 Cinotech Consultants Limited (Cinotech) was appointed by Dragages -China Harbour-VSL JV (hereinafter called “the Contractor”) as the Environmental Team (ET) to undertake the Environmental Monitoring and Audit (EM&A) programme during construction phase of the Contract No. HY/2011/09 – Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road – Section between HKSAR Boundary and Scenic Hill” (hereinafter called the “Contract”) in accordance with EP Conditions 2.1.

### **Purpose of the report**

- 1.2 This is the first EM&A report which summarises the impact monitoring results and audit findings for the EM&A programme during the reporting period from 22<sup>nd</sup> to 28<sup>th</sup> February 2013.

### **Structure of the report**

- 1.3 The structure of the report is as follows:

Section 1: **Introduction** - purpose and structure of the report.

Section 2: **Contract Information** - summarises background and scope of the Contract, site description, project organization and contact details, construction programme, the construction works undertaken and the status of Environmental Permits/Licenses during the reporting period.

Section 3: **Air Quality Monitoring** - summarises the monitoring parameters, monitoring programmes, monitoring methodologies, monitoring frequency, monitoring locations, Action and Limit Levels, monitoring results and Event / Action Plans.

Section 4: **Noise Monitoring** - summarises the monitoring parameters, monitoring programmes, monitoring methodologies, monitoring frequency, monitoring locations, Action and Limit Levels, monitoring results and Event / Action Plans.

Section 5: **Water Quality Monitoring** - summarises the monitoring parameters, monitoring programmes, monitoring methodologies, monitoring frequency, monitoring locations, Action and Limit Levels, monitoring results and Event / Action Plans.

Section 6: **Dolphin Monitoring** - summarises the monitoring parameters, monitoring programmes, monitoring methodologies, monitoring frequency, monitoring locations, Action and Limit Levels and monitoring results.

Section 7: **Environmental Site Inspection** - summarises the audit findings of the weekly site inspections undertaken within the reporting period.

Section 8: **Environmental Non-conformance** - summarises any monitoring exceedance, environmental complaints, environmental summons and successful prosecutions within the reporting period.

Section 9: **Future Key Issues** - summarises the impact forecast and monitoring schedule for the next three months.



## Section 10: **Conclusions and Recommendation**

## 2 CONTRACT INFORMATION

### Background

- 2.1 The proposed Hong Kong - Zhuhai - Macao Bridge Hong Kong Link Road (HKLR) is 12km long connecting the Hong Kong-Zhuhai-Macao Bridge (HZMB) at the HKSAR Boundary with the Hong Kong Boundary Crossing Facilities (HKBCF) situated at the north eastern waters of the Hong Kong International Airport, opening a new and direct connection route between Hong Kong, Macao and the Western Pearl River Delta.
- 2.2 The HKLR comprises a 9.4km long viaduct section from the HKSAR boundary to Scenic Hill on the Airport Island; a 1km tunnel section to the reclamation formed along the east coast of the Airport Island and a 1.6km long at-grade road section on the reclamation connecting to the HKBCF. The tunnel section of HKLR will pass under Scenic Hill, Airport Road and Airport Railway to minimize the environmental and visual impacts to Tung Chung residents.
- 2.3 An application (No ESB-110/2003) for an Environmental Impact Assessment (EIA) Study Brief under Section 5(1) of the Environmental Impact Assessment Ordinance (EIAO) was submitted by Highways Department (the Project Proponent) on 8 October 2003 with a Project Profile (No. No. PP-201/2003) for the Hong Kong - Zhuhai - Macao Bridge Hong Kong Section and North Lantau Highway Connection. The Hong Kong - Zhuhai - Macao Bridge Hong Kong Section and North Lantau Highway Connection has subsequently been renamed as HKLR. EPD issued an EIA Study Brief (No: ESB-110/2003) in November 2003 to the Project Proponent to carry out an EIA study.
- 2.4 An EIA Study (Reg. No. AEIAR-144/2009) has been undertaken to provide information on nature and extent of environmental impacts arising from the construction and operation of HKLR. The Environmental Permit was issued on 4 November 2009 (Permit No. EP-352/2009). Pursuant to Section 13 of the EIAO, the Director of Environmental Protection amends the Environmental Permit (No. EP-352/2009) based on the Application No. VEP-339/2011 and the environmental Permit (Permit No. EP-352/2009/A) was issue on 9 November 2011 for HKLR to the Highways Department as the Permit Holder.
- 2.5 **Figure 1** shows the layout of the Contract and the scope of the Contract works comprises the following major items:
  - a dual 3-lane carriageway in the form of viaduct from the HKSAR boundary (connecting with the HZMB Main Bridge) to the Scenic Hill (connecting with the tunnel under separate Contract No. HY/2011/03), of approximately 9.4km in length with a hard shoulder for each bound of carriageway and a utilities trough on the outer edge of each bound of viaducts;
  - a grade-separated turnaround facility located near San Shek Wan, composed of sliproads in the form of viaduct with single-lane carriageway bifurcated from the HKLR mainline with an elevated junction above the mainline;
  - provision of ancillary facilities including, but not limited to, meteorological enhancement measures including the provisioning of anemometers and modification of the wind profiler station at hillside of Sha Lo Wan, provisioning of a compensatory marine radar, and provisioning of security systems; and

- associated civil, structural, geotechnical, marine, environmental protection, landscaping, drainage and highways electrical and mechanical (E&M) works, street lightings, traffic aids and sign gantries, marine navigational aids, ship impact protection system, water mains and fire hydrants, lightning protection system, structural health monitoring and maintenance management system (SHM&MMS), supervisory control and data acquisition (SCADA) system, as well as operation and maintenance provisions of viaducts, provisioning of facilities for installation of traffic control and surveillance system (TCSS), provisioning of facilities for installation of telecommunication cables/equipments and reprovisioning works of affected existing facilities/utilities.

**Contract Organisation**

2.6 Different parties with different levels of involvement in the Contract organization include:

- Supervising Officer’s Representative (SOR) – Ove Arup & Partners Hong Kong Limited (ARUP)
- Contractor –Dragages -China Harbour-VSL JV (DCVJV)
- Environmental Team (ET) – Cinotech Consultants Ltd. (Cinotech)

2.7 The proposed project organization and lines of communication with respect to the on-site environmental management structure are shown in **Figure 2**. The key personnel contact names and numbers are summarized in **Table 2.1**.

**Table 2.1 Key Contacts of the Contract**

Party	Position	Position	Phone No.	Fax No.
SOR (ARUP)	CRE	Mr. Michael Chan	3767 5803	3767 5922
		Mr. Colin Meadows	3767 5801	
ENPO/IEC (Environ)	Environmental Project Office Leader	Mr. Y. H Hui	3743 0788	3548 6988
	Independent Environmental Checker	Mr. Antony Wong	3743 0788	3548 6988
Contractor (DCVJV)	Deputy Project Director	Mr. W.K Poon	3121 6638	3121 6688
	Environmental Officer	Mr. CHU Chung Sing	3121 6672	
ET (Cinotech)	Environmental Team Leader	Dr. H.F Chan	2151 2088	3107 1388

2.8 ENVIRON Hong Kong Ltd. (Environ) is employed by the Highways Department as the Independent Environmental Checker (IEC) and Environmental Project Office (ENPO) for the Project.

**Construction Programme**

2.9 A copy of Contractor’s construction programme is provided in **Appendix A**.

**Summary of Construction Works Undertaken During Reporting Month**

2.10 The major site activities undertaken in the reporting period included:

<b>Site Area</b>	<b>Description of Activities</b>
WA3	- Pre-drilling works
WA4	- Setting up of bentonite slurry barges and assembly of 2 nos. of BG40 piling rigs - Fabrication of piling platforms
WA7	- Plant mobilization
Portion C	- Trial pit excavation - Utilities diversion - Erection of hoarding & fence and site office area
Pier Site(s)	- Pre-drilling works at P20, P51, P69, P71, P75, P82, P83, P101 & P103 - Installation of temporary casings for the piling platform at P48 and P0
Other(s)	- Establishment of precast concrete segment casting in Zhongshan - Set up of the floating concrete batching plant

**Status of Environmental Licences, Notification and Permits**

2.11 A summary of the relevant permits, licences, and/or notifications on environmental protection for this Contract is presented in **Table 2.2**.

**Table 2.2 Status of Environmental Licences, Notification and Permits**

Permit / License No.	Valid Period		Status
	From	To	
<b>Environmental Permit (EP)</b>			
EP-352/2009/A	09/11/2011	N/A	Valid
<b>Construction Noise Permit (CNP)</b>			
<b>WA6B:</b> GW-RS0968-12	24/09/2012 (19:00)	23/03/2013 (23:00)	Valid
<b>WA6B:</b> GW-RS1094-12	29/10/2012(19:00)	24/04/2013(24:00)	Valid
<b>WA3B:</b> GW-RW1146-12	13/11/2012(19:00)	14/05/2013(24:00)	Valid
<b>WA4C:</b> GW-RW0959-12	24/12/2012(19:00)	23/06/2013(23:00)	Valid
<b>WA4B:</b> GW-RW0960-12	24/12/2012(19:00)	23/06/2013(23:00)	Valid
<b>WA4B:</b> GW-RW0047-13	28/01/2013(23:00)	27/07/2013(07:00)	Valid
<b>P48-P52:</b> GW-RS0171-13	24/02/2013(07:00)	23/08/2013(23:00)	Valid
<b>P50-P52:</b> GW-RS0180-13	24/02/2013(23:00)	23/08/2013(07:00)	Valid
<b>WA7:</b> GW-RW0125-13	28/02/2013(19:00)	27/08/2013(23:00)	Valid
<b>Notification pursuant to Air Pollution Control (Construction Dust) Regulation</b>			
345773	04/06/2012	N/A	Receipt acknowledged by EPD
<b>Billing Account for Construction Waste Disposal</b>			
A/C# 7015341 (Construction Site)	13/06/2012	N/A	Valid
A/C# 7015341 (Western water and Airport Channel)	20/02/2013	31/05/2013	Valid
<b>Registration of Chemical Waste Producer</b>			
WPN 5213-951-D2499-01	05/07/2012	N/A	Valid
<b>Effluent Discharge License under Water Pollution Control Ordinance</b>			
<b>WA6A:</b> WT00014053-2012	17/09/2012	30/09/2017	Valid
<b>WA6B:</b> WT00014447-2012	30/10/2012	31/10/2017	Valid
<b>WA3:</b> WT00015118-2013	30/01/2013	31/01/2018	Valid
<b>Portion C:</b> WT00015356-2013	22/02/2013	28/02/2018	Valid

### 3 AIR QUALITY MONITORING

#### Monitoring Requirements

- 3.1 In accordance with the EM&A Manual, impact 1-hour TSP and 24-hour TSP monitoring were conducted to monitor the air quality for the Contract. **Appendix B** shows the established Action/Limit Levels for the air quality monitoring works.
- 3.2 Impact 1-hour TSP monitoring was conducted for at least three times every 6 days, while impact 24-hour TSP monitoring was conducted for at least once every 6 days at 2 air quality monitoring stations.

#### Monitoring Location

- 3.3 Impact air quality monitoring was conducted at the 2 monitoring stations under the Contract, as shown in **Figure 3**. **Table 3.1** describes the locations of the air quality monitoring stations.

**Table 3.1 Location for Air Quality Monitoring Locations**

Monitoring Stations	Location
AMS1	Sha Lo Wan
AMS4	San Tau

#### Monitoring Equipment

- 3.4 **Table 3.2** summarizes the equipment used in the impact air monitoring programme. Copies of calibration certificates are attached in **Appendix C**.

**Table 3.2 Air Quality Monitoring Equipment**

Equipment	Model and Make	Quantity
HVS Sampler	TISCH Model: TE-5170	2
Calibrator	TISCH Model: TE-5025A	1
Wind Anemometer	DAVIS Model: Vantage PRO2 6152CUK	1

#### Monitoring Parameters, Frequency and Duration

- 3.5 **Table 3.3** summarizes the monitoring parameters and frequencies of impact dust monitoring during the course of the Contract activities. The air quality monitoring schedule for the reporting period is shown in **Appendix D**.

**Table 3.3 Impact Dust Monitoring Parameters, Frequency and Duration**

Parameters	Frequency
1-hr TSP	Three times / 6 days
24-hr TSP	Once / 6 days

## **Monitoring Methodology and QA/QC Procedure**

### **1-hour and 24-hour TSP Air Quality Monitoring**

#### ***Instrumentation***

- 3.6 High Volume Samplers (HVS) completed with appropriate sampling inlets were employed for air quality monitoring. Each sampler was composed of a motor, a filter holder, a flow controller and a sampling inlet and its performance specification complies with that required by USEPA Standard Title 40, Code of Federation Regulations Chapter 1 (Part 50).

#### ***HVS Installation***

- 3.7 The following guidelines were adopted during the installation of HVS:
- Sufficient support was provided to secure the sampler against gusty wind.
  - No two samplers were placed less than 2 meters apart.
  - The distance between the sampler and an obstacle, such as buildings, was at least twice the height that the obstacle protrudes above the sampler.
  - A minimum of 2 meters of separation from walls, parapets and penthouses was required for rooftop samples.
  - A minimum of 2 meters separation from any supporting structure, measured horizontally was required.
  - No furnaces or incineration flues were nearby.
  - Airflow around the sampler was unrestricted.
  - The samplers were more than 20 meters from the drip line.
  - Any wire fence and gate, to protect the sampler, should not cause any obstruction during monitoring.
  - Permission must be obtained to set up the samples and to obtain access to the monitoring stations; and
  - A secured supply of electricity is needed to operate the samplers.

#### ***Filters Preparation***

- 3.8 Filter paper of size 8" X 10" was used. A HOKLAS accredited laboratory, ETS – Testconsult Limited (ETS), was responsible for the preparation of 24-hr conditioned and pre-weighed filter papers for Cinotech's monitoring team.
- 3.9 All filters, which were prepared by ETS, 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  $\pm 3$  °C; the relative humidity (RH) was < 50% and not variable by more than  $\pm 5$ %. A convenient working RH was 40%.
- 3.10 ETS has comprehensive quality assurance and quality control programmes.

#### ***Operating/Analytical Procedures***

- 3.11 Operating/analytical procedures for the air quality monitoring were highlighted as follows:

- Prior to the commencement of the dust sampling, the flow rate of the HVS was properly set (between 1.1 m<sup>3</sup>/min. and 1.4 m<sup>3</sup>/min.) in accordance with the manufacturer's instruction to within the range recommended in USEPA Standard Title 40, CFR Part 50.
- The power supply was checked to ensure the sampler worked properly.
- On sampling, the sampler was operated for 5 minutes to establish thermal equilibrium before placing any filter media at the designated air quality monitoring station.
- The filter holding frame was then removed by loosening the four nuts and carefully a weighted and conditioned filter was centered with the stamped number upwards, on a supporting screen.
- The filter was aligned on the screen so that the gasket formed an airtight seal on the outer edges of the filter. Then the filter holding frame was tightened to the filter holder with swing bolts. The applied pressure should be sufficient to avoid air leakage at the edges.
- The shelter lid was closed and secured with the aluminum strip.
- The timer was then programmed. Information was recorded on the record sheet, which included the starting time, the weather condition and the filter number (the initial weight of the filter paper can be found out by using the filter number).
- After sampling, the filter was removed and sent to the ETS for weighing. The elapsed time was also recorded.
- Before weighing, all filters were equilibrated in a conditioning environment for 24 hours. The conditioning environment temperature should be between 25°C and 30°C and not vary by more than ±3°C; the relative humidity (RH) should be < 50% and not vary by more than ±5%. A convenient working RH is 40%. Weighing results were returned to Cinotech for further analysis of TSP concentrations collected by each filter.

#### *Maintenance/Calibration*

3.12 The following maintenance/calibration was required for the HVS:

- The high volume motors and their accessories were properly maintained. Appropriate maintenance such as routine motor brushes replacement and electrical wiring checking were made to ensure that the equipment and necessary power supply are in good working condition.
- All HVS were calibrated (five point calibration) using Calibration Kit prior to the commencement of the baseline monitoring and thereafter at bi-monthly intervals.

#### **Results and Observations**

3.13 The monitoring results for 1-hour TSP and 24-hour TSP are summarized in **Table 3.4 and 3.5** respectively. Detailed monitoring results and graphical presentations of 1-hour and 24-hour TSP monitoring results are shown in **Appendices E and F** respectively.



**Table 3.4 Summary Table of 1-hour TSP Monitoring Results during the Reporting Period**

Monitoring Station	Concentration (µg/m <sup>3</sup> )		Action Level, µg/m <sup>3</sup>	Limit Level, µg/m <sup>3</sup>
	Average	Range		
AMS1	77	29 – 129	381	500
AMS4	128	60 – 204	352	

**Table 3.5 Summary Table of 24-hour TSP Monitoring Results during the Reporting Period**

Monitoring Station	Concentration (µg/m <sup>3</sup> )		Action Level, µg/m <sup>3</sup>	Limit Level, µg/m <sup>3</sup>
	Average	Range		
AMS1	45	20 – 70	170	260
AMS4	51	30 – 72	171	

- 3.14 All 1-hour TSP monitoring was conducted as scheduled in the reporting period. No Action/Limit Level exceedance was recorded.
- 3.15 All 24-hour TSP monitoring was conducted as scheduled in the reporting period. No Action/Limit Level exceedance was recorded.
- 3.16 According to our field observations, the major dust source identified at the designated air quality monitoring stations are as follows:

**Table 3.6 Observation at Dust Monitoring Stations**

Monitoring Station	Major Dust Source
AMS1	Shallow sand beach nearby
AMS4	N/A

- 3.17 The wind speed and wind direction were recorded by the installed Wind Anemometer set at AMS4. The location is shown in **Figure 3**. The wind data for the reporting period is summarized in **Appendix J**.

**Event and Action Plan**

- 3.18 Should non-compliance of the criteria occur, action in accordance with the Action Plan in **Appendix K** shall be carried out.

## 4 NOISE MONITORING

### Monitoring Requirements

- 4.1 In accordance with EM&A Manual, two noise monitoring stations, namely NMS1 and NMS4 were selected for impact monitoring for the Contract. Impact noise monitoring was conducted for at least once per week during the construction phase of the Contract. **Appendix B** shows the established Action and Limit Levels for the noise monitoring works.

### Monitoring Location

- 4.2 Impact noise monitoring was conducted at the 2 monitoring stations under the Contract, as shown in **Figure 3**. **Table 4.1** describes the locations of the air quality monitoring stations.

**Table 4.1 Location for Air Quality Monitoring Locations**

Monitoring Stations	Location
NMS1	Sha Lo Wan
NMS4	San Tau

### Monitoring Equipment

- 4.3 **Table 4.2** summarizes the noise monitoring equipment. Copies of calibration certificates are provided in **Appendix C**.

**Table 4.2 Noise Monitoring Equipment**

Equipment	Model and Make	Qty.
Integrating Sound Level Meter	SVAN 957	2
Calibrator	SV 30A	2

### Monitoring Parameters, Frequency and Duration

- 4.4 **Table 4.3** summarizes the monitoring parameters, frequency and total duration of monitoring. The noise monitoring schedule is shown in **Appendix D**.

**Table 4.3 Noise Monitoring Parameters, Frequency and Duration**

Monitoring Stations	Parameter	Period	Frequency
NMS1 NMS4	L <sub>10</sub> (30 min.) dB(A) L <sub>90</sub> (30 min.) dB(A) L <sub>eq</sub> (30 min.) dB(A) (as six consecutive L <sub>eq, 5min</sub> readings)	0700-1900 hrs on normal weekdays	Once per week

## Monitoring Methodology and QA/QC Procedures

- The microphone head of the sound level meter was positioned 1m exterior of the noise sensitive facade and lowered sufficiently so that the building's external wall acts as a reflecting surface.
- The battery condition was checked to ensure the correct functioning of the meter.
- Parameters such as frequency weighting, the time weighting and the measurement time were set as follows:
  - frequency weighting : A
  - time weighting : Fast
  - time measurement :  $L_{eq}(30 \text{ min.}) \text{ dB(A)}$  (as six consecutive  $L_{eq, 5\text{min}}$  readings) during non-restricted hours (i.e. 0700-1900 hrs on normal weekdays)
- Prior to and after each noise measurement, the meter was calibrated using a Calibrator for 94.0 dB at 1000 Hz. If the difference in the calibration level before and after measurement was more than 1.0 dB, the measurement would be considered invalid and repeat of noise measurement would be required after re-calibration or repair of the equipment.
- During the monitoring period, the  $L_{eq}$ ,  $L_{90}$  and  $L_{10}$  were recorded. In addition, site conditions and noise sources were recorded on a standard record sheet.
- Noise measurement was paused temporarily during periods of high intrusive noise (e.g. dog barking, helicopter noise) if possible and observation was recorded when intrusive noise was not avoided.
- Noise monitoring was cancelled in the presence of fog, rain, and wind with a steady speed exceeding 5 m/s, or wind with gusts exceeding 10 m/s. The wind speed shall be checked with a portable wind speed meter capable of measuring the wind speed in m/s.

### *Maintenance and Calibration*

- 4.5 The microphone head of the sound level meter and calibrator were cleaned with a soft cloth at quarterly intervals.
- 4.6 The sound level meter and calibrator were checked and calibrated at yearly intervals.
- 4.7 Immediately prior to and following each noise measurement the accuracy of the sound level meter shall be checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements may be accepted as valid only if the calibration levels from before and after the noise measurement agree to within 1.0 dB.

## Results and Observations

- 4.8 The noise monitoring results are summarized in **Table 4.4**. Detailed monitoring results and graphical presentations of noise monitoring are shown in **Appendices G**.

**Table 4.4 Summary Table of Noise Monitoring Results during the Reporting Period**

Monitoring Station	Noise Level, $L_{eq(30min)}$ dB(A)		Limit Level
	Average	Range	
NMS1	65	N/A	75 dB(A)
NMS4	59	N/A	

Remark: +3dB(A) Façade correction included

N/A: Only one noise monitoring was conducted in the reporting period, no range of noise level is provided.

- 4.9 All noise monitoring was conducted as scheduled in the reporting period. No Action/Limit Level exceedance was recorded.
- 4.10 According to our field observations, the major noise source identified at the designated noise monitoring stations are as follows:

**Table 4.5 Observation at Noise Monitoring Stations**

Monitoring Station	Major Noise Source
NMS1	Air traffic & marine traffic noise
NMS4	Air traffic & marine traffic noise

#### Event and Action Plan

- 4.11 Should non-compliance of the criteria occur, action in accordance with the Action Plan in **Appendix K** shall be carried out.

## 5 WATER QUALITY MONITORING

### Monitoring Requirements

- 5.1 According to EM&A Manual, impact water quality monitoring shall be carried out three days per week during the construction period. The interval between two sets of monitoring will not be less than 36 hours.
- 5.2 Replicate in-situ measurements and samples collected from each independent sampling event shall be collected to ensure a robust statistically interpretable database.
- 5.3 Impact water quality monitoring was conducted two times per monitoring day during mid ebb (within  $\pm 1.75$  hours of the predicted time) and mid flood tides (within  $\pm 1.75$  hours of the predicted time) at three depths (i.e. 1m below surface, mid-depth and 1m above seabed, except where the water depth less than 6m, mid-depth station may be omitted. Should the water depth be less than 3m, only the mid-depth station was monitored) Dissolved oxygen, Suspended solids (SS), turbidity, pH, salinity and temperature were monitored in accordance with the requirements set out in the EM&A Manual.
- 5.4 **Appendix B** shows the established Action/Limit Levels for the water quality monitoring works.

### Monitoring Locations

- 5.5 Impact water quality monitoring was conducted at 14 monitoring stations under the Contract which are summarized in **Table 5.1**. The monitoring station is also shown in **Figure 4**.

**Table 5.1 Location for Marine Water Quality Monitoring Locations**

Monitoring Stations	Coordinates	
	Easting	Northing
IS1	803474	815060
IS2	804851	815715
IS3	806502	815743
IS4	807008	816986
CS1	801784	812711
CS2	805849	818780
SR1	803126	812379
SR2	807856	816953
SR3	810525	816456
SR6	805837	821818
ST1	802677	816006
ST2	804055	818840
ST3	800667	810126
SRA	809872	817152

## **Monitoring Equipment**

### **Instrumentation**

- 5.6 A multi-parameter meters (Model YSI 6820-C-M) were used to measure DO, turbidity, salinity, pH and temperature.

### **Dissolved Oxygen (DO) and Temperature Measuring Equipment**

- 5.7 The instrument for measuring dissolved oxygen and temperature was portable and weatherproof complete with cable, sensor, comprehensive operation manuals and use DC power source. It was capable of measuring:
- a dissolved oxygen level in the range of 0-20 mg/L and 0-200% saturation; and
  - a temperature of 0-45 degree Celsius.
- 5.8 It has a membrane electrode with automatic temperature compensation complete with a cable.
- 5.9 Sufficient stocks of spare electrodes and cables were available for replacement where necessary.
- 5.10 Salinity compensation was built-in in the DO equipment.

### **Turbidity**

- 5.11 Turbidity was measured in situ by the nephelometric method. The instrument was portable and weatherproof using a DC power source complete with cable, sensor and comprehensive operation manuals. The equipment was capable of measuring turbidity between 0-1000 NTU. The probe cable was not less than 25m in length. The meter was calibrated in order to establish the relationship between NTU units and the levels of suspended solids. The turbidity measurement was carried out on split water sample collected from the same depths of suspended solids samples.

### **Sampler**

- 5.12 A water sampler, consisting of a transparent PVC or glass cylinder of a capacity of not less than two litres which can be effectively sealed with cups at both ends was used. The water sampler has a positive latching system to keep it open and prevent premature closure until released by a messenger when the sampler was at the selected water depth.

### **Water Depth Detector**

- 5.13 A portable, battery-operated echo sounder was used for the determination of water depth at each designated monitoring station.

## **pH**

- 5.14 The instrument was consisting of a potentiometer, a glass electrode, a reference electrode and a temperature-compensating device. It was readable to 0.1pH in a range of 0 to 14. Standard buffer solutions of at least pH 7 and pH 10 were used for calibration of the instrument before and after use.

## **Salinity**

- 5.15 A portable salinometer capable of recording salinity within the range of 0-40 ppt was used for salinity measurements.

## **Monitoring Position Equipment**

- 5.16 A hand held Differential Global Positioning System (DGPS) was used during water quality monitoring to ensure the monitoring vessel is at the correct location before taking measurements.

## **Sample Container and Storage**

- 5.17 Following collection, water samples for laboratory analysis were stored in high density polythene bottles (250ml/1L) with no preservatives added, packed in ice (cooled to 4°C without being frozen) and kept in dark during both on-site temporary storage and shipment to the testing laboratory. The samples were delivered to the laboratory as soon as possible and the laboratory determination works were started within 24 hours after collection of the water samples. Sufficient volume of samples was collected to achieve the detection limit.

## **Calibration of In Situ Instruments**

- 5.18 All in situ monitoring instruments were checked, calibrated and certified by a laboratory accredited under HOKLAS or other international accreditation scheme before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring programme. Responses of sensors and electrodes were checked with certified standard solutions before each use. Wet bulb calibration for a DO meter was carried out before measurement at each monitoring event.
- 5.19 For the on site calibration of field equipment (Multi-parameter Water Quality System), the BS 1427:2009, "Guide to on-site test methods for the analysis of waters" was observed.
- 5.20 Sufficient stocks of spare parts were maintained for replacements when necessary. Backup monitoring equipment was also being made available so that monitoring can proceed uninterrupted even when some equipment was under maintenance, calibration, etc.
- 5.21 The equipment used for impact water quality monitoring is shown in **Table 5.2** and copies of the calibration certificates are shown in **Appendix C**. All the monitoring equipment complied with the requirements set out in the EM&A Manual.

**Table 5.2 Water Quality Monitoring Equipment**

Equipment	Model and Make	Qty
Sonar Water Depth Detector	Garmin Fishfinder 140	2
Monitoring Position Equipment	KODEN DGPS (KGP913MKIID, GA-08 & BA-03)	2
Multi-parameter Water Quality System	YSI 6820-C-M	2
Water Sampler	Kahlsico Water-Bottle Model 135DW 150	2

**Monitoring Parameters, Frequency**

5.22 **Table 5.3** summarizes the monitoring parameters, monitoring period and frequencies of the water quality monitoring. The water quality monitoring schedule for the reporting period is shown in **Appendix D**.

**Table 5.3 Water Quality Monitoring Parameters and Frequency**

Monitoring Stations	Parameters, unit	Depth	Frequency
IS1, IS2, IS3 IS4, CS1, CS2, SR1, SR2, SR3, SR6, ST1, ST2, ST3, SRA	<ul style="list-style-type: none"> <li>• Temperature(°C)</li> <li>• pH(pH unit)</li> <li>• turbidity (NTU)</li> <li>• water depth (m)</li> <li>• salinity (ppt)</li> <li>• dissolved oxygen (DO) (mg/L and % of saturation)</li> <li>• suspended solids (SS) (mg/L)</li> </ul>	<ul style="list-style-type: none"> <li>• 3 water depths: 1m below sea surface, mid-depth and 1m above sea bed.</li> <li>• If the water depth is less than 3m, mid-depth sampling only.</li> <li>• If water depth less than 6m, mid-depth may be omitted.</li> </ul>	<ul style="list-style-type: none"> <li>• Impact monitoring: 3 days per week, at mid-flood and mid-ebb tides during the construction period of the Contract</li> </ul>

5.23 Monitoring location/position, time, water depth, sampling depth, pH, salinity, DO saturation, water temperature, tidal stages, weather conditions and any special phenomena or work underway nearby were recorded.

**Monitoring Methodology**

*Instrumentation*

5.24 A multi-parameter meters (Model YSI 6820-C-M) were used to measure DO, turbidity, salinity, pH and temperature.

*Operating/Analytical Procedures*

5.25 The monitoring stations were accessed by the guide of a hand-held Differential Global Positioning System (DGPS) during water quality monitoring in accordance with the EM&A Manual. The depth of the monitoring location was measured using depth meter in order to determine the sampling depths. Afterwards, the probes of the in-situ measurement equipment were lowered to the predetermined depths (1 m below water



surface, mid-depth and 1 m above seabed) and the measurements were carried out accordingly.

- 5.26 At each measurement, two consecutive measurements of DO concentration, DO saturation, salinity, turbidity, pH and temperature were taken. 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 each set was more than 25% of the value of the first reading, the reading was discarded and further readings were taken.
- 5.27 Water sampler was lowered into the water to the required depths of sampling. Upon reaching the pre-determined depth, a messenger to activate the sampler was then released to travel down the wire. The water sample was sealed within the sampler before retrieving. At each station, water samples at three depths (1 m below water surface, mid-depth and 1 m above seabed) were collected accordingly. Water samples were stored in a cool box and kept at less than 4°C but without frozen and sent to the laboratory as soon as possible. In addition, field information as described in Section 5.23 was also recorded.

#### ***Laboratory Analytical Methods***

- 5.28 The testing of all parameters was conducted by CMA Testing and Certification Laboratories (HOKLAS Registration No.004) and comprehensive quality assurance and control procedures in place in order to ensure quality and consistency in results. The testing method, reporting limit and detection limit are provided in **Table 5.4**.

**Table 5.4 Methods for Laboratory Analysis for Water Samples**

<b>Determinant</b>	<b>Instrumentation</b>	<b>Analytical Method</b>	<b>Detection Limit</b>
Suspended Solid (SS)	Weighing	APHA 21e 2540D	0.5 mg/L

#### ***QA/QC Requirements***

##### Decontamination Procedures

- 5.29 Water sampling equipment used during the course of the monitoring programme was decontaminated by manual washing and rinsed clean seawater/distilled water after each sampling event. All disposal equipment was discarded after sampling.

##### Sampling Management and Supervision

- 5.30 All sampling bottles were labelled with the sample I.D (including the indication of sampling station and tidal stage e.g. IS1\_me\_a), laboratory number and sampling date. Water samples were dispatched to the testing laboratory for analysis as soon as possible after the sampling. All samples were stored in a cool box and kept at less than 4°C but without frozen. All water samples were handled under chain of custody protocols and relinquished to the laboratory representatives at locations specified by the laboratory.

- 5.31 The laboratory determination works were started within 24 hours after collection of the

water samples.

#### Quality Control Measures for Sample Testing

- 5.32 The samples testing were performed by CMA Testing and Certification Laboratories.
- 5.33 The following quality control programme was performed by the CMA Testing and Certification Laboratories for every batch of 20 samples:
- ✧ One set of quality control (QC) samples.

#### *Maintenance and Calibration*

- 5.34 All in situ monitoring instruments were checked, calibrated and certified by a laboratory accredited under HOKLAS or other international accreditation scheme before use, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring programme.

#### **Results and Observations**

- 5.35 The monitoring results and graphical presentation of water quality at the monitoring stations is shown in **Appendix H**.
- 5.36 The summary of exceedance record in reporting period is shown in **Appendix L** and summarized in the **Table 5.5**.

**Table 5.5 Summary of Water Quality Exceedances**

Station	Exceedance Level	DO (Surface & Middle)		DO(Bottom)		Turbidity		SS		Total Number of Exceedances	
		Mid-Ebb	Mid-Flood	Mid-Ebb	Mid-Flood	Mid-Ebb	Mid-Flood	Mid-Ebb	Mid-Flood	Mid-Ebb	Mid-Flood
IS1	Action Level									0	0
	Limit Level					22/02/2013 25/02/2013	22/02/2013 25/02/2013 27/02/2013	22/02/2013 25/02/2013	22/02/2013 27/02/2013	4	5
IS2	Action Level					25/02/2013			22/02/2013	1	1
	Limit Level					22/02/2013	22/02/2013 27/02/2013	25/02/2013	27/02/2013	2	3
IS3	Action Level		22/02/2013 25/02/2013				27/02/2013		22/02/2013	0	4
	Limit Level						22/02/2013	22/02/2013 25/02/2013		2	1
IS4	Action Level									0	0
	Limit Level						22/02/2013	25/02/2013	27/02/2013	1	2
SR1	Action Level									0	0
	Limit Level		22/02/2013				22/02/2013 27/02/2013	22/02/2013 25/02/2013	22/02/2013 25/02/2013	2	5
SR2	Action Level		25/02/2013			27/02/2013				1	1
	Limit Level		22/02/2013			22/02/2013	22/02/2013 25/02/2013 27/02/2013	22/02/2013 25/02/2013	22/02/2013 25/02/2013	4	4
SR3	Action Level		25/02/2013				22/02/2013			0	2
	Limit Level		22/02/2013			22/02/2013	25/02/2013	22/02/2013	22/02/2013 25/02/2013	2	4
SR6	Action Level				22/02/2013					0	1
	Limit Level					22/02/2013	22/02/2013			1	1
ST1	Action Level			25/02/2013	22/02/2013					1	1
	Limit Level					22/02/2013 25/02/2013	22/02/2013 27/02/2013	22/02/2013 25/02/2013	22/02/2013 27/02/2013	4	4
ST2	Action Level			25/02/2013	22/02/2013	27/02/2013				2	1
	Limit Level					22/02/2013	22/02/2013 27/02/2013	25/02/2013	27/02/2013	2	3
ST3	Action Level	22/02/2013 3 25/02/2013 3		22/02/2013	22/02/2013 25/02/2013	25/02/2013			22/02/2013	4	3
	Limit Level		22/02/2013 25/02/2013			22/02/2013		22/02/2013 25/02/2013		3	2
SRA	Action Level		25/02/2013		22/02/2013 25/02/2013		27/02/2013	22/02/2013 25/02/2013		2	4
	Limit Level		22/02/2013							0	1
Total	Action Level	2	5	3	7	4	3	2	3		
	Limit Level	0	6	0	0	10	16	17	13		

5.37 During the reporting period, there are seventeen Action Level exceedances and six Limit Level exceedances were recorded for dissolved oxygen. Seven Action Level exceedances and twenty-six Limit Level exceedances for turbidity were recorded. Five Action exceedances and thirty Limit Level exceedances for suspended solids were recorded.

5.38 According to the investigation, no major marine construction activities were conducted during the monitoring period. Therefore, all exceedances are considered not due to the Contract.

5.39 As no major marine construction activities were conducted for the Contract in the reporting period. Water quality impact sources during the water quality monitoring were the nearby construction activities by other parties and nearby operating vessels by other

parties.

### **Event and Action Plan**

5.40 Should non-compliance of the criteria occur, action in accordance with the Action Plan in **Appendix K** shall be carried out.

## 6 DOLPHIN MONITORING

### Monitoring Requirements

- 6.1 According to Section 10 of the EM&A Manual, four kinds of ecological monitoring works are required during the construction phase, namely dolphin monitoring, construction-phase underwater noise monitoring, dolphin behavior monitoring and land-based dolphin behavior and movement monitoring.
- 6.2 The monitoring work shall be undertaken by suitably qualified specialist(s), (i.e. dolphin specialist and bio-acoustician), who shall have sufficient (at least 5-10 years) relevant post-graduate experience and publication in the respective aspects. They should be approved by Agriculture, Fisheries and Conservation Department (AFCD) and Environmental Protection Department (EPD).
- 6.3 Since there was no marine bored piling work in the reporting period, only dolphin monitoring was carried out.

### Dolphin Monitoring

#### Monitoring Requirements

- 6.4 According to EM&A Manual Section 10.3.2, a dolphin monitoring programme should be set up to verify the predictions of impacts and to ensure that there are no unforeseen impacts on the dolphin population during construction phase.
- 6.5 Following the requirement in the EM&A Manual Section 10.4.1, the dolphin monitoring should adopt line-transect vessel survey method, and cover the following line-transect survey areas as in AFCD annual marine mammal monitoring programme.

#### Monitoring Location

- 6.6 For this contract, dolphin monitoring will be carried out in the West Lantau (WL) along the line transect as depicted in **Figure 1** of **Appendix I**. The co-ordinates of all transect lines are shown in **Table 6.1**.

**Table 6.1 Co-ordinates of transect lines in WL survey area**

Line No.		Easting	Northing	Line No.		Easting	Northing
1	Start Point	803750	818500	7	Start Point	799800	810450
1	End Point	803750	815500	7	End Point	801400	810450
2	Start Point	803750	815500	8	Start Point	801300	809450
2	End Point	802860	815500	8	End Point	799500	809450
3	Start Point	801880	814500	9	Start Point	799400	808450
3	End Point	803700	814500	9	End Point	801430	808450
4	Start Point	803200	813600	10	Start Point	801500	807450

Line No.		Easting	Northing	Line No.		Easting	Northing
4	End Point	801500	813600	10	End Point	799600	807450
5	Start Point	800800	812450	11	Start Point	800300	806500
5	End Point	803300	812450	11	End Point	801750	806500
6	Start Point	802500	811500	12	Start Point	801760	805450
6	End Point	800400	811500	12	End Point	800600	805450

Monitoring Frequency

6.7 Dolphin transect survey will be carried out at least twice a month (i.e. complete all the transect lines of West Lantau survey area twice per month) throughout the construction period.

Monitoring Day

6.8 Dolphin monitoring was carried out on 19<sup>th</sup> and 25<sup>th</sup> February 2013. The dolphin monitoring schedule for the reporting period is shown in **Appendix D**.

Monitoring Results

6.9 From these surveys, a total of 65.80 km of survey effort was collected, with 83.3% of the total survey effort being conducted under favourable weather conditions. Out of the 65.80 km of survey effort, the total survey effort conducted on primary lines (the vertical lines perpendicular to the coastlines) was 43.45 km, while the effort on secondary lines (the lines connecting the primary lines) was 22.35 km.

6.10 Only one group of four Chinese White Dolphins was sighted in the offshore waters of central portion of West Lantau. The dolphins were engaged in feeding activities following closely behind a shrimp trawler.

6.11 Dolphin encounter rates deduced from the survey effort and on-effort sighting data made under favourable conditions (Beaufort 3 or below) are shown in **Table 6.2**.

**Table 6.2 Dolphin encounter rates (sightings per 100 km of survey effort) in February’s surveys**

	Encounter rate (STG) (no. of on-effort dolphin sightings per 100 km of survey effort)		Encounter rate (ANI) (no. of dolphins from all on-effort sightings per 100 km of survey effort)	
	Primary Lines Only	Both Primary and Secondary Lines	Primary Lines Only	Both Primary and Secondary Lines
<b>West Lantau</b>	2.9	1.8	11.6	7.3

6.12 No photograph was taken during the February’s surveys.

- 6.13 No adverse impact on Chinese white dolphins was noticeable from general observations.
- 6.14 Evaluation of impacts on dolphins due to construction work will be conducted in the quarterly EM&A report.
- 6.15 Detailed monitoring methodology and results can be found in **Appendix I**.

## 7 ENVIRONMENTAL SITE INSPECTION

### Site Audits

- 7.1 Site audits were carried out by ET on weekly basis to monitor the timely implementation of proper environmental management practices and mitigation measures in the Contract site. The summaries of site audits are attached in **Appendix M**.
- 7.2 Site audits were conducted on 26<sup>th</sup> February 2013 by ET after the commencement of construction works for the Contract. A joint site audit with the representative with IEC, ER, the Contractor and the ET was carried out on 26<sup>th</sup> February 2013. The details of observations during site audit can refer to **Table 7.1**.
- 7.3 According to EP condition 4.7 and EM&A Manual, periodic monitoring (every three months) of construction works shall be conducted to ensure the avoidance of any impacts on Sha Lo Wan (West) Archaeological Site. Access to Sha Lo Wan (West) Archaeological site for works areas and storage of construction equipment is not allowed. As no major construction works were conducted in Sha Lo Wan in the reporting period. The first inspection to the Sha Lo Wan (West) Archeological Site will be conducted in March 2013 and further inspection will be conducted every three months.

### Implementation Status of Environmental Mitigation Measures

- 7.4 According to the EIA Study Report, Environmental Permit and the EM&A Manual, the mitigation measures detailed in the documents are recommended to be implemented during the construction phase. An updated summary of the EMIS is provided in **Appendix N**.
- 7.5 Regular marine travel route for marine vessels were implemented properly in accordance with the submitted plan and relevant records were kept properly.
- 7.6 Acoustic decoupling measures for the stationary equipment (generators, winch generators and air compressors) mounted on boards were adopted in according to the approved Acoustic Decoupling Measures Plan.
- 7.7 During site inspections in the reporting period, no non-conformance was identified. The observations and recommendations made during the audit sessions are summarized in **Table 7.1**.



**Table 7.1 Observations and Recommendations of Site Audit**

Parameters	Date	Observations and Recommendations	Follow-up
<i>Water Quality</i>	N/A <sup>(1)</sup>	N/A <sup>(1)</sup>	N/A <sup>(1)</sup>
<i>Ecology</i>	N/A <sup>(1)</sup>	N/A <sup>(1)</sup>	N/A <sup>(1)</sup>
<i>Air Quality</i>	N/A <sup>(1)</sup>	N/A <sup>(1)</sup>	N/A <sup>(1)</sup>
<i>Noise</i>	N/A <sup>(1)</sup>	N/A <sup>(1)</sup>	N/A <sup>(1)</sup>
<i>Waste / Chemical Management</i>	N/A <sup>(1)</sup>	N/A <sup>(1)</sup>	N/A <sup>(1)</sup>
<i>Cultural Heritage (Sha Lo Wan (West) Archaeological Site)</i>	N/A <sup>(2)</sup>	N/A <sup>(2)</sup>	N/A <sup>(2)</sup>

Remark: N/A<sup>(1)</sup> – No major environmental deficiency was identified during the site inspection in the reporting period.

N/A<sup>(2)</sup> – The first inspection to the Sha Lo Wan (West) Archeological Site will be conducted in March 2013. Inspection to archaeological site will be conducted every three months in accordance with EP condition 4.7.

#### **Advice on the Solid and Liquid Waste Management Status**

- 7.8 According to the Contractor, no inert C&D materials were generated during the reporting period.
- 7.9 The Contractor was advised to minimize the wastes generated through the recycling or reusing. All mitigation measures stipulated in approved waste management plan shall be fully implemented.
- 7.10 The amount of wastes generated by the activities of the Contract during the reporting period is shown in **Appendix O**.

## **8 ENVIRONMENTAL NON-CONFORMANCE (EXCEEDANCES)**

### **Summary of Exceedances**

- 8.1 Summary of exceedance is provided in **Appendix L**.
- 8.2 No Action/Limit Level exceedance was recorded for air quality and construction noise.
- 8.3 There are seventeen Action Level exceedances and six Limit Level exceedances were recorded for dissolved oxygen. Seven Action Level exceedances and twenty-six Limit Level exceedances for turbidity were recorded. Five Action exceedances and thirty Limit Level exceedances for suspended solids were recorded.
- 8.4 According to the investigation, no major marine construction activities were conducted during the monitoring period. Therefore, all exceedances are considered not due to the Contract.

### **Summary of Environmental Complaint**

- 8.5 No environmental related complaint was received in the reporting period. The Complaint Log is attached in **Appendix P**.

### **Summary of Notification of Summons and Successful Prosecution**

- 8.6 There was no prosecution or notification of summons received since the Contract commencement.

## 9 FUTURE KEY ISSUES

### Key Issues in the Coming Month

9.1 Major site activities for the coming reporting month will include:

- Continue erection of hoarding & fence and site office area set up in Portion C;
- Carry out slewing work for CLP 11kVA and 132kVA power cable between P108, P109 & P113;
- Construction of the concrete cable trough for CLP cable slewing;
- Slewing of the tele-communication cable;
- Continue pre-drilling work at western water, along slopping seawall and at Portion C;
- Protection work to the fuel pipes along the access road at Portion C;
- Complete the piling platform for the Kelly method at P48, P0 and P49 and commence bored piling work;
- Erection of platform at P50 and P52 for preparation of RCD bored piling;
- Continue the setup of casting yard;
- Set-up facilities for marine delivery of concrete from land plants.
- Setting up of silt-curtain. (dolphin exclusion zone and dolphin watching plan will be implemented in accordance with EP condition 3.4 and 3.5)

### Monitoring Schedule for the Next Month

9.2 The tentative environmental monitoring schedule for the next month is shown in **Appendix D**.

### Construction Programme for the Next Month

9.3 A tentative construction programme is provided in **Appendix A**.

## 10 CONCLUSIONS AND RECOMMENDATIONS

### Conclusions

- 10.1 The Environmental Monitoring and Audit (EM&A) Report presents the EM&A works undertaken during the period from 22<sup>nd</sup> February 2013 to 28<sup>th</sup> February 2013 in accordance with EM&A Manual.
- 10.2 No Action/Limit Level exceedance was recorded for air quality and construction noise.
- 10.3 For water quality monitoring, there are seventeen Action Level exceedances and six Limit Level exceedances were recorded for dissolved oxygen. Seven Action Level exceedances and twenty-six Limit Level exceedances for turbidity were recorded. Five Action exceedances and thirty Limit Level exceedances for suspended solids were recorded.
- 10.4 According to the investigation, no major marine construction activities were conducted during the monitoring period. Therefore, all exceedances are considered not due to the Contract.
- 10.5 Only one group of four Chinese White Dolphins was sighted in the offshore waters of central portion of West Lantau. No adverse impact on Chinese white dolphins was noticeable from general observations.
- 10.6 Environmental site inspection was conducted on 26<sup>th</sup> February 2013 by ET after the commencement of construction works for the Contract. No non-conformance was identified.
- 10.7 There was no environmental complaint, notification of summons and successful prosecution received.
- 10.8 The ET will keep track on the EM&A programme to ensure compliance of environmental requirements and the proper implementation of all necessary mitigation measures.

### Recommendations

- 10.9 According to the environmental audit performed in the reporting period, the following recommendations were made:

#### *Air Quality Impact*

- To regularly maintain the quality of machinery and vehicles on site.
- To implement dust suppression measures on all haul roads, stockpiles, dry surfaces and excavation works.
- To provide hoarding along the entire length of that portion of the site boundary.

*Noise Impact*

- To inspect the noise sources inside the site.
- To space out noisy equipment and position the equipment as far away as possible from sensitive receivers.
- To provide temporary noise barriers for operations of noisy equipment near the noise sensitive receivers, if necessary.

*Water Impact*

- To prevent any surface runoff discharge into any stream course.
- To review and implement temporary drainage system.
- To identify any wastewater discharges from site.
- To ensure properly maintenance for de-silting facilities.
- To clear the silt and sediment in the sedimentation tanks.
- To review the capacity of de-silting facilities for discharge.
- To divert all the water generated from construction site to de-silting facilities with enough handling capacity before discharge.
- To avoid accumulation of stagnant and ponding water on site.

*Waste/Chemical Management*

- To check for any accumulation of waste materials or rubbish on site.
- To ensure the performance of sorting of C&D materials at source (during generation);
- To carry out inspection of dump truck at site exit to ensure inert and non-inert C&D materials are properly segregated before removing off site.
- To avoid any discharge or accidental spillage of chemical waste or oil directly from the site.
- To avoid improper handling or storage of oil drum on site.

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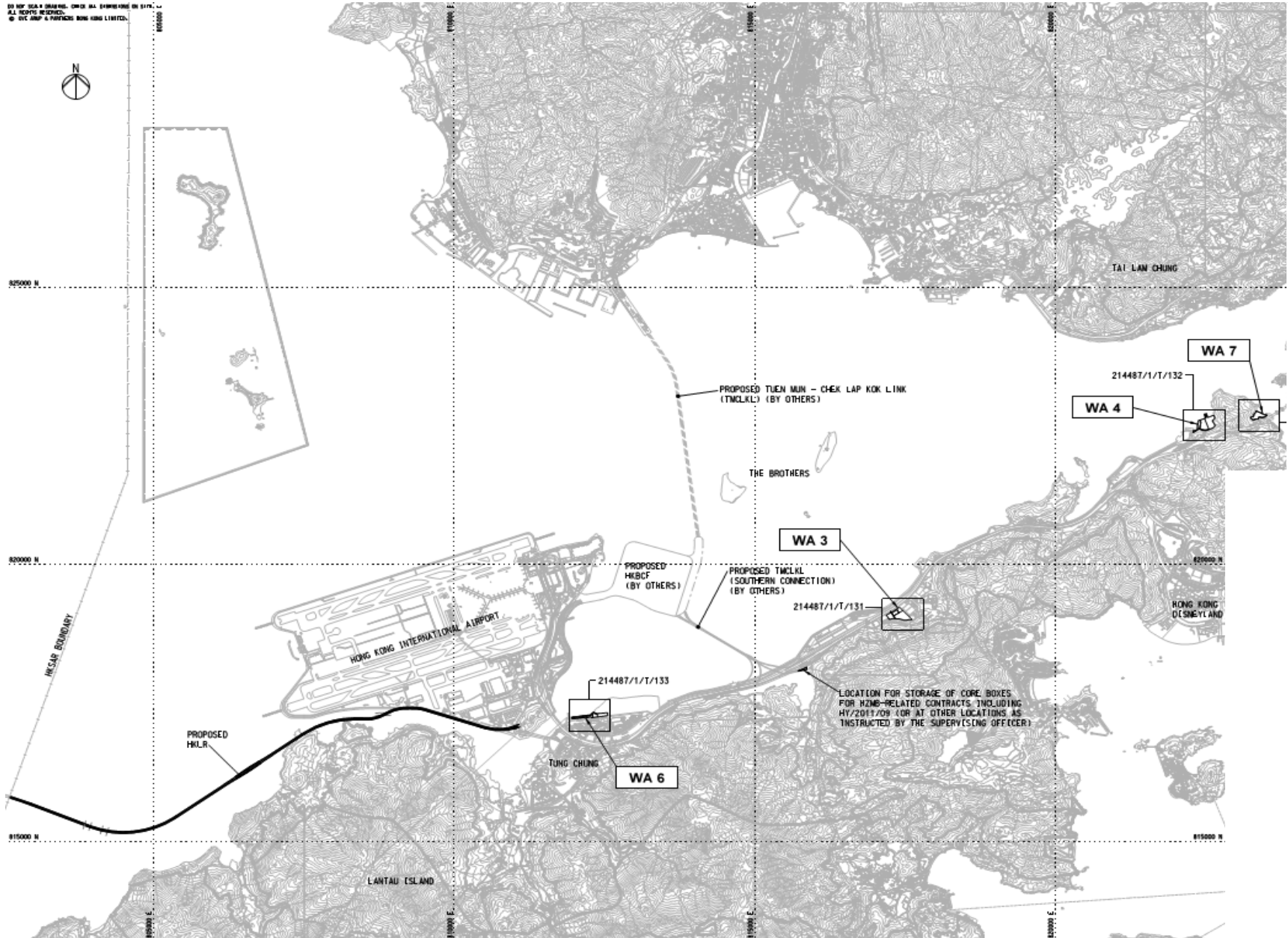
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## FIGURES

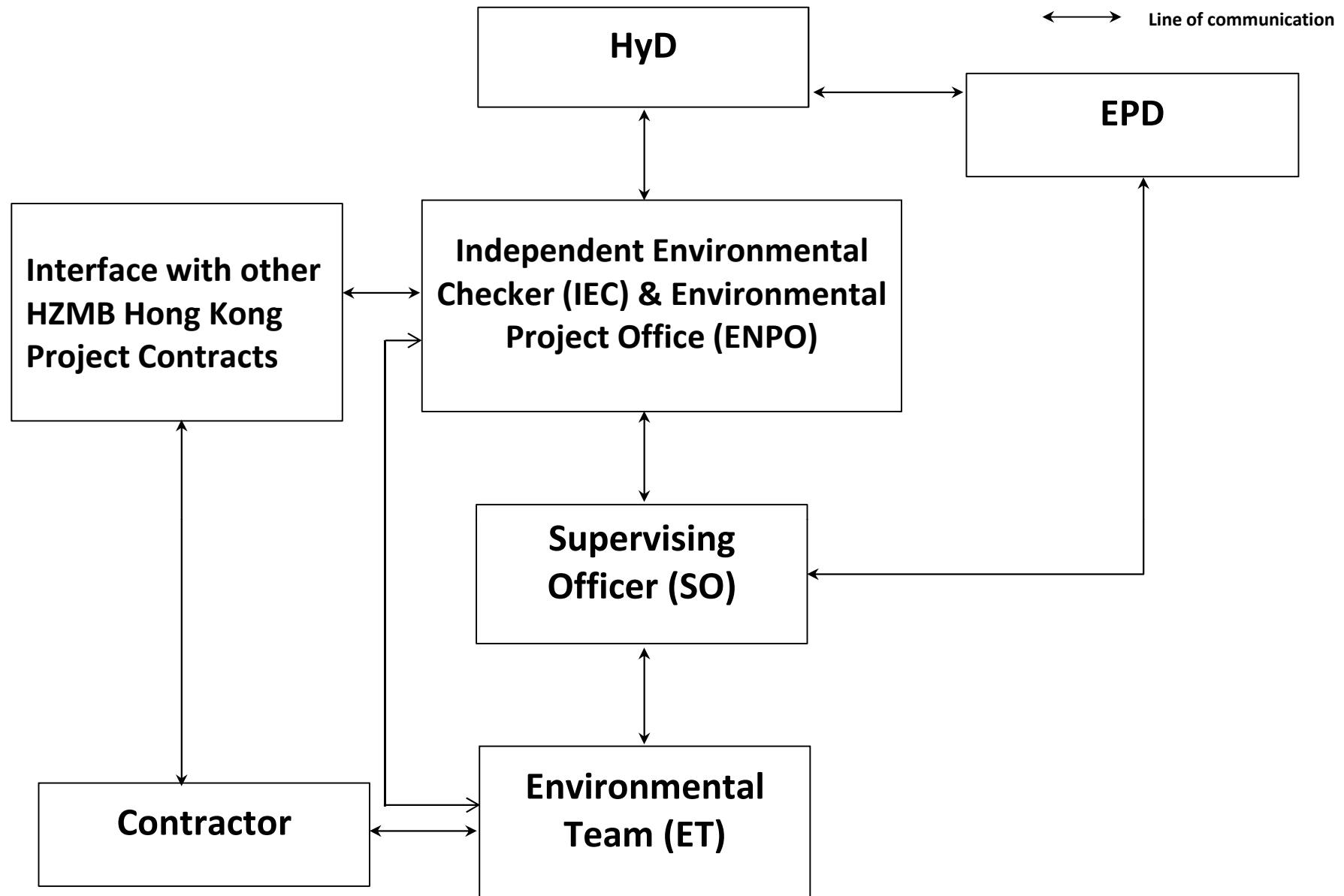
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Title	Contract No. HY/2011/09 Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road – Section between HKSAR Boundary and Scenic Hill  Site Layout Plan	Scale	N.T.S	Propose No.	MA12014	CINOTECH
		Date	Feb-13	Figure	1	

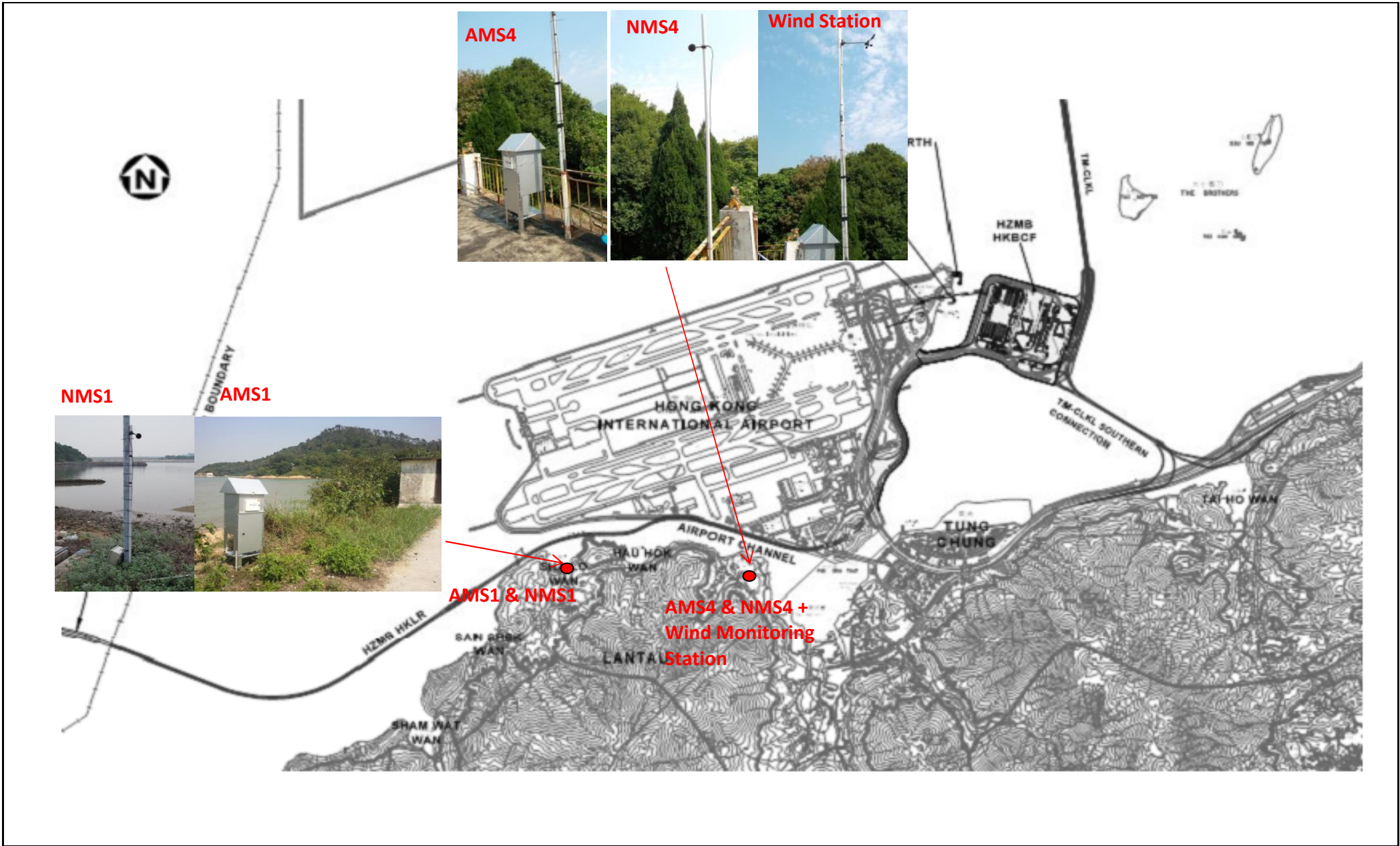


Title Contract No. HY/2011/09  
 Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road – Section between  
 HKSAR Boundary and Scenic Hill  
 Project Organisation for Environmental Works

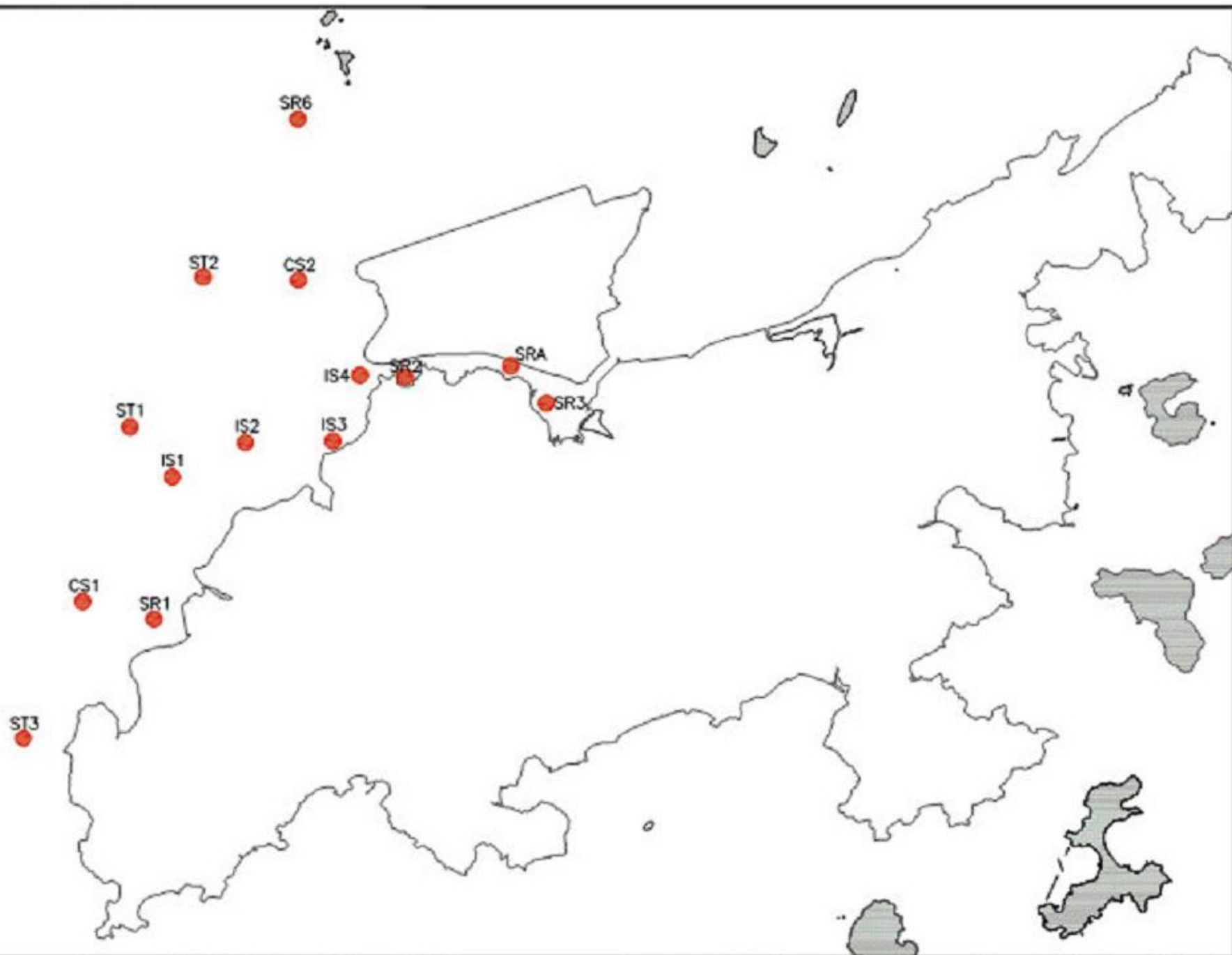
Scale	N.T.S	Proposal No.	MA12014
Date	Feb-13	Figure	2

**CINOTECH**





Title	Contract No. HY/2011/09 Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road – Section between HKSAR Boundary and Scenic Hill	Scale	N.T.S	Propose No.	MA12014	CINOTECH
		Date	Feb-13	Figure	3	
Locations of Air Quality and Noise Monitoring Stations						



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**APPENDIX A  
CONSTRUCTION PROGRAMME**

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Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Late Start	Late Finish	2013																	
								February				March				April				May					
								28	04	11	18	25	04	11	18	25	01	08	15	22	29	06	13	20	27
<b>HKZB Hong Kong Link Road - 3 Months Rolling Programme 2802 (Based on DWP00B)</b>																									
<b>Design and Design Checking of the Works</b>																									
<b>General Design Submission</b>																									
GDS1100	1st draft Geotechnical Submission for all permanent Geotechnical Works	0	0		28-Feb-13*		10-Nov-12																		
GDS1110	Final Geotechnical Submission for all permanent Geotechnical Works	0	0		28-Feb-13*		09-Jan-13																		
GDS1130	Final Durability Assessment Report	0	0		28-Feb-13*		07-Dec-12																		
GDS1140	Final Landscape Plan	0	0		29-Jan-13 A		08-Jun-15																		
GDS1220	Detailed Construction Risk Assessment	0	0		27-Mar-13*		27-Mar-13																		
<b>Approval in Principle (AIP)</b>																									
<b>AIP 06 Roadworks</b>																									
AIP06-40	Approve Design AIP - Roadworks	35	0	21-Nov-12 A	30-Jan-13 A	02-Dec-12	02-Dec-12																		
<b>AIP 07 E&amp;M and Provisioning for TCSS</b>																									
AIP07-40	Approve Design AIP - TCSS, E&M	35	0	20-Nov-12 A	28-Feb-13	08-Jun-13	08-Jun-13																		
<b>AIP 08 Geotechnical Works (e.g. slopework near Scenic Hill)</b>																									
AIP08-40	Approve Design AIP - Geotechnical Works	35	35	01-Feb-13 A	03-Apr-13	22-Jan-14	26-Feb-14																		
AIP08-50	Submit to GEO for Approval - Geotechnical Works	35	35	04-Apr-13	08-May-13	04-Apr-14	09-May-14																		
<b>AIP 09 Landscaping</b>																									
AIP09-40	Approve Design AIP - Landscaping	35	0	16-Oct-12 A	28-Feb-13	02-Nov-15	02-Nov-15																		
<b>AIP 10 SHM&amp;MMS</b>																									
AIP10-20	Comment Design AIP - Remaining Works (SHM&MMS)	21	0	29-Jan-13 A	28-Feb-13	23-May-16	23-May-16																		
AIP10-30	Resubmit Design AIP with DC's Certificate - Remaining Works (SHM&M)	28	28	28-Feb-13	27-Mar-13	24-May-16	20-Jun-16																		
AIP10-40	Approve Design AIP - Remaining Works (SHM&MMS)	35	35	28-Mar-13	01-May-13	21-Jun-16	25-Jul-16																		
<b>Detailed Design Approval (DDA)</b>																									
<b>Foundation</b>																									
<b>Western Water</b>																									
DDA01-40	Approve Design DDA - ML07L/R	35	5	29-Jan-13 A	04-Mar-13	13-Jan-13	17-Jan-13																		
DDA02-10	Prepare and submit Design DDA - ML06L/R	30	0	18-Dec-12 A	28-Feb-13	25-Feb-13	25-Feb-13																		
DDA02-20	Comment Design DDA - ML06L/R	35	35	28-Feb-13	03-Apr-13	26-Feb-13	01-Apr-13																		
DDA02-30	Resubmit Design DDA with DC Certificate - ML06L/R	21	21	04-Apr-13	24-Apr-13	02-Apr-13	22-Apr-13																		
DDA02-40	Approve Design DDA - ML06L/R	35	35	25-Apr-13	29-May-13	01-Aug-13	04-Sep-13																		
DDA03-20	Prepare and submit Design DDA - ML05L/R	30	30	28-Feb-13	29-Mar-13	12-Apr-13	11-May-13																		
DDA03-30	Comment Design DDA - ML05L/R	35	35	30-Mar-13	03-May-13	12-May-13	15-Jun-13																		
DDA03-40	Resubmit Design DDA with DC Certificate - ML05L/R	21	21	04-May-13	24-May-13	16-Jun-13	06-Jul-13																		
DDA03-50	Approve Design DDA - ML05L/R	35	35	25-May-13	28-Jun-13	31-Oct-13	04-Dec-13																		
DDA04-10	Prepare and submit Design DDA - ML04L/R	30	30	30-Mar-13	28-Apr-13	27-May-13	25-Jun-13																		
DDA04-20	Comment Design DDA - ML04L/R	35	35	29-Apr-13	02-Jun-13	26-Jun-13	30-Jul-13																		
DDA05-10	Prepare and submit Design DDA - ML02L/R	30	30	29-Apr-13	28-May-13	11-Jul-13	09-Aug-13																		
DDA06-20	Comment Design DDA - ML01L/R	35	0	28-Nov-12 A	28-Feb-13	24-Dec-12	24-Dec-12																		
DDA06-30	Resubmit Design DDA with DC Certificate - ML01L/R	21	21	28-Feb-13	20-Mar-13	25-Dec-12	14-Jan-13																		
DDA06-40	Approve Design DDA - ML01L/R	35	35	21-Mar-13	24-Apr-13	15-Jan-13	18-Feb-13																		
DDA07-10	Prepare and submit Design DDA - ML08L/R (with Trunaround)	45	0	17-Jan-13 A	08-Feb-13 A	12-Apr-13	12-Apr-13																		
DDA07-20	Comment Design DDA - ML08L/R (with Trunaround)	35	15	09-Feb-13 A	14-Mar-13	02-May-13	16-May-13																		
DDA07-30	Resubmit Design DDA with DC Certificate - ML08L/R (with Trunaround)	21	21	15-Mar-13	04-Apr-13	17-May-13	06-Jun-13																		

- █ Actual Work
- █ Remaining Work
- █ Critical Remaining Work
- ◆ Milestone
- Primary Baseline

**3 Months Rolling Programme - 28 Feb 2013**

Date	Revision	Checked	Approved
27-Feb-13	Feb Updated Rolling Programme	Tim	

Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Late Start	Late Finish	2013																	
								February					March					April				May			
								28	04	11	18	25	04	11	18	25	01	08	15	22	29	06	13	20	27
DDA07-40	Approve Design DDA - ML08L/R (with Trunaround)	35	35	05-Apr-13	09-May-13	07-Jul-13	10-Aug-13																		
DDA08-10	Prepare and submit Design DDA - ML09L/R	30	0	19-Dec-12 A	28-Feb-13	17-Jan-13	17-Jan-13																		
DDA08-20	Comment Design DDA - ML09L/R	35	35	28-Feb-13	03-Apr-13	18-Jan-13	21-Feb-13																		
DDA08-30	Resubmit Design DDA with DC Certificate - ML09L/R	21	21	04-Apr-13	24-Apr-13	22-Feb-13	14-Mar-13																		
DDA08-40	Approve Design DDA - ML09L/R	35	35	25-Apr-13	29-May-13	18-Nov-13	22-Dec-13																		
<b>Navigation Channel</b>																									
DDA09-20	Comment Design DDA - ML03L/R (with Dolphin)	35	1	28-Nov-12 A	28-Feb-13	11-Feb-13	11-Feb-13																		
DDA09-30	Resubmit Design DDA with DC Certificate - ML03L/R (with Dolphin)	21	21	01-Mar-13	21-Mar-13	12-Feb-13	04-Mar-13																		
DDA09-40	Approve Design DDA - ML03L/R (with Dolphin)	35	35	22-Mar-13	25-Apr-13	05-Mar-13	08-Apr-13																		
<b>Airport Channel</b>																									
DDA10-10	Prepare and submit Design DDA - ML10L/R	35	3	27-Jan-13 A	02-Mar-13	28-Feb-13	02-Mar-13																		
DDA10-20	Comment Design DDA - ML10L/R	35	35	03-Mar-13	06-Apr-13	03-Mar-13	06-Apr-13																		
DDA10-30	Resubmit Design DDA with DC Certificate - ML10L/R	21	21	07-Apr-13	27-Apr-13	07-Apr-13	27-Apr-13																		
DDA10-40	Approve Design DDA - ML10L/R	35	35	28-Apr-13	01-Jun-13	28-Apr-13	01-Jun-13																		
DDA11-20	Comment Design DDA - ML11L/R	35	0	04-Dec-12 A	05-Feb-13 A	01-Apr-13	01-Apr-13																		
DDA11-30	Resubmit Design DDA with DC Certificate - ML11L/R	21	0	06-Feb-13 A	28-Feb-13	01-Apr-13	01-Apr-13																		
DDA11-40	Approve Design DDA - ML11L/R	35	35	28-Feb-13	03-Apr-13	16-May-13	19-Jun-13																		
DDA12-10	Prepare and submit Design DDA - ML12L/R	45	0	04-Oct-12 A	28-Feb-13	02-Dec-12	02-Dec-12																		
DDA12-20	Comment Design DDA - ML12L/R	35	35	28-Feb-13	03-Apr-13	03-Dec-12	06-Jan-13																		
DDA12-30	Resubmit Design DDA with DC Certificate - ML12L/R	21	21	04-Apr-13	24-Apr-13	07-Jan-13	27-Jan-13																		
DDA12-40	Approve Design DDA - ML12L/R	35	35	25-Apr-13	29-May-13	16-Apr-13	20-May-13																		
DDA13-10	Prepare and submit Design DDA - ML13L/R	35	0	18-Nov-12 A	28-Feb-13	06-Jan-13	06-Jan-13																		
DDA13-20	Comment Design DDA - ML13L/R	35	35	28-Feb-13	03-Apr-13	07-Jan-13	10-Feb-13																		
DDA13-30	Resubmit Design DDA with DC Certificate - ML13L/R	21	21	04-Apr-13	24-Apr-13	11-Feb-13	03-Mar-13																		
DDA13-40	Approve Design DDA - ML13L/R	35	35	25-Apr-13	29-May-13	25-Mar-13	28-Apr-13																		
DDA14-10	Prepare and submit Design DDA - ML14L/R	35	35	03-Mar-13	06-Apr-13	28-May-13	01-Jul-13																		
DDA14-20	Comment Design DDA - ML14L/R	35	35	07-Apr-13	11-May-13	02-Jul-13	05-Aug-13																		
DDA14-30	Resubmit Design DDA with DC Certificate - ML14L/R	21	21	12-May-13	01-Jun-13	06-Aug-13	26-Aug-13																		
<b>Airport Island</b>																									
DDA15-10	Prepare and submit Design DDA - ML19L/C/R	45	1	28-Nov-12 A	28-Feb-13	26-Mar-13	26-Mar-13																		
DDA15-20	Comment Design DDA - ML19L/C/R	35	35	01-Mar-13	04-Apr-13	27-Mar-13	30-Apr-13																		
DDA15-30	Resubmit Design DDA with DC Certificate - ML19L/C/R	21	21	05-Apr-13	25-Apr-13	01-May-13	21-May-13																		
DDA15-40	Approve Design DDA - ML19L/C/R	35	35	26-Apr-13	30-May-13	25-May-13	28-Jun-13																		
DDA16-20	Comment Design DDA - ML18L/R	35	0	28-Nov-12 A	15-Feb-13 A	01-Feb-13	01-Feb-13																		
DDA16-30	Resubmit Design DDA with DC Certificate - ML18L/R	21	0	16-Feb-13 A	22-Feb-13 A	01-Feb-13	01-Feb-13																		
DDA16-40	Approve Design DDA - ML18L/R	35	30	23-Feb-13 A	29-Mar-13	01-Feb-13	03-Mar-13																		
DDA17-20	Comment Design DDA - ML17L/R	35	0	28-Dec-12 A	28-Feb-13	13-Oct-13	13-Oct-13																		
DDA17-30	Resubmit Design DDA with DC Certificate - ML17L/R	21	21	28-Feb-13	20-Mar-13	14-Oct-13	03-Nov-13																		
DDA17-40	Approve Design DDA - ML17L/R	35	35	21-Mar-13	24-Apr-13	04-Nov-13	08-Dec-13																		
DDA18-10	Prepare and submit Design DDA - ML16L/R	45	0	26-Dec-12 A	28-Feb-13	29-Dec-13	29-Dec-13																		
DDA18-20	Comment Design DDA - ML16L/R	35	35	28-Feb-13	03-Apr-13	30-Dec-13	02-Feb-14																		
DDA18-30	Resubmit Design DDA with DC Certificate - ML16L/R	21	21	04-Apr-13	24-Apr-13	23-Feb-14	15-Mar-14																		
DDA18-40	Approve Design DDA - ML16L/R	35	35	25-Apr-13	29-May-13	16-Mar-14	19-Apr-14																		
DDA19-10	Prepare and submit Design DDA - ML15L/R	45	45	28-Feb-13	13-Apr-13	18-Mar-14	01-May-14																		

- Actual Work
- Remaining Work
- Critical Remaining Work
- Milestone
- Primary Baseline

### 3 Months Rolling Programme - 28 Feb 2013

Date	Revision	Checked	Approved
27-Feb-13	Feb Updated Rolling Programme	Tim	

Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Late Start	Late Finish	2013																
								February					March					April				May		
								28	04	11	18	25	04	11	18	25	01	08	15	22	29	06	13	20
DDA19-20	Comment Design DDA - ML15L/R	35	35	14-Apr-13	18-May-13	02-May-14	05-Jun-14	[Gantt bar: 14-Apr-13 to 18-May-13]																
DDA19-30	Resubmit Design DDA with DC Certificate - ML15L/R	21	21	19-May-13	08-Jun-13	01-Jul-14	21-Jul-14	[Gantt bar: 19-May-13 to 08-Jun-13]																
<b>Substructure</b>																								
<b>Western Water</b>																								
DDA20-20	Comment Design DDA - ML07L/R	35	0	29-Jan-13 A	28-Feb-13	17-Jan-13	17-Jan-13	[Gantt bar: 29-Jan-13 to 28-Feb-13]																
DDA20-30	Resubmit Design DDA with DC Certificate - ML07L/R	21	21	28-Feb-13	20-Mar-13	18-Jan-13	07-Feb-13	[Gantt bar: 28-Feb-13 to 20-Mar-13]																
DDA20-40	Approve Design DDA - ML07L/R	35	35	21-Mar-13	24-Apr-13	18-Feb-13	24-Mar-13	[Gantt bar: 21-Mar-13 to 24-Apr-13]																
DDA21-10	Prepare and submit Design DDA - ML06L/R	30	30	25-Apr-13	24-May-13	24-Mar-13	22-Apr-13	[Gantt bar: 25-Apr-13 to 24-May-13]																
DDA21-20	Comment Design DDA - ML06L/R	35	35	25-May-13	28-Jun-13	29-Apr-13	02-Jun-13	[Gantt bar: 25-May-13 to 28-Jun-13]																
DDA25-10	Prepare and submit Design DDA - ML01L/R	30	0	14-Dec-12 A	21-Mar-13	12-Feb-13	12-Feb-13	[Gantt bar: 14-Dec-12 to 21-Mar-13]																
DDA25-20	Comment Design DDA - ML01L/R	35	35	21-Mar-13	24-Apr-13	15-Mar-13	18-Apr-13	[Gantt bar: 21-Mar-13 to 24-Apr-13]																
DDA25-30	Resubmit Design DDA with DC Certificate - ML01L/R	21	21	25-Apr-13	15-May-13	19-Apr-13	09-May-13	[Gantt bar: 25-Apr-13 to 15-May-13]																
DDA25-40	Approve Design DDA - ML01L/R	35	35	16-May-13	19-Jun-13	10-May-13	13-Jun-13	[Gantt bar: 16-May-13 to 19-Jun-13]																
DDA26-10	Prepare and submit Design DDA - ML08L/R (with trunaround)	45	45	25-May-13	08-Jul-13	23-Apr-13	06-Jun-13	[Gantt bar: 25-May-13 to 08-Jul-13]																
DDA27-10	Prepare and submit Design DDA - ML09L/R	30	30	26-Mar-13	24-Apr-13	13-Feb-13	14-Mar-13	[Gantt bar: 26-Mar-13 to 24-Apr-13]																
DDA27-20	Comment Design DDA - ML09L/R	35	35	25-Apr-13	29-May-13	15-Mar-13	18-Apr-13	[Gantt bar: 25-Apr-13 to 29-May-13]																
<b>Navigation Channel</b>																								
DDA28-10	Prepare and submit Design DDA - ML03L/R (with Dolphin)	45	0	11-Nov-12 A	05-Feb-13 A	08-Mar-13	08-Mar-13	[Gantt bar: 11-Nov-12 to 05-Feb-13]																
DDA28-20	Comment Design DDA - ML03L/R (with Dolphin)	35	18	06-Feb-13 A	08-Apr-13	08-Mar-13	25-Mar-13	[Gantt bar: 06-Feb-13 to 08-Apr-13]																
DDA28-30	Resubmit Design DDA with DC Certificate - ML03L/R (with Dolphin)	21	21	09-Apr-13	29-Apr-13	26-Mar-13	15-Apr-13	[Gantt bar: 09-Apr-13 to 29-Apr-13]																
DDA28-40	Approve Design DDA - ML03L/R (with Dolphin)	35	35	30-Apr-13	03-Jun-13	16-Apr-13	20-May-13	[Gantt bar: 30-Apr-13 to 03-Jun-13]																
<b>Airport Channel</b>																								
DDA29-10	Prepare and submit Design DDA - ML10L/R	35	35	24-Mar-13	27-Apr-13	02-Apr-13	06-May-13	[Gantt bar: 24-Mar-13 to 27-Apr-13]																
DDA29-20	Comment Design DDA - ML10L/R	35	35	28-Apr-13	01-Jun-13	07-May-13	10-Jun-13	[Gantt bar: 28-Apr-13 to 01-Jun-13]																
DDA30-10	Prepare and submit Design DDA - ML11L/R	35	0	09-Dec-12 A	06-Feb-13 A	02-Apr-13	02-Apr-13	[Gantt bar: 09-Dec-12 to 06-Feb-13]																
DDA30-20	Comment Design DDA - ML11L/R	35	19	07-Feb-13 A	18-Mar-13	24-Apr-13	12-May-13	[Gantt bar: 07-Feb-13 to 18-Mar-13]																
DDA30-30	Resubmit Design DDA with DC Certificate - ML11L/R	21	21	19-Mar-13	08-Apr-13	13-May-13	02-Jun-13	[Gantt bar: 19-Mar-13 to 08-Apr-13]																
DDA30-40	Approve Design DDA - ML11L/R	35	35	09-Apr-13	13-May-13	08-Dec-13	11-Jan-14	[Gantt bar: 09-Apr-13 to 13-May-13]																
DDA31-10	Prepare and submit Design DDA - ML12L/R	35	0	09-Dec-12 A	25-Apr-13	27-Jan-13	27-Jan-13	[Gantt bar: 09-Dec-12 to 25-Apr-13]																
DDA31-20	Comment Design DDA - ML12L/R	35	35	25-Apr-13	29-May-13	28-Jan-13	03-Mar-13	[Gantt bar: 25-Apr-13 to 29-May-13]																
DDA32-10	Prepare and submit Design DDA - ML13L/R	35	0	13-Jan-13 A	25-Apr-13	03-Mar-13	03-Mar-13	[Gantt bar: 13-Jan-13 to 25-Apr-13]																
DDA32-20	Comment Design DDA - ML13L/R	35	35	25-Apr-13	29-May-13	04-Mar-13	07-Apr-13	[Gantt bar: 25-Apr-13 to 29-May-13]																
DDA33-10	Prepare and submit Design DDA - ML14L/R	35	35	28-Apr-13	01-Jun-13	11-Aug-13	14-Sep-13	[Gantt bar: 28-Apr-13 to 01-Jun-13]																
<b>Airport Island</b>																								
DDA34-10	Prepare and submit Design DDA - ML19L/C/R	30	30	27-Mar-13	25-Apr-13	22-Apr-13	21-May-13	[Gantt bar: 27-Mar-13 to 25-Apr-13]																
DDA34-20	Comment Design DDA - ML19L/C/R	35	35	26-Apr-13	30-May-13	22-May-13	25-Jun-13	[Gantt bar: 26-Apr-13 to 30-May-13]																
DDA35-10	Prepare and submit Design DDA - ML18L/R	30	30	28-Feb-13	29-Mar-13	11-Jan-13	09-Feb-13	[Gantt bar: 28-Feb-13 to 29-Mar-13]																
DDA35-20	Comment Design DDA - ML18L/R	35	35	30-Mar-13	03-May-13	10-Feb-13	16-Mar-13	[Gantt bar: 30-Mar-13 to 03-May-13]																
DDA35-30	Resubmit Design DDA with DC Certificate - ML18L/R	21	21	04-May-13	24-May-13	10-Apr-13	01-May-13	[Gantt bar: 04-May-13 to 24-May-13]																
DDA35-40	Approve Design DDA - ML18L/R	35	35	25-May-13	28-Jun-13	01-May-13	05-Jun-13	[Gantt bar: 25-May-13 to 28-Jun-13]																
DDA36-10	Prepare and submit Design DDA - ML17L/R	30	30	30-Mar-13	28-Apr-13	15-Sep-13	14-Oct-13	[Gantt bar: 30-Mar-13 to 28-Apr-13]																
DDA36-20	Comment Design DDA - ML17L/R	35	35	29-Apr-13	02-Jun-13	15-Oct-13	18-Nov-13	[Gantt bar: 29-Apr-13 to 02-Jun-13]																
DDA37-10	Prepare and submit Design DDA - ML16L/R	30	30	29-Apr-13	28-May-13	04-Jan-14	02-Feb-14	[Gantt bar: 29-Apr-13 to 28-May-13]																
<b>Superstructure</b>																								

- █ Actual Work
- █ Remaining Work
- █ Critical Remaining Work
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### 3 Months Rolling Programme - 28 Feb 2013

Date	Revision	Checked	Approved
27-Feb-13	Feb Updated Rolling Programme	Tim	

Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Late Start	Late Finish	2013																	
								February				March				April				May					
								28	04	11	18	25	04	11	18	25	01	08	15	22	29	06	13	20	27
<b>Western Water</b>																									
DDA39-10	Prepare and submit Design DDA - ML07L/R	45	45	28-Feb-13	13-Apr-13	25-Dec-12	07-Feb-13	Prepare and submit Design DDA - ML07L/R																	
DDA39-20	Comment Design DDA - ML07L/R	35	35	14-Apr-13	18-May-13	08-Feb-13	14-Mar-13	Comment Design DDA - ML07L/R																	
DDA39-30	Resubmit Design DDA with DC Certificate - ML07L/R	21	21	19-May-13	08-Jun-13	15-Mar-13	04-Apr-13	Resubmit Design DDA with DC Certificate - ML07L/R																	
DDA46-10	Prepare and submit Design DDA - ML09L/R	45	45	15-Apr-13	29-May-13	05-Mar-13	18-Apr-13	Prepare and submit Design DDA - ML09L/R																	
<b>Navigation Channel</b>																									
DDA48-10	Prepare and submit Design DDA - ML03L/R	45	45	16-Mar-13	29-Apr-13	30-Jul-13	12-Sep-13	Prepare and submit Design DDA - ML03L/R																	
DDA48-20	Comment Design DDA - ML03L/R	35	35	30-Apr-13	03-Jun-13	13-Sep-13	17-Oct-13	Comment Design DDA - ML03L/R																	
<b>Airport Channel</b>																									
DDA51-10	Prepare and submit Design DDA - ML12L/R	35	35	16-May-13	19-Jun-13	18-Feb-13	24-Mar-13	Prepare and submit Design DDA - ML12L/R																	
<b>Airport Island</b>																									
DDA54-10	Prepare and submit Design DDA - ML19L/C/R	45	45	25-May-13	08-Jul-13	02-Jun-13	16-Jul-13	Prepare and submit Design DDA - ML19L/C/R																	
DDA55-10	Prepare and submit Design DDA - ML18L/R	45	45	10-Apr-13	24-May-13	21-Feb-13	06-Apr-13	Prepare and submit Design DDA - ML18L/R																	
DDA55-20	Comment Design DDA - ML18L/R	35	35	25-May-13	28-Jun-13	07-Apr-13	11-May-13	Comment Design DDA - ML18L/R																	
<b>Roadworks</b>																									
DDA59-10	Prepare and submit Design DDA - Roadworks	35	0	28-Nov-12 A	06-Feb-13 A	02-Dec-12	02-Dec-12	Prepare and submit Design DDA - Roadworks																	
DDA59-20	Comment Design DDA - Roadworks	35	19	07-Feb-13 A	18-Mar-13	25-Mar-13	13-Apr-13	Comment Design DDA - Roadworks																	
DDA59-30	Resubmit Design DDA with DC Certificate - Roadworks	21	21	19-Mar-13	08-Apr-13	13-Apr-13	04-May-13	Resubmit Design DDA with DC Certificate - Roadworks																	
DDA59-40	Approve Design DDA - Roadworks	35	35	09-Apr-13	13-May-13	04-May-13	08-Jun-13	Approve Design DDA - Roadworks																	
<b>TCSS and E&amp;M</b>																									
DDA60-10	Prepare and submit Design DDA - TCSS & E&M	87	87	14-May-13	08-Aug-13	08-Jun-13	03-Sep-13	Prepare and submit Design DDA - TCSS & E&M																	
<b>Geotechnical Works</b>																									
DDA61-10	Prepare and submit Design DDA - Geotechnical Works	72	72	04-Apr-13	14-Jun-13	26-Feb-14	09-May-14	Prepare and submit Design DDA - Geotechnical Works																	
<b>Remaining Works</b>																									
DDA64-10	Prepare and submit Design DDA - Remaining Works (barrier walls/ anemometers)	60	0	27-Dec-12 A	28-Feb-13	03-Sep-13	03-Sep-13	Prepare and submit Design DDA - Remaining Works (barrier walls/ anemometers)																	
DDA64-20	Comment Design DDA - Remaining Works (barrier walls/ anemometers)	35	35	28-Feb-13	03-Apr-13	03-Sep-13	08-Oct-13	Comment Design DDA - Remaining Works (barrier walls/ anemometers)																	
DDA64-30	Resubmit Design DDA with DC Certificate - Remaining Works (barrier walls/ anemometers)	21	21	04-Apr-13	24-Apr-13	08-Oct-13	29-Oct-13	Resubmit Design DDA with DC Certificate - Remaining Works (barrier walls/ anemometers)																	
DDA64-40	Approve Design DDA - Remaining Works (barrier walls/ anemometers)	35	35	25-Apr-13	29-May-13	29-Oct-13	03-Dec-13	Approve Design DDA - Remaining Works (barrier walls/ anemometers)																	
<b>Project General Submission</b>																									
PGS1030	Site Traffic Safety Management Plan (STSMP)	0	0		28-Feb-13*		11-Jul-12	Site Traffic Safety Management Plan (STSMP)																	
PGS1090	Joint Venture guarantee	0	0		28-Feb-13*		13-Jun-12	Joint Venture guarantee																	
<b>Tree Felling/Transplantation Plan</b>																									
PGS1490	Tree Felling/Transplantation Plan Approval	60	0	06-Nov-12 A	07-Feb-13 A	28-Feb-13	28-Feb-13	Tree Felling/Transplantation Plan Approval																	
PGS1780	Tree Felling/Transplant	90	90	28-Feb-13	27-Jun-13	28-Feb-13	27-Jun-13	Tree Felling/Transplant																	
<b>TTA for CLK South Rd</b>																									
PGS1520	TTA - Notification for CLK South Rd	28	28	22-Jan-13 A	27-Mar-13	09-Nov-13	06-Dec-13	TTA - Notification for CLK South Rd																	
<b>Utilities Diversion Schedule</b>																									
PGS1560	Resubmission and approval of utilities diversion schedule	21	0	15-Nov-12 A	28-Feb-13	17-Dec-12	17-Dec-12	Resubmission and approval of utilities diversion schedule																	
PGS2255	Resubmission and approval of utilities diversion schedule	10	0	15-Nov-12 A	28-Feb-13	17-Jan-13	17-Jan-13	Resubmission and approval of utilities diversion schedule																	
<b>Dumping permit</b>																									
PGS1430	Tier III - Testing & Submit Formal SQR	21	0	22-Sep-12 A	28-Feb-13	18-Dec-12	18-Dec-12	Tier III - Testing & Submit Formal SQR																	
PGS1440	Approval of Dumping permit	30	30	28-Feb-13	29-Mar-13	19-Dec-12	17-Jan-13	Approval of Dumping permit																	
<b>Construction Noise Permit</b>																									
PGS2445	Submit and approve CNP for Bored Piles (P0 to P84)	75	0	31-Oct-12 A	25-Feb-13 A	18-Jan-13	18-Jan-13	Submit and approve CNP for Bored Piles (P0 to P84)																	

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								February				March				April				May					
								28	04	11	18	25	04	11	18	25	01	08	15	22	29	06	13	20	27
<b>Cross-boundary Disposal of Marine Sediment (if necessary)</b>																									
PGS1800	Obtained Dumping Permit fm PRC	60	0	14-Aug-12 A	28-Feb-13	17-Nov-17	17-Nov-17	Obtained Dumping Permit fm PRC																	
PGS1810	Submit PRC Dumping Permit to EPD	7	7	28-Feb-13	06-Mar-13	17-Nov-17	24-Nov-17	Submit PRC Dumping Permit to EPD																	
PGS1820	Obtained Marine Dumping Permit fm EPD	60	60	07-Mar-13	05-May-13	24-Nov-17	23-Jan-18	Obtained Marine Dumping Permit fm EPD																	
PGS1830	Submit PRC Dumping Permit to SOR	7	7	28-Feb-13	06-Mar-13	16-Jan-18	23-Jan-18	Submit PRC Dumping Permit to SOR																	
PGS1840	Obtained permit for delivery material to Mainland	14	14	06-May-13	19-May-13	23-Jan-18	02-Feb-18	Obtained permit for delivery material to Mainland																	
<b>Temporary Piling Platform/Cofferdem</b>																									
PGS1650	Design approval of temporary piling platform	18	0	29-Dec-12 A	28-Feb-13	17-Dec-12	17-Dec-12	Design approval of temporary piling platform																	
PGS1655	Deliver maternal for temporary piling platform	28	0	20-Nov-12 A	28-Feb-13	17-Dec-12	17-Dec-12	Deliver maternal for temporary piling platform																	
PGS1670	Design temporary cofferdem	80	0	29-Aug-12 A	28-Feb-13	04-Apr-13	04-Apr-13	Design temporary cofferdem																	
PGS1680	Design approval of temporary cofferdem	21	21	28-Feb-13	20-Mar-13	05-Apr-13	25-Apr-13	Design approval of temporary cofferdem																	
PGS1690	Deliver maternal for temporary cofferdem	45	45	21-Mar-13	04-May-13	26-Apr-13	09-Jun-13	Deliver maternal for temporary cofferdem																	
PGS2205	Design temporary jetty at Pier P67 to P68 & P69 to P71	110	12	17-Nov-12 A	11-Mar-13	23-Feb-13	06-Mar-13	Design temporary jetty at Pier P67 to P68 & P69 to P71																	
PGS2215	Design approval of temporary jetty	27	27	12-Mar-13	07-Apr-13	07-Mar-13	02-Apr-13	Design approval of temporary jetty																	
PGS2225	Deliver maternal for temporary jetty	60	60	08-Apr-13	06-Jun-13	03-Apr-13	01-Jun-13	Deliver maternal for temporary jetty																	
<b>Marine Concrete Batching Plant</b>																									
PGS1700	modification and licensing marine batching plant	180	0	31-May-12 A	28-Feb-13	27-Dec-12	27-Dec-12	modification and licensing marine batching plant																	
PGS1710	Submit and approval marine batching plant	21	21	28-Feb-13	20-Mar-13	28-Dec-12	17-Jan-13	Submit and approval marine batching plant																	
<b>Segment Casting Yard</b>																									
PGS2000	Detail design casting yard	61	0	01-Oct-12 A	28-Feb-13	17-Mar-13	17-Mar-13	Detail design casting yard																	
PGS2010	Formwork design (Typical span)	150	5	01-Oct-12 A	04-Mar-13	10-Mar-13	14-Mar-13	Formwork design (Typical span)																	
PGS2020	Formwork design (Long span)	180	35	01-Oct-12 A	03-Apr-13	08-Apr-13	12-May-13	Formwork design (Long span)																	
<b>Construct Concrete Batching Plant</b>																									
CPY1040	Install concrete batching plant	35	7	18-Jan-13 A	07-Mar-13	18-Mar-13	25-Mar-13	Install concrete batching plant																	
CPY1050	QSPSC inspection and certification	60	60	08-Mar-13	27-May-13	26-Mar-13	15-Jun-13	QSPSC inspection and certification																	
<b>Office, Living Quarters, Labrotary &amp; Warehouse</b>																									
CPY1090	Backfill for road	10	1	08-Jan-13 A	28-Feb-13	19-Mar-13	19-Mar-13	Backfill for road																	
<b>Precast Area (Typical &amp; Land Span)</b>																									
CPY1110	Backfill precast area	14	0	19-Jan-13 A	31-Jan-13 A	19-Mar-13	19-Mar-13	Backfill precast area																	
CPY1120	Piling works (include gantry rail foundation)	14	0	19-Jan-13 A	02-Feb-13 A	20-Mar-13	20-Mar-13	Piling works (include gantry rail foundation)																	
CPY1130	Ground beams & cap for precast area	40	21	05-Feb-13 A	26-Mar-13	20-Mar-13	19-Apr-13	Ground beams & cap for precast area																	
CPY1140	Ground beams and cap for gantry rail	21	3	05-Feb-13 A	04-Mar-13	13-Apr-13	16-Apr-13	Ground beams and cap for gantry rail																	
CPY1150	Concrete paving	21	21	16-Mar-13	13-Apr-13	19-Apr-13	15-May-13	Concrete paving																	
CPY1160	Install survey tower and rebar jigs	50	50	06-Apr-13	10-Jun-13	15-May-13	23-Jul-13	Install survey tower and rebar jigs																	
CPY1270	Backfill storage area	14	14	05-Mar-13	20-Mar-13	23-Mar-13	12-Apr-13	Backfill storage area																	
CPY1280	Piling works (include gantry rail foundation)	30	30	13-Mar-13	22-Apr-13	05-Apr-13	11-May-13	Piling works (include gantry rail foundation)																	
CPY1290	Ground beams & cap for storage area	30	30	23-Apr-13	31-May-13	13-May-13	22-Jun-13	Ground beams & cap for storage area																	
CPY1300	Ground beams and cap for gantry rail (storage area)	50	50	23-Apr-13	28-Jun-13	15-May-13	23-Jul-13	Ground beams and cap for gantry rail (storage area)																	
<b>Pre-cast Area (Long Span)</b>																									
CPY1170	Backfill precast area	14	0	28-Jan-13 A	01-Mar-13	19-Mar-13	19-Mar-13	Backfill precast area																	
CPY1180	Piling works (include gantry rail foundation)	14	0	05-Feb-13 A	01-Mar-13	10-Apr-13	10-Apr-13	Piling works (include gantry rail foundation)																	
CPY1190	Ground beams & cap for precast area	35	35	26-Mar-13	13-May-13	20-Apr-13	04-Jun-13	Ground beams & cap for precast area																	
CPY1200	Ground beams and cap for gantry rail	21	21	05-Mar-13	28-Mar-13	18-Apr-13	13-May-13	Ground beams and cap for gantry rail																	
CPY1210	Concrete paving	21	21	24-Apr-13	23-May-13	16-May-13	13-Jun-13	Concrete paving																	

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								February					March					April				May			
								28	04	11	18	25	04	11	18	25	01	08	15	22	29	06	13	20	27
CPY1220	Install survey tower and rebar jigs	35	35	11-May-13	29-Jun-13	04-Jun-13	23-Jul-13																		
CPY1230	Backfill storage area	14	3	16-Feb-13 A	04-Mar-13	20-Mar-13	22-Mar-13																		
CPY1240	Piling works (include gantry rail foundation)	30	26	26-Feb-13 A	03-Apr-13	11-Apr-13	13-May-13																		
CPY1260	Ground beams and cap for gantry rail (storage area)	50	50	05-Apr-13	08-Jun-13	15-May-13	23-Jul-13																		
<b>Construct Gantry Cranes</b>																									
CPY1310	Install gantry rail (typical & land span area)	110	110	05-Mar-13	31-Jul-13	07-May-13	09-Oct-13																		
CPY1320	Piling works (include gantry rail foundation)	90	90	02-Apr-13	01-Aug-13	29-May-13	03-Oct-13																		
CPY1330	Gantries installation	80	80	20-Apr-13	07-Aug-13	15-Jun-13	09-Oct-13																		
<b>Construct Jetty</b>																									
CPY1340	Safety assessment & design of jetty	107	0	29-Aug-12 A	28-Feb-13	04-Feb-13	04-Feb-13																		
CPY1350	Channel dredging	24	24	28-Feb-13	27-Mar-13	05-Feb-13	07-Mar-13																		
CPY1360	Construct the jetty	80	80	28-Mar-13	17-Jul-13	08-Mar-13	22-Jun-13																		
CPY1365	Construct the material jetty	40	40	24-May-13	17-Jul-13	30-Apr-13	22-Jun-13																		
<b>Segment Moulds</b>																									
PGS2105	Fabrication & 1st Deliver segment mould (Typical span)	175	91	01-Dec-12 A	29-May-13	10-Mar-13	08-Jun-13																		
PGS2285	Fabrication & 2nd Deliver segment mould (Typical span)	175	175	01-Mar-13	22-Aug-13	11-Mar-13	01-Sep-13																		
PGS2315	Fabrication & 1st Deliver segment mould (Long span)	201	175	30-Dec-12 A	21-Aug-13	08-Apr-13	29-Sep-13																		
PGS2325	Fabrication & 2nd Deliver segment mould (Long span)	201	201	30-Mar-13	16-Oct-13	13-May-13	29-Nov-13																		
<b>Major Method Statement</b>																									
PGS2120	Approve MS for Bored Pile (Kelly method)	21	1	12-Dec-12 A	28-Feb-13	17-Jan-13	17-Jan-13																		
PGS2160	Approve MS for Bored Pile (RCD method)	60	1	09-Jan-13 A	28-Feb-13	31-Jan-13	31-Jan-13																		
PGS2365	Prepare MS for Pile Cap	60	1	23-Nov-12 A	28-Feb-13	23-Jan-13	23-Jan-13																		
PGS2375	Approve MS for Pile Cap	60	60	01-Mar-13	29-Apr-13	24-Jan-13	24-Mar-13																		
PGS2385	Prepare MS for Column & Portal	60	7	01-Jan-13 A	03-May-13	22-Mar-13	28-Mar-13																		
PGS2395	Approve MS for Column & Portal	60	60	04-May-13	02-Jul-13	29-Mar-13	27-May-13																		
PGS2405	Prepare MS for SOP Installation	60	60	15-May-13	13-Jul-13	10-May-13	08-Jul-13																		
<b>Procurement and Fabrication</b>																									
PGS1927	Deliver barge for SI works (Airport Channel)	108	0	29-Aug-12 A	28-Feb-13	27-Jan-13	27-Jan-13																		
PGS2140	2nd deliver bored pile rigs (Kelly method)	90	1	26-Nov-12 A	28-Feb-13	17-Jul-13	17-Jul-13																		
PGS2180	2nd deliver bored pile rigs (RCD method)	109	83	26-Jan-13 A	21-May-13	08-Mar-13	29-May-13																		
PGS2183	3rd deliver bored pile rigs (RCD method)	77	77	22-May-13	06-Aug-13	12-Nov-13	27-Jan-14																		
<b>Site Establishment Works</b>																									
PGS1910	Setup re-bar yard at WA7	60	0	25-Sep-12 A	28-Feb-13	17-Jan-13	17-Jan-13																		
PGS2465	Submit and approve hoarding design	60	1	06-Dec-12 A	28-Feb-13	02-Mar-13	02-Mar-13																		
PGS2475	Erection hoarding	120	0	14-Sep-12 A	01-Mar-13	02-Mar-13	02-Mar-13																		
<b>Viaduct between HKSAR Boundary and Landing Point on Airport Island</b>																									
<b>ML01L/R 75mx8 - Stage 1 of Works</b>																									
<b>Pier P0L/R</b>																									
<b>Temporary Works</b>																									
WW1000	Install temporary working platform for bored pile P0 (Learning)	24	24	14-Feb-13 A	06-May-13	31-Jan-13	02-Mar-13																		
<b>Site Investigation</b>																									
WW1010	Site investigation for bored pile P0	8	8	07-May-13	16-May-13	04-Mar-13	12-Mar-13																		
<b>ML03L/R 109.661m+150mx3+109.661m Navigation Channel - Stage 4 of Works</b>																									

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								28	04	11	18	25	04	11	18	25	01	08	15	22	29	06	13	20	27
<b>Pier P17/LR</b>																									
<b>Site Investigation</b>																									
NC1130	Site investigation for bored pile P17 (Bridge)	10	10	18-May-13	30-May-13	15-Aug-13	28-Aug-13	[Gantt bar: 18-May-13 to 30-May-13]																	
<b>Pier P18/LR</b>																									
<b>Site Investigation</b>																									
NC1250	Site investigation for bored pile P18 (Bridge)	10	10	22-Apr-13	03-May-13	29-Jun-13	13-Jul-13	[Gantt bar: 22-Apr-13 to 03-May-13]																	
NC1260	Site investigation for bored pile P18 (Dolphin)	10	10	04-May-13	16-May-13	15-Jul-13	27-Jul-13	[Gantt bar: 04-May-13 to 16-May-13]																	
<b>Pier P19/LR</b>																									
<b>Temporary Works</b>																									
NC1360	Install temporary working platform for bored pile P19	30	30	22-Apr-13	30-May-13	08-Jun-13	20-Jul-13	[Gantt bar: 22-Apr-13 to 30-May-13]																	
<b>Site Investigation</b>																									
NC1370	Site investigation for bored pile P19 (Bridge)	10	10	23-Mar-13	08-Apr-13	11-May-13	25-May-13	[Gantt bar: 23-Mar-13 to 08-Apr-13]																	
NC1380	Site investigation for bored pile P19 (Dolphin)	10	10	09-Apr-13	20-Apr-13	27-May-13	07-Jun-13	[Gantt bar: 09-Apr-13 to 20-Apr-13]																	
<b>Pier P20/LR</b>																									
<b>Temporary Works</b>																									
NC1480	Install temporary working platform for bored pile P20 (Learning)	45	45	23-Mar-13	24-May-13	07-Feb-13	08-Apr-13	[Gantt bar: 23-Mar-13 to 24-May-13]																	
<b>Site Investigation</b>																									
NC1490	Site investigation for bored pile P20 (Bridge)	10	10	01-Feb-13 A	11-Mar-13	15-Jan-13	25-Jan-13	[Gantt bar: 01-Feb-13 A to 11-Mar-13]																	
NC1500	Site investigation for bored pile P20 (Dolphin)	10	10	12-Mar-13	22-Mar-13	26-Jan-13	06-Feb-13	[Gantt bar: 12-Mar-13 to 22-Mar-13]																	
<b>ML06/LR 74.5mx8 - Stage 4 of Works</b>																									
<b>Pier 39/LR</b>																									
<b>Site Investigation</b>																									
WW6370	Site investigation for bored pile P39	8	8	28-May-13	06-Jun-13	19-Oct-13	28-Oct-13	[Gantt bar: 28-May-13 to 06-Jun-13]																	
<b>Pier 40/LR</b>																									
<b>Site Investigation</b>																									
WW6450	Site investigation for bored pile P40	8	8	16-May-13	27-May-13	07-Oct-13	17-Oct-13	[Gantt bar: 16-May-13 to 27-May-13]																	
<b>Pier 41/LR</b>																									
<b>Site Investigation</b>																									
WW6530	Site investigation for bored pile P41	8	8	06-May-13	15-May-13	24-Sep-13	05-Oct-13	[Gantt bar: 06-May-13 to 15-May-13]																	
<b>Pier 42/LR</b>																									
<b>Site Investigation</b>																									
WW6610	Site investigation for bored pile P42	8	8	25-Apr-13	04-May-13	11-Sep-13	23-Sep-13	[Gantt bar: 25-Apr-13 to 04-May-13]																	
<b>Pier 43/LR</b>																									
<b>Site Investigation</b>																									
WW6690	Site investigation for bored pile P43	8	8	15-Apr-13	24-Apr-13	31-Aug-13	10-Sep-13	[Gantt bar: 15-Apr-13 to 24-Apr-13]																	
<b>Pier 44/LR</b>																									
<b>Site Investigation</b>																									
WW6770	Site investigation for bored pile P44	8	8	05-Apr-13	13-Apr-13	20-Aug-13	29-Aug-13	[Gantt bar: 05-Apr-13 to 13-Apr-13]																	
<b>ML07/LR 73.396mx8 - Stage 4 of Works</b>																									
<b>Pier P45/LR (M.J.)</b>																									
<b>Site Investigation</b>																									
WW6850	Site investigation for bored pile P45	8	8	22-Mar-13	03-Apr-13	06-Aug-13	15-Aug-13	[Gantt bar: 22-Mar-13 to 03-Apr-13]																	
<b>Pier P46/LR</b>																									
<b>Site Investigation</b>																									

- Actual Work
- Remaining Work
- Critical Remaining Work
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**3 Months Rolling Programme - 28 Feb 2013**

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Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Late Start	Late Finish	2013																	
								February					March					April				May			
								28	04	11	18	25	04	11	18	25	01	08	15	22	29	06	13	20	27
<b>Pier P73L/R</b>																									
<b>Temporary Works</b>																									
AC1410	Install temporary piling platform & cofferdem for pier P73	45	45	25-May-13	25-Jul-13	18-May-13	18-Jul-13	[Gantt bar: 25-May-13 to 25-Jul-13]																	
<b>Site Investigation</b>																									
AC1440	Site investigation for bored pile P73	30	30	15-Apr-13	24-May-13	09-Apr-13	16-May-13	[Gantt bar: 15-Apr-13 to 24-May-13]																	
<b>ML12L/R 109m+165mx2+109m - Stage 4 of Works</b>																									
<b>Pier P74L/R (M.J.)</b>																									
<b>Temporary Works</b>																									
AC1500	Install temporary piling platform & cofferdem for pier P74	36	36	15-Apr-13	31-May-13	02-May-13	18-Jun-13	[Gantt bar: 15-Apr-13 to 31-May-13]																	
<b>Site Investigation</b>																									
AC1530	Site investigation for bored pile P74	15	15	23-Mar-13	13-Apr-13	18-Mar-13	08-Apr-13	[Gantt bar: 23-Mar-13 to 13-Apr-13]																	
<b>Pier P75L/R</b>																									
<b>Temporary Works</b>																									
AC1590	Install temporary piling platform & cofferdem for pier P75	57	57	06-May-13	23-Jul-13	03-Sep-13	20-Nov-13	[Gantt bar: 06-May-13 to 23-Jul-13]																	
<b>Site Investigation</b>																									
AC1620	Site investigation for bored pile P75	30	20	21-Jan-13 A	22-Mar-13	22-Feb-13	16-Mar-13	[Gantt bar: 21-Jan-13 A to 22-Mar-13]																	
<b>Foundation - Bored Pile</b>																									
AC1630	Construct bored piles P75 - 12 nos.	48	48	02-May-13*	06-Jul-13	07-Aug-13	16-Oct-13	[Gantt bar: 02-May-13* to 06-Jul-13]																	
<b>Pier P76L/R</b>																									
<b>Temporary Works</b>																									
AC1680	Install temporary piling platform & cofferdem for pier P76	57	57	06-May-13	23-Jul-13	10-Jun-13	28-Aug-13	[Gantt bar: 06-May-13 to 23-Jul-13]																	
<b>Site Investigation</b>																									
AC1700	Site investigation for bored pile P76	30	30	28-Feb-13	08-Apr-13	28-Jan-13	06-Mar-13	[Gantt bar: 28-Feb-13 to 08-Apr-13]																	
<b>Foundation - Bored Pile</b>																									
AC1720	Construct bored piles P76 - 12 nos.	52	52	02-May-13*	11-Jul-13	22-May-13	31-Jul-13	[Gantt bar: 02-May-13* to 11-Jul-13]																	
<b>ML13L/R 115m+180m+115m - Stage 4 of Works</b>																									
<b>Pier P80L/R</b>																									
<b>Temporary Works</b>																									
AC2020	Install temporary piling platform for pier P80	12	12	18-May-13	01-Jun-13	11-May-13	28-May-13	[Gantt bar: 18-May-13 to 01-Jun-13]																	
<b>Site Investigation</b>																									
AC2030	Site investigation for bored pile P80	30	30	09-Apr-13	16-May-13	21-Mar-13	30-Apr-13	[Gantt bar: 09-Apr-13 to 16-May-13]																	
<b>ML14L/R 115m+180m+100.561m - Stage 4 of Works</b>																									
<b>Pier P82L/R</b>																									
<b>Utilities Diversion</b>																									
AC2460	1200mm Drainage diversion for P82	50	50	28-Feb-13	02-May-13	18-Jan-13	20-Mar-13	[Gantt bar: 28-Feb-13 to 02-May-13]																	
<b>Temporary Works</b>																									
AC2190	Remove existing seawall for pier P82	50	50	03-May-13	10-Jul-13	21-Mar-13	28-May-13	[Gantt bar: 03-May-13 to 10-Jul-13]																	
<b>Site Investigation</b>																									
AC2210	Site investigation for bored pile P82	30	23	21-Jan-13 A	15-Jul-13	02-May-13	31-May-13	[Gantt bar: 21-Jan-13 A to 15-Jul-13]																	
<b>Pier P83L/R</b>																									
<b>Utilities Diversion</b>																									
AC2470	300 & 450mm Drainage diversion for P83	45	45	28-Feb-13	25-Apr-13	30-May-13	23-Jul-13	[Gantt bar: 28-Feb-13 to 25-Apr-13]																	
<b>Site Investigation</b>																									
AC2310	Site investigation for bored pile P83	30	23	28-Dec-12 A	17-Oct-13	26-Sep-13	29-Oct-13	[Gantt bar: 28-Dec-12 A to 17-Oct-13]																	

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Date	Revision	Checked	Approved
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Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Late Start	Late Finish	2013																	
								February				March				April				May					
								28	04	11	18	25	04	11	18	25	01	08	15	22	29	06	13	20	27
<b>Viaduct between Landing Point on Airport Island and Scenic Hill</b>																									
<b>ML16L/R 37m+65m x 5+43m - Stage 5 of Works</b>																									
<b>Pier P93L/R</b>																									
<b>Site Investigation</b>																									
AI1660	Site investigation for bored pile P93 - 2 holes	11	11	15-May-13	29-May-13	30-May-13	13-Jun-13																		
<b>Pier P94L/R</b>																									
<b>Site Investigation</b>																									
AI1730	Site investigation for bored pile P94 - 2 holes	11	11	22-May-13	03-Jun-13	13-Apr-13	25-Apr-13																		
<b>Pier P95L/R</b>																									
<b>Site Investigation</b>																									
AI1800	Site investigation for bored pile P95 - 2 holes	11	11	30-Apr-13	13-May-13	15-May-13	29-May-13																		
<b>Pier P96L/R</b>																									
<b>Site Investigation</b>																									
AI1870	Site investigation for bored pile P96 - 2 holes	10	10	07-May-13	21-May-13	27-Mar-13	12-Apr-13																		
<b>Pier P98L/R</b>																									
<b>Site Investigation</b>																									
AI2010	Site investigation for bored pile P98 - 2 holes	10	10	24-Apr-13	06-May-13	15-Mar-13	26-Mar-13																		
<b>ML17L/R 43m+65m x 3+47m - Stage 5 of Works</b>																									
<b>Pier P99L/R (M.J.)</b>																									
<b>Site Investigation</b>																									
AI2080	Site investigation for bored pile P99 - 2 holes	10	10	18-Apr-13	29-Apr-13	30-Apr-13	13-May-13																		
<b>Pier P100L/R</b>																									
<b>Site Investigation</b>																									
AI2150	Site investigation for bored pile P100 - 2 holes	15	15	05-Apr-13	23-Apr-13	04-Mar-13	14-Mar-13																		
<b>Pier P101L/R</b>																									
<b>Site Investigation</b>																									
AI2220	Site investigation for bored pile P101 - 2 holes	14	7	04-Feb-13 A	16-Apr-13	22-Apr-13	29-Apr-13																		
<b>Pier P103L/R</b>																									
<b>Site Investigation</b>																									
AI2360	Site investigation for bored pile P103 - 2 holes	10	10	07-Feb-13 A	08-Apr-13	03-Apr-13	20-Apr-13																		
<b>ML18L/R 47m+55m x 5+35m - Stage 5 of Works</b>																									
<b>Pier P104L/R (M.J.)</b>																									
<b>Site Investigation</b>																									
AI2430	Site investigation for bored pile P104 - 2 holes	10	10	20-Mar-13	03-Apr-13	20-Feb-13	02-Mar-13																		
<b>Pier P105L/R</b>																									
<b>Site Investigation</b>																									
AI2500	Site investigation for bored pile P105 - 2 holes	10	10	08-Mar-13	19-Mar-13	05-Feb-13	19-Feb-13																		
<b>Land Viaduct P108 to P114</b>																									
<b>ML18L/R 47m+55m x 5+35m - Stage 5 of Works</b>																									
<b>Pier P108L/R</b>																									
<b>Utilities Diversion</b>																									
AI3540	Temporary slew Tel cable for P108 & P109	45	45	28-Feb-13	25-Apr-13	16-Jan-13	12-Mar-13																		
AI3550	Temporary slew 11kv cable for P108 & P109	45	45	26-Apr-13	20-Jun-13	13-Mar-13	09-May-13																		

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### 3 Months Rolling Programme - 28 Feb 2013

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Activity ID	Activity Name	Original Duration	Remaining Duration	Start	Finish	Late Start	Late Finish	2013																	
								February				March				April				May					
								28	04	11	18	25	04	11	18	25	01	08	15	22	29	06	13	20	27
<b>Pier P109L/R</b>																									
<b>Utilities Diversion</b>																									
AI3560	Diversion 132kv cable for P108, P109 & P113	112	112	20-Feb-13 A	17-Jul-13	18-Dec-12	09-May-13	[Gantt bar: Feb 20 to May 09]																	
<b>Pier P110L/R</b>																									
<b>Site Investigation</b>																									
AI2820	Site investigation for bored pile P110 - 2 holes	10	5	14-Jan-13 A	22-Mar-13	23-Mar-13	02-Apr-13	[Gantt bar: Jan 14 to Mar 22] [Milestone: Mar 23] [Text: Site investigation for bored pile P110 - 2 holes]																	
<b>Foundation - Bored Pile</b>																									
AI2830	Construct bored piles P110 - 2 nos.	35	35	29-Apr-13	14-Jun-13	02-Apr-13	18-May-13	[Gantt bar: Apr 29 to Jun 14] [Milestone: Apr 02] [Text: Construct bored piles P110 - 2 nos.]																	
<b>ML19L/C/R 40m+65mx2 Stage 5 of Works</b>																									
<b>Pier P111L/C/R</b>																									
<b>Site Investigation</b>																									
AI2880	Site investigation for bored pile P111 - 6 holes	30	15	08-Jan-13 A	16-Mar-13	14-Feb-13	02-Mar-13	[Gantt bar: Jan 08 to Mar 16] [Milestone: Feb 14] [Text: Site investigation for bored pile P111 - 6 holes]																	
<b>Foundation - Bored Pile</b>																									
AI2890	Construct bored piles P111L/R - 4 nos.	52	52	02-Apr-13	08-Jun-13	04-Mar-13	09-May-13	[Gantt bar: Apr 02 to Jun 08] [Milestone: Mar 04] [Text: Construct bored piles P111L/R - 4 nos.]																	
<b>Pier P112L/C/R</b>																									
<b>Site Investigation</b>																									
AI2940	Site investigation for bored pile P112 - 4 holes	20	7	03-Jan-13 A	07-Mar-13	28-Jan-13	04-Feb-13	[Gantt bar: Jan 03 to Mar 07] [Milestone: Jan 28] [Text: Site investigation for bored pile P112 - 4 holes]																	
<b>Pier P113 L/C/R</b>																									
<b>Utilities Diversion</b>																									
AI3580	Temporary slew 11kv cable for P113	150	150	28-Feb-13	30-Aug-13	28-Feb-13	30-Aug-13	[Gantt bar: Feb 28 to Aug 30]																	
AI3590	Diversion IPA250 Gasmain for P113	150	150	28-Feb-13	30-Aug-13	28-Feb-13	30-Aug-13	[Gantt bar: Feb 28 to Aug 30]																	
<b>Milestones schedule</b>																									
<b>Design and Design Checking of the Works</b>																									
CC2-1050	Final Construction Traffic Impact Assessment Report	0	0		28-Feb-13		28-Nov-16	[Milestone: Feb 28] [Text: Final Construction Traffic Impact Assessment Report]																	
CC2-1070	Final Ground Investigation Report	0	0		28-Feb-13		28-Nov-16	[Milestone: Feb 28] [Text: Final Ground Investigation Report]																	
CC2-1090	Final Durability Assessment Report	0	0		28-Feb-13		28-Nov-16	[Milestone: Feb 28] [Text: Final Durability Assessment Report]																	
<b>Marine Viaduct at chainage 4+260.000 to 11+800.000 approximate</b>																									
CC33-1010	Acceptance of final report for site investigation for DASO	0	0		28-Feb-13		02-Feb-18	[Milestone: Feb 28] [Text: Acceptance of final report for site investigation for DASO]																	
CC33-1020	Excavation	313	313	14-Apr-13	20-Feb-14	30-Aug-13	01-Jan-15	[Gantt bar: Apr 14 to Feb 20] [Milestone: Aug 30] [Text: Excavation]																	
CC33-1040	Piles	866	866	02-Apr-13	15-Aug-15	18-Jan-13	21-May-15	[Gantt bar: Apr 02 to Aug 15] [Milestone: Jan 18] [Text: Piles]																	
<b>Viaduct above Seawall</b>																									
CC41-1000	Establishment of essential piling plant	215	160	28-Dec-12 A	06-Aug-13	28-Dec-12	27-Jan-14	[Gantt bar: Dec 28 to Aug 06] [Milestone: Dec 28] [Text: Establishment of essential piling plant]																	
<b>Land Viaduct</b>																									
CC42-1000	Piles	445	445	02-Apr-13	20-Jun-14	04-Mar-13	18-Apr-14	[Gantt bar: Apr 02 to Jun 20] [Milestone: Mar 04] [Text: Piles]																	

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**APPENDIX B  
ACTION AND LIMIT LEVELS**

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## Appendix B - Action and Limit Levels

**Table B-1 Action and Limit Levels for 1-Hour TSP**

Location	Action Level, $\mu\text{g}/\text{m}^3$	Limit Level, $\mu\text{g}/\text{m}^3$
AMS1	381	500
AMS4	352	

**Table B-2 Action and Limit Levels for 24-Hour TSP**

Location	Action Level, $\mu\text{g}/\text{m}^3$	Limit Level, $\mu\text{g}/\text{m}^3$
AMS1	170	260
AMS4	171	

**Table B-3 Action and Limit Levels for Construction Noise**

Time Period	Action Level	Limit Level
0700-1900 hrs on normal weekdays	When one documented complaint is received	75 dB(A) *

Noted: If works are to be carried during restricted hours, the conditions stipulated in the construction noise permit issued by the Noise Control Authority have to be followed.

(\*) reduce to 70 dB(A) for schools and 65 dB(A) during school examination periods.



**Table B-4 Action and Limit Levels for Water Quality**

<b>Parameter (unit)</b>	<b>Water Depth</b>	<b>Action Level</b>	<b>Limit Level</b>
Dissolved Oxygen (mg/L) (surface, middle, bottom)	Surface and Middle	<u>5.0</u>	4.2 except 5 for FCZ
	Bottom	<u>4.7</u>	3.6
Turbidity (NTU)	Depth average	<u>27.5</u> or 120% of upstream control station's turbidity at the same tide of the same day	<u>47.0</u> or 130% of turbidity at the upstream control station at the same tide of same day
Suspended Solids (mg/L)	Depth average	<u>23.5</u> or 120% of upstream control station's SS at the same tide of the same day	<u>34.4</u> or 130% of SS at the upstream control station at the same tide of same day and 10mg/L for WSD Seawater Intakes

Note:

- (1) Depth-averaged is calculated by taking the arithmetic means of reading of all three depths
- (2) For DO, non-compliance of the water quality limit occurs when monitoring result is lower than the limit.
- (3) For SS & turbidity non-compliance of the water quality limits occur when monitoring result is higher than the limits.
- (4) All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered as necessary.
- (5) The 1%-ile of baseline data for dissolved oxygen (surface and middle) and dissolved oxygen (bottom) are 4.2mg/L and 3.6mg/L respectively.

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**APPENDIX C  
COPIES OF CALIBRATION  
CERTIFICATES**

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# High-Volume TSP Sampler 5-POINT CALIBRATION DATA SHEET

CINOTECH

File No. MA12014/67/0001

Project No. AMS 1 - Sha Lo Wan Operator: WK  
 Date: 21-Feb-13 Next Due Date: 20-Apr-13  
 Equipment No.: A-01-67 Serial No. 3218

Ambient Condition			
Temperature, Ta (K)	292.3	Pressure, Pa (mmHg)	766.8

Orifice Transfer Standard Information					
Equipment No.:	A-04-04	Slope, mc	0.0574	Intercept, bc	-0.0478
Last Calibration Date:	3-Oct-12	$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	2-Oct-13	$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$			

Calibration of TSP Sampler					
Calibration Point	Orifice			HVS	
	ΔH (orifice), in. of water	[ΔH x (Pa/760) x (298/Ta)] <sup>1/2</sup>	Qstd (CFM) X - axis	ΔW (HVS), in. of oil	[ΔW x (Pa/760) x (298/Ta)] <sup>1/2</sup> Y-axis
1	9.3	3.09	54.72	5.8	2.44
2	7.8	2.83	50.18	5.0	2.27
3	5.8	2.44	43.39	3.8	1.98
4	4.1	2.05	36.61	2.8	1.70
5	2.6	1.64	29.32	1.7	1.32

By Linear Regression of Y on X

Slope, mw = 0.0438 Intercept, bw = 0.0645

Correlation coefficient\* = 0.9987

\*If Correlation Coefficient < 0.990, check and recalibrate.

### Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; W = (mw x Qstd + bw)<sup>2</sup> x (760 / Pa) x (Ta / 298) = 3.69

Remarks: \_\_\_\_\_

Conducted by: Wk. Tang Signature: \_\_\_\_\_  
 Checked by: Wk Signature: \_\_\_\_\_

Date: 21/2/13  
 Date: 21 February 2013

# High-Volume TSP Sampler

## 5-POINT CALIBRATION DATA SHEET

CINOTECH

File No. MA12014/74/0001

Project No. AMS 4 - San Tau Operator: WK  
 Date: 21-Feb-13 Next Due Date: 20-Apr-13  
 Equipment No.: A-01-74 Serial No. 2202

Ambient Condition			
Temperature, Ta (K)	292.2	Pressure, Pa (mmHg)	766.6

Orifice Transfer Standard Information					
Equipment No.:	A-04-04	Slope, mc	0.0574	Intercept, bc	-0.0478
Last Calibration Date:	3-Oct-12	$mc \times Qstd + bc = [\Delta H \times (Pa/760) \times (298/Ta)]^{1/2}$			
Next Calibration Date:	2-Oct-13	$Qstd = \{[\Delta H \times (Pa/760) \times (298/Ta)]^{1/2} - bc\} / mc$			

Calibration of TSP Sampler					
Calibration Point	Orifice			HVS	
	ΔH (orifice), in. of water	[ΔH x (Pa/760) x (298/Ta)] <sup>1/2</sup>	Qstd (CFM) X - axis	ΔW (HVS), in. of oil	[ΔW x (Pa/760) x (298/Ta)] <sup>1/2</sup> Y-axis
1	11.8	3.48	61.53	8.2	2.90
2	9.3	3.09	54.72	6.7	2.63
3	7.1	2.70	47.92	5.4	2.36
4	4.6	2.18	38.73	3.8	1.98
5	2.8	1.70	30.40	2.5	1.60

By Linear Regression of Y on X

Slope, mw = 0.0416 Intercept, bw : 0.3538

Correlation coefficient\* = 0.9997

\*If Correlation Coefficient < 0.990, check and recalibrate.

### Set Point Calculation

From the TSP Field Calibration Curve, take Qstd = 43 CFM

From the Regression Equation, the "Y" value according to

$$mw \times Qstd + bw = [\Delta W \times (Pa/760) \times (298/Ta)]^{1/2}$$

Therefore, Set Point; W = (mw x Qstd + bw)<sup>2</sup> x (760 / Pa) x (Ta / 298) = 4.46

Remarks: \_\_\_\_\_

Conducted by: Wk Tang Signature: \_\_\_\_\_  
 Checked by: Wk Signature: \_\_\_\_\_

Date: 21/2/13  
 Date: 21 February 2013

**TEST REPORT**

Description	Calibration Orifice	Manufacturer	TISCH
Serial No.	0993	Temperature, Ta (K)	298
Model No.	TE-5025A	Pressure, Pa (mmHg)	759.2
Date	3 October 2012		

Plate	Diff.Vol (m <sup>3</sup> )	Diff.Time (min)	Diff.Hg (mm)	Diff.H <sub>2</sub> O (in.)
1	1.00	1.3820	3.2	2.00
2	1.00	0.9800	6.2	4.00
3	1.00	0.8770	7.8	5.00
4	1.00	0.8380	8.7	5.50
5	1.00	0.6930	12.7	8.00

**DATA TABULATION**

Vstd	(X axis) Qstd	(Y axis)
0.9947	0.7197	1.4134
0.9907	1.0109	1.9989
0.9886	1.1273	2.2348
0.9874	1.1783	2.3439
0.9822	1.4173	2.8268

Y axis=  $\text{SQRT}[\text{H}_2\text{O}(\text{Pa}/760)(298/\text{Ta})]$

Qstd Slope ( m ) = 2.02751

Intercept ( b ) = -0.04785

Coefficient ( r ) = 0.99999

Va	(X axis) Qa	(Y axis)
0.9958	0.7205	0.8861
0.9918	1.0121	1.2531
0.9897	1.1285	1.4010
0.9885	1.1796	1.4694
0.9833	1.4189	1.7721

Y axis=  $\text{SQRT}[\text{H}_2\text{O}(\text{Ta}/\text{Pa})]$

Qa Slope ( m ) = 1.26959

Intercept ( b ) = -0.03000

Coefficient ( r ) = 0.99999

**CALCULATIONS**

$V_{std} = \text{Diff. Vol}[(\text{Pa} - \text{Diff. Hg})/760](298/\text{Ta})$

$Q_{std} = V_{std}/\text{Time}$

$V_a = \text{Diff. Vol}[(\text{Pa} - \text{Diff. Hg})/\text{Pa}]$

$Q_a = V_a/\text{Time}$

**For subsequent flow rate calculations:**

$Q_{std} = l/m\{[\text{SQRT}(\text{H}_2\text{O}(\text{Pa}/760)(298/\text{Ta}))]-b\}$

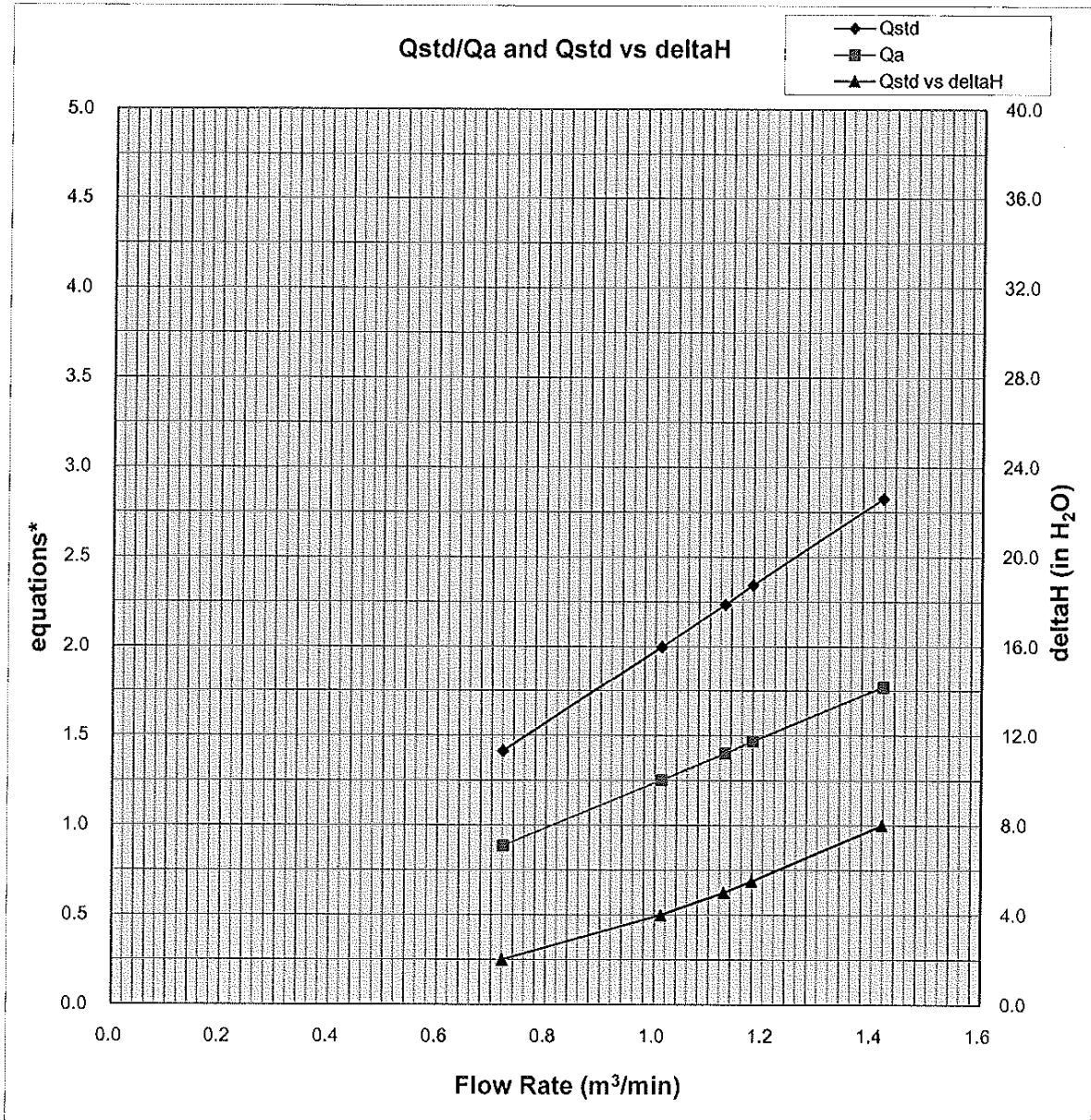
$Q_a = l/m\{[\text{SQRT} \text{H}_2\text{O}(\text{Ta}/\text{Pa})]-b\}$

PREPARED AND CHECKED BY:  
For and On Behalf of **WELLAB Ltd.**



**PATRICK TSE**  
Laboratory Manager

**TEST REPORT**



Y-axis equations:

Qstd series:  $\text{SQRT}[\Delta H(\text{Pa}/\text{Pstd})(\text{Tstd}/\text{Ta})]$

Qa series:  $\text{SQRT}[\Delta H(\text{Ta}/\text{Pa})]$



# Calibration Certificate

Certificate No. 30130

Page 1 of 2 Pages

**Customer :** Dragages - China Harbour - VSL Joint Venture

**Address :** 3/F., Island Place Tower, 510 King's Road, North Point, H. K.

**Order No. :** Q30108

**Date of receipt :** 4-Jan-13

## Item Tested

**Description :** Weather Station

**Manufacturer :** DAVIS

**Model :** Vantage PRO2 6152CUK

**Serial No. :** AA120924015

## Test Conditions

**Date of Test :** 15-Jan-13

**Supply Voltage :** --

**Ambient Temperature :** (23 ± 3)°C

**Relative Humidity :** (50 ± 25) %

## Test Specifications

Calibration check.

Ref. Document/Procedure : Z04, M14.

## Test Results


The results are shown in the attached page(s).

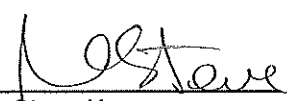
Main Test equipment used:

<u>Equipment No.</u>	<u>Description</u>	<u>Cert. No.</u>	<u>Traceable to</u>
S155	Std. Anemometer	NSC201230022	NIM-PRC
S070	Protractor	01121	NIM-PRC

The values given in this Calibration Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environmental changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Hong Kong Calibration Ltd. shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to International System of Units (SI).  
The test results apply to the above Unit-Under-Test only

Calibrated by :   
S. K. Tang

Approved by :   
Steve Kwan

Date: 15-Jan-13



# Calibration Certificate

Certificate No. 30130

Page 2 of 2 Pages

Results :

## 1. Wind Speed

Applied Value (m/s)	UUT Reading (m/s)
2.50	2.2
4.70	4.5
7.50	7.2
9.80	9.4
15.50	14.3
19.93	19.5

Uncertainty :  $\pm (2 \% + 0.2 \text{ m/s})$

## 2. Wind Direction

Reference Value	UUT Indication
N (0°)	N
NE (45°)	NE
E (90°)	E
SE (135°)	SE
S (180°)	S
SW (225°)	SW
W (270°)	W
NW (315°)	NW

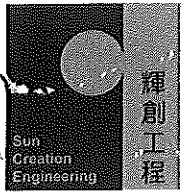
Remark : 1. UUT: Unit-Under-Test

2. Atmospheric Pressure : 1 013 hPa

3. Before the calibration of the Wind Direction function, the Arrow Head was adjusted to the magnetic NORTH direction while the monitor indicated N. The customer is reminded to do the alignment again after installation.

----- END -----





# Certificate of Calibration

## 校正證書

Certificate No. : C130601  
證書編號

ITEM TESTED / 送檢項目 ( Job No. / 序引編號 : IC13-0227 )

Description / 儀器名稱 : Sound & Vibration Analyser  
Manufacturer / 製造商 : Svantek  
Model No. / 型號 : SVAN957  
Serial No. / 編號 : 23851  
Supplied By / 委託者 : Dragages - China Harbour - VSL Joint Venture  
3/F, Island Place Tower, 510 King's Road,  
North Point, Hong Kong

### TEST CONDITIONS / 測試條件

Temperature / 溫度 : (23 ± 2)°C  
Line Voltage / 電壓 : ---  
Relative Humidity / 相對濕度 : (55 ± 20)%

### TEST SPECIFICATIONS / 測試規範

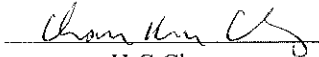
Calibration check

DATE OF TEST / 測試日期 : 25 January 2013

### TEST RESULTS / 測試結果

The results apply to the particular unit-under-test only.  
All results are within manufacturer's specification.  
The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :  
- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory  
- Rohde & Schwarz Laboratory, Germany  
- Fluke Everett Service Center, USA  
- Agilent Technologies, USA

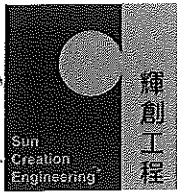
Tested By :   
測試 : H C Chan

Certified By :   
核證 : K C Lee

Date of Issue : 28 January 2013  
簽發日期

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室書面批准。



# Certificate of Calibration

## 校正證書

Certificate No. : C130601  
證書編號

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
- Self-calibration using the Svantek acoustic calibrator SV30A, S/N : 24780 was performed before the test.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C130019
CL281	Multifunction Acoustic Calibrator	DC110233

- Test procedure : MA101N.

- Results :

### 6.1 Sound Pressure Level

#### 6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
HIGH	SPL	A	Fast	114.00	1	113.8	± 1.1

#### 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
HIGH	SPL	A	Fast	114.00	1	113.8 (Ref.)
				104.00		103.8
				94.00		93.8

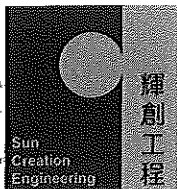
IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

### 6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
HIGH	SPL	A	Fast	114.00	1	113.8	Ref.
			Slow			113.8	± 0.3

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室書面批准。



# Certificate of Calibration

## 校正證書

Certificate No. : C130601  
證書編號

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
HIGH	SPL	A	Fast	114.00	63 Hz	87.6	-26.2 ± 1.5
					125 Hz	97.6	-16.1 ± 1.5
					250 Hz	105.1	-8.6 ± 1.4
					500 Hz	110.5	-3.2 ± 1.4
					1 kHz	113.8	Ref.
					2 kHz	115.0	+1.2 ± 1.6
					4 kHz	114.8	+1.0 ± 1.6
					8 kHz	112.8	-1.1 (+2.1 ; -3.1)
					12.5 kHz	109.6	-4.3 (+3.0 ; -6.0)

#### 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
HIGH	SPL	C	Fast	114.00	63 Hz	113.0	-0.8 ± 1.5
					125 Hz	113.6	-0.2 ± 1.5
					250 Hz	113.8	0.0 ± 1.4
					500 Hz	113.8	0.0 ± 1.4
					1 kHz	113.8	Ref.
					2 kHz	113.7	-0.2 ± 1.6
					4 kHz	113.1	-0.8 ± 1.6
					8 kHz	110.9	-3.0 (+2.1 ; -3.1)
					12.5 kHz	107.6	-6.2 (+6.0 ; -∞)

Remarks : - UUT Microphone Model No. : AC07502E & S/N : 48532

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	63 Hz - 125 Hz	: ± 0.45 dB
	250 Hz - 500 Hz	: ± 0.40 dB
	1 kHz	: ± 0.30 dB
	2 kHz - 4 kHz	: ± 0.45 dB
	8 kHz	: ± 0.55 dB
	12.5 kHz	: ± 0.80 dB
104 dB	1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB	1 kHz	: ± 0.10 dB (Ref. 94 dB)

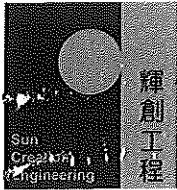
- The uncertainties are for a confidence probability of not less than 95 %.

#### Note :

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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# Certificate of Calibration 校正證書

Certificate No. : C130600  
證書編號

**ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-0227)**

Description / 儀器名稱 : Sound & Vibration Analyser  
Manufacturer / 製造商 : Svantek  
Model No. / 型號 : SVAN957  
Serial No. / 編號 : 21460  
Supplied By / 委託者 : Dragages - China Harbour - VSL Joint Venture  
3/F, Island Place Tower, 510 King's Road,  
North Point, Hong Kong

**TEST CONDITIONS / 測試條件**

Temperature / 溫度 :  $(23 \pm 2)^{\circ}\text{C}$   
Line Voltage / 電壓 : ---

Relative Humidity / 相對濕度 :  $(55 \pm 20)\%$

**TEST SPECIFICATIONS / 測試規範**

Calibration check

**DATE OF TEST / 測試日期** : 25 January 2013

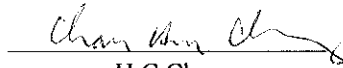
**TEST RESULTS / 測試結果**

The results apply to the particular unit-under-test only.  
All results are within manufacturer's specification.  
The results are detailed in the subsequent page(s).

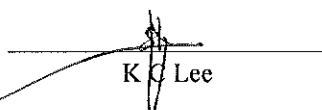
The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By  
測試

:   
H C Chan

Certified By  
核證

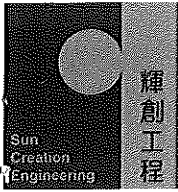
:   
K C Lee

Date of Issue :  
簽發日期

28 January 2013

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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# Certificate of Calibration

## 校正證書

Certificate No. : C130600  
證書編號

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours, and switched on to warm up for over 10 minutes before the commencement of the test.
- Self-calibration using the Svantek acoustic calibrator SV30A, S/N : 24791 was performed before the test.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

Equipment ID	Description	Certificate No.
CL280	40 MHz Arbitrary Waveform Generator	C130019
CL281	Multifunction Acoustic Calibrator	DC110233

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
HIGH	SPL	A	Fast	114.00	1	114.2	± 1.1

6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
HIGH	SPL	A	Fast	114.00	1	114.2 (Ref.)
				104.00		104.2
				94.00		94.2

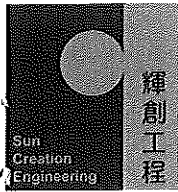
IEC 61672 Class 1 Spec. : ± 0.6 dB per 10 dB step and ± 1.1 dB for overall different.

6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
HIGH	SPL	A	Fast	114.00	1	114.2	Ref.
			Slow			114.2	± 0.3

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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# Certificate of Calibration

## 校正證書

Certificate No. : C130600  
證書編號

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
HIGH	SPL	A	Fast	114.00	63 Hz	88.0	-26.2 ± 1.5
					125 Hz	98.0	-16.1 ± 1.5
					250 Hz	105.5	-8.6 ± 1.4
					500 Hz	110.9	-3.2 ± 1.4
					1 kHz	114.2	Ref.
					2 kHz	115.4	+1.2 ± 1.6
					4 kHz	115.2	+1.0 ± 1.6
					8 kHz	113.2	-1.1 (+2.1 ; -3.1)
					12.5 kHz	109.9	-4.3 (+3.0 ; -6.0)

#### 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
HIGH	SPL	C	Fast	114.00	63 Hz	113.4	-0.8 ± 1.5
					125 Hz	114.0	-0.2 ± 1.5
					250 Hz	114.2	0.0 ± 1.4
					500 Hz	114.2	0.0 ± 1.4
					1 kHz	114.2	Ref.
					2 kHz	114.0	-0.2 ± 1.6
					4 kHz	113.5	-0.8 ± 1.6
					8 kHz	111.3	-3.0 (+2.1 ; -3.1)
					12.5 kHz	108.0	-6.2 (+6.0 ; -∞)

Remarks : - UUT Microphone Model No. : AC07052H & S/N : 43679

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	63 Hz - 125 Hz	: ± 0.45 dB
	250 Hz - 500 Hz	: ± 0.40 dB
	1 kHz	: ± 0.30 dB
	2 kHz - 4 kHz	: ± 0.45 dB
	8 kHz	: ± 0.55 dB
	12.5 kHz	: ± 0.80 dB
104 dB	1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB	1 kHz	: ± 0.10 dB (Ref. 94 dB)

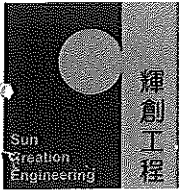
- The uncertainties are for a confidence probability of not less than 95 %.

#### Note :

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室書面批准。



# Certificate of Calibration

## 校正證書

Certificate No. : C130599  
證書編號

**ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-0227)**

Description / 儀器名稱 : Acoustic Calibrator  
 Manufacturer / 製造商 : Svantek  
 Model No. / 型號 : SV30A  
 Serial No. / 編號 : 24780  
 Supplied By / 委託者 : Dragages - China Harbour - VSL Joint Venture  
 3/F, Island Place Tower, 510 King's Road,  
 North Point, Hong Kong

**TEST CONDITIONS / 測試條件**

Temperature / 溫度 : (23 ± 2)°C  
 Relative Humidity / 相對濕度 : (55 ± 20)%  
 Line Voltage / 電壓 : ---

**TEST SPECIFICATIONS / 測試規範**

Calibration check

**DATE OF TEST / 測試日期** : 25 January 2013


**TEST RESULTS / 測試結果**

The results apply to the particular unit-under-test only.  
 All results are within manufacturer's specification.  
 The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

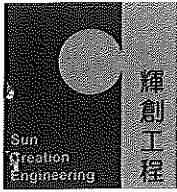
Tested By :   
 測試 : H C Chan

Certified By :   
 核證 : K C Lee

Date of Issue : 28 January 2013  
 簽發日期

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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# Certificate of Calibration

## 校正證書

Certificate No. : C130599  
證書編號

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL130	Universal Counter	C123541
CL281	Multifunction Acoustic Calibrator	DC110233
TST150A	Measuring Amplifier	C120886

4. Test procedure : MA100N.

5. Results :

5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	94.1	± 0.3	± 0.2
114 dB, 1 kHz	114.0		

5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	0.999 99	1 kHz ± 0.02 %	± 0.01

Remark : - The uncertainties are for a confidence probability of not less than 95 %.

Note :

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

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Sun Creation Engineering Limited - Calibration & Testing Laboratory

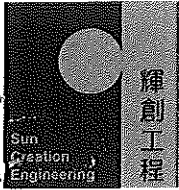
c/o 4/F, Tsing Shan Wan Exchange Building, 1 Bing On Lane, Tuen Mun, New Territories, Hong Kong

輝創工程有限公司 - 校正及檢測實驗室

c/o 香港新界屯門興安里一號青山灣機樓四樓

Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com





# Certificate of Calibration

## 校正證書

Certificate No. : C130598  
證書編號

**ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-0227)**

Description / 儀器名稱 : Acoustic Calibrator  
 Manufacturer / 製造商 : Svantek  
 Model No. / 型號 : SV30A  
 Serial No. / 編號 : 24791  
 Supplied By / 委託者 : Dragages - China Harbour - VSL Joint Venture  
 3/F, Island Place Tower, 510 King's Road,  
 North Point, Hong Kong

**TEST CONDITIONS / 測試條件**

Temperature / 溫度 : (23 ± 2)°C  
 Relative Humidity / 相對濕度 : (55 ± 20)%  
 Line Voltage / 電壓 : ---

**TEST SPECIFICATIONS / 測試規範**

Calibration check

**DATE OF TEST / 測試日期** : 25 January 2013

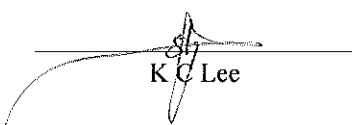
**TEST RESULTS / 測試結果**

The results apply to the particular unit-under-test only.  
 All results are within manufacturer's specification.  
 The results are detailed in the subsequent page(s).

The test equipment used for calibration are traceable to National Standards via :

- The Government of The Hong Kong Special Administrative Region Standard & Calibration Laboratory
- Rohde & Schwarz Laboratory, Germany
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

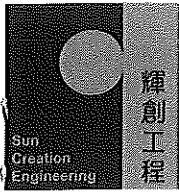
Tested By :   
 測試 H C Chan

Certified By :   
 核證 K C Lee

Date of Issue : 28 January 2013  
 簽發日期

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室所書而批准。



# Certificate of Calibration

## 校正證書

Certificate No. : C130598  
證書編號

- The unit-under-test (UUT) was allowed to stabilize in the laboratory for over 12 hours before the commencement of the test.
- The results presented are the mean of 3 measurements at each calibration point.
- Test equipment :

<u>Equipment ID</u>	<u>Description</u>	<u>Certificate No.</u>
CL130	Universal Counter	C123541
CL281	Multifunction Acoustic Calibrator	DC110233
TST150A	Measuring Amplifier	C120886

4. Test procedure : MA100N.

5. Results :

### 5.1 Sound Level Accuracy

UUT Nominal Value	Measured Value (dB)	Mfr's Spec. (dB)	Uncertainty of Measured Value (dB)
94 dB, 1 kHz	93.9	± 0.3	± 0.2
114 dB, 1 kHz	113.9		

### 5.2 Frequency Accuracy

UUT Nominal Value (kHz)	Measured Value (kHz)	Mfr's Spec.	Uncertainty of Measured Value (Hz)
1	1.000 00	1 kHz ± 0.02 %	± 0.01

Remark : - The uncertainties are for a confidence probability of not less than 95 %.

### Note :

The values given in this Certificate only relate to the values measured at the time of the test and any uncertainties quoted will not include allowance for the equipment long term drift, variations with environment changes, vibration and shock during transportation, overloading, mis-handling, or the capability of any other laboratory to repeat the measurement. Sun Creation Engineering Limited shall not be liable for any loss or damage resulting from the use of the equipment.

The test equipment used for calibration are traceable to the Nation Standards as specified in this certificate. This certificate shall not be reproduced except in full, without the prior written approval of this laboratory.

本證書所載校正用之測試器材均可溯源至國際標準。局部複印本證書需先獲本實驗室書面批准。

Sun Creation Engineering Limited Calibration & Testing Laboratory

c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hung On Lane, Tuen Mun, New Territories, Hong Kong

輝創工程有限公司 - 校正及檢測實驗室

c/o 香港新界屯門興安里一號青山灣機樓四樓

Tel/電話: 2927 2606 Fax/傳真: 2744 8986 E-mail/電郵: callab@suncreation.com Website/網址: www.suncreation.com

**TEST REPORT**  
**Chemical Analysis of Water**

**Accuracy check of YSI Sondes Environmental Monitoring System**

Date of issue: 22-02-2013

Page 1 of 1 pages

Castco LRN: EN0130219-14

**Sample details as supplied by customer**

Customer : Dragages-China Harbour-VSL Joint Venture

Customer Ref. No. : --

Address: P.O.Box No.136 Tung Chung Post Office, N.T., H.K.

Job Title : Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road - Section between HKSAR Boundary and Scenic Hill

Contract No.: HY/2011/09

**Laboratory Test Result**

Instrument Name: Sonde Environmental Monitoring System

Manufacturer : YSI

Instrument No. : W.03.01

Model No. : 6820-C-M

Date of Calibration : 20-02-2013

Serial No. : 02D0126AA

Date of Next Calibration : 20-05-2013

pH Value Check ( pH Meter : Model: 6561, L/N:11H )

Expected Reading (pH Unit)	Sonde Reading (pH Unit)	Tolerance (pH Unit)	Tolerance Limit (pH Unit)	Method Reference
4.00	4.05	0.05	± 0.2	APHA 21e, 4500-H+B
7.02	7.14	0.12		
10.06	10.20	0.14		

Turbidity Check (Turbidity Sensor : Model: 6136, S/N: 11J1000475 )

Expected Reading (NTU)	Sonde Reading (NTU)	Tolerance (%)	Tolerance Limit (%)	Method Reference
4.00	4.3	7.5	± 10	APHA 21e, 2130B
10.00	10.4	4.0		
20.00	20.7	3.5		
50.00	50.5	1.0		
100.00	97.4	-2.6		

Conductivity Performance Check ( Conductivity Sensor : Model: 6560, L/N: 11J100025 )

Expected Reading (µS/cm)	Sonde Reading (µS/cm)	Tolerance (%)	Tolerance Limit (%)	Method Reference
1412 at 25 °C	1380 at 25 °C	-2.3	± 10	APHA 21e, 2510B

Salinity Performance Check ( Salinity Sensor : Model: 6560, L/N: 11J100025 )

Expected Reading (ppt)	Sonde Reading (ppt)	Tolerance (%)	Tolerance Limit (%)	Method Reference
35	34.19	-2.3	± 10	HACH Procedure Manual

Dissolved Oxygen Check ( Dissolved Oxygen Sensor : Model: 6562, L/N: 07E100029 )

DO from Winkler Titration (mg/L)	Sonde Reading (mg/L)	Tolerance (%)	Tolerance Limit (%)	Method Reference
8.62	8.48	-1.6	± 10	APHA 21e, 4500-O C&G
4.48	4.85	8.3		

Water Level Meter Check

Expected Reading (m)	Sonde Reading (m)	Tolerance (m)	Tolerance Limit (m)	Method Reference
1.00	1.03	0.03	± 0.05	YSI Sondes Procedure Manual

Temperature Check

Expected Reading (°C)	Sonde Reading (°C)	Tolerance (°C)	Tolerance Limit (°C)	Method Reference
25.0	25.0	0.0	± 2.0	Telarc Technical Guide No.3 1986

Checked by: 

Certified by: 

**LIYU WAH**  
Senior Chemist

**End of Report**

**LEE STEPHEN SHU HANG**  
Ph.D.  
Technical Director



**TEST REPORT**  
**Chemical Analysis of Water**  
**Accuracy check of YSI Sondes Environmental Monitoring System**

Date of issue: 22-02-2013

Page 1 of 1 pages

Castco LRN: EN0130219-15

**Sample details as supplied by customer**

Customer : Dragages-China Harbour-VSL Joint Venture

Customer Ref. No. : --

Address: P.O.Box No.136 Tung Chung Post Office, N.T., H.K.

Job Title : Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road - Section between HKSAR Boundary and Scenic Hill

Contract No.: HY/2011/09

**Laboratory Test Result**

Instrument Name: Sonde Environmental Monitoring System

Manufacturer : YSI

Instrument No. : W.03.13

Model No. : 6820-C-M

Date of Calibration : 20-02-2013

Serial No. : 12B100804

Date of Next Calibration : 20-05-2013

pH Value Check ( pH Meter : Model: 6561, L/N:11H )

Expected Reading (pH Unit)	Sonde Reading (pH Unit)	Tolerance (pH Unit)	Tolerance Limit (pH Unit)	Method Reference
4.00	4.07	0.07	± 0.2	APHA 21e, 4500-H+B
7.02	7.05	0.03		
10.06	10.03	0.03		

Turbidity Check (Turbidity Sensor : Model: 6136, S/N: 12B100645 )

Expected Reading (NTU)	Sonde Reading (NTU)	Tolerance (%)	Tolerance Limit (%)	Method Reference
4.00	4.2	5.0	± 10	APHA 21e, 2130B
10.00	10.3	3.0		
20.00	20.7	3.5		
50.00	50.8	1.6		
100.00	95.6	-4.4		

Conductivity Performance Check ( Conductivity Sensor : Model: 6560, L/N: 12B100055 )

Expected Reading (µS/cm)	Sonde Reading (µS/cm)	Tolerance (%)	Tolerance Limit (%)	Method Reference
1412 at 25 °C	1518 at 25 °C	7.5	± 10	APHA 21e, 2510B

Salinity Performance Check ( Salinity Sensor : Model: 6560, L/N: 12B100055 )

Expected Reading (ppt)	Sonde Reading (ppt)	Tolerance (%)	Tolerance Limit (%)	Method Reference
35	34.32	-1.9	± 10	HACH Procedure Manual

Dissolved Oxygen Check ( Dissolved Oxygen Sensor : Model: 6562, L/N: 12A100930 )

DO from Winkler Titration (mg/L)	Sonde Reading (mg/L)	Tolerance (%)	Tolerance Limit (%)	Method Reference
8.62	8.73	1.3	± 10	APHA 21e, 4500-O C&G
4.48	4.68	4.5		

Water Level Meter Check

Expected Reading (m)	Sonde Reading (m)	Tolerance (m)	Tolerance Limit (m)	Method Reference
1.00	1.04	0.04	± 0.05	YSI Sondes Procedure Manual

Temperature Check

Expected Reading (°C)	Sonde Reading (°C)	Tolerance (°C)	Tolerance Limit (°C)	Method Reference
25.0	25.0	0.0	± 2.0	Telarc Technical Guide No.3 1986

Checked by:

**LI YIU WAH**  
 Senior Chemist

Certified by:

**LEE STEPHEN SHU HANG**  
 Ph.D.  
 Technical Director

**End of Report**

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**APPENDIX D  
ENVIRONMENTAL MONITORING  
SCHEDULES**

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**Contract HY/2011/09 Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
Impact Air Quality and Noise Monitoring Schedule in February 2013**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1-Feb	2-Feb
<b>3-Feb</b>	4-Feb	5-Feb	6-Feb	7-Feb	8-Feb	9-Feb
<b>10-Feb</b>	11-Feb	12-Feb	13-Feb	14-Feb	15-Feb	16-Feb
<b>17-Feb</b>	18-Feb	19-Feb	20-Feb	21-Feb	22-Feb	23-Feb
					24 hr TSP 1 hr TSP X 3	Noise
<b>24-Feb</b>	25-Feb	26-Feb	27-Feb	28-Feb		
				24 hr TSP 1 hr TSP X 3		

**Air Quality Monitoring Stations**

AMS1 - Sha Lo Wan  
AMS4 - San Tau

**Noise Monitoring Stations**

NMS1 - Sha Lo Wan  
NMS4 - San Tau

**Contract HY/2011/09 Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
Tentative Impact Air Quality and Noise Monitoring Schedule in March 2013**

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

The schedule may be changed due to unforeseen circumstances (adverse weather, etc)

**Air Quality Monitoring Stations**

AMS1 - Sha Lo Wan  
AMS4 - San Tau

**Noise Monitoring Stations**

NMS1 - Sha Lo Wan  
NMS4 - San Tau

**Contract HY/2011/09 Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
Impact Water Quality Monitoring Schedule in February 2013**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1-Feb	2-Feb
<b>3-Feb</b>	4-Feb	5-Feb	6-Feb	7-Feb	8-Feb	9-Feb
<b>10-Feb</b>	11-Feb	12-Feb	13-Feb	14-Feb	15-Feb	16-Feb
<b>17-Feb</b>	18-Feb	19-Feb	20-Feb	21-Feb	22-Feb	23-Feb
					<u>Water Quality Monitoring</u>  Mid-Ebb            11:08 Mid-Flood        16:14	
<b>24-Feb</b>	25-Feb	26-Feb	27-Feb	28-Feb		
	<u>Water Quality Monitoring</u>  Mid-Ebb            12:45 Mid-Flood        18:35		<u>Water Quality Monitoring</u>  Mid-Flood        07:59 Mid-Ebb            13:54			



**Contract HY/2011/09 Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
Tentative Impact Water Quality Monitoring Schedule in March 2013**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1-Mar	2-Mar
					<u>Water Quality Monitoring</u> Mid-Flood 08:57 Mid-Ebb 15:06	
3-Mar	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar
	<u>Water Quality Monitoring</u> Mid-Flood 10:41 Mid-Ebb 17:30		<u>Water Quality Monitoring</u> Mid-Flood 12:55 Mid-Ebb 20:22		<u>Water Quality Monitoring</u> Mid-Ebb 10:51 Mid-Flood 15:52	
10-Mar	11-Mar	12-Mar	13-Mar	14-Mar	15-Mar	16-Mar
	<u>Water Quality Monitoring</u> Mid-Ebb 12:50 Mid-Flood 18:38		<u>Water Quality Monitoring</u> Mid-Flood 07:49 Mid-Ebb 13:55		<u>Water Quality Monitoring</u> Mid-Flood 08:40 Mid-Ebb 14:59	
17-Mar	18-Mar	19-Mar	20-Mar	21-Mar	22-Mar	23-Mar
	<u>Water Quality Monitoring</u> Mid-Flood 09:44 Mid-Ebb 16:50		<u>Water Quality Monitoring</u> Mid-Flood 09:23 Mid-Ebb 19:12			<u>Water Quality Monitoring</u> Mid-Ebb 10:44 Mid-Flood 15:56
24-Mar	25-Mar	26-Mar	27-Mar	28-Mar	29-Mar	30-Mar
	<u>Water Quality Monitoring</u> Mid-Ebb 11:46 Mid-Flood 17:40		<u>Water Quality Monitoring</u> Mid-Ebb 12:54 Mid-Flood 19:09		<u>Water Quality Monitoring</u> Mid-Flood 07:52 Mid-Ebb 14:07	
31-Mar						

The schedule may be changed due to unforeseen circumstances (adverse weather, etc)

**Contract HY/2011/09 Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
Construction-Phase Dolphin Monitoring in West Lantau (Line Transect Vessel Survey) in February 2013**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1-Feb	2-Feb
<b>3-Feb</b>	4-Feb	5-Feb	6-Feb	7-Feb	8-Feb	9-Feb
<b>10-Feb</b>	11-Feb	12-Feb	13-Feb	14-Feb	15-Feb	16-Feb
<b>17-Feb</b>	18-Feb	19-Feb	20-Feb	21-Feb	22-Feb	23-Feb
		Line Transect Vessel Survey				
<b>24-Feb</b>	25-Feb	26-Feb	27-Feb	28-Feb		
	Line Transect Vessel Survey					

**Contract HY/2011/09 Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
Tentative Construction-Phase Dolphin Monitoring in West Lantau (Line Transect Vessel Survey) in March 2013**

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

The schedule may be changed due to unforeseen circumstances (adverse weather, etc)

**Contract HY/2011/09 Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
Tentative Dolphin Behaviour & Land-based Dolphin Behaviour and Movement Monitoring in March 2013**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1-Mar	2-Mar
<b>3-Mar</b>	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar
						1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring
<b>10-Mar</b>	11-Mar	12-Mar	13-Mar	14-Mar	15-Mar	16-Mar
1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring
<b>17-Mar</b>	18-Mar	19-Mar	20-Mar	21-Mar	22-Mar	23-Mar
1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring
<b>24-Mar</b>	25-Mar	26-Mar	27-Mar	28-Mar	29-Mar	30-Mar
1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring	1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring
<b>31-Mar</b>						
1) Dolphin Behaviour Monitoring  2) Land-based Dolphin Behaviour and Movement Monitoring						

The schedule may be changed due to unforeseen circumstances (adverse weather, etc)

The Dolphin Behaviour & Land-based Dolphin Behaviour and Movement Monitoring will be continued in April 2013 so that 30days results during the bored piling activities will be collected.

**Contract HY/2011/09 Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
Tentative Construction-Phase Underwater Noise Monitoring in March 2013**

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
					1-Mar	2-Mar
<b>3-Mar</b>	4-Mar	5-Mar	6-Mar	7-Mar	8-Mar	9-Mar
<b>10-Mar</b>	11-Mar	12-Mar	13-Mar	14-Mar	15-Mar	16-Mar
			Underwater Noise Monitoring for Pier 48	Underwater Noise Monitoring for Pier 48	Underwater Noise Monitoring for Pier 48	Underwater Noise Monitoring for Pier 48
<b>17-Mar</b>	18-Mar	19-Mar	20-Mar	21-Mar	22-Mar	23-Mar
Underwater Noise Monitoring for Pier 48	Underwater Noise Monitoring for Pier 48	Underwater Noise Monitoring for Pier 48	Underwater Noise Monitoring for Pier 48	Underwater Noise Monitoring for Pier 48	Underwater Noise Monitoring for Pier 48	
<b>24-Mar</b>	25-Mar	26-Mar	27-Mar	28-Mar	29-Mar	30-Mar
<b>31-Mar</b>						

The schedule may be changed due to unforeseen circumstances (adverse weather, etc)

The scheduled underwater noise monitoring may be extended in order to collect 10 days results during the bored piling process for the pier site

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**APPENDIX E**  
**1-HOUR TSP MONITORING RESULTS**

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## Appendix E - 1-hour TSP Impact Monitoring Results

### Location AMS1 - Sha Lo Wan

Sampling Date	Start Time	Weather Condition	Air Temp. (K)	Atmospheric Pressure, Pa (mmHg)	Filter Weight (g)		Particulate weight (g)	Elapse Time		Sampling Time(hrs.)	Flow Rate (m <sup>3</sup> /min.)		Av. flow (m <sup>3</sup> /min)	Total vol. (m <sup>3</sup> )	Conc. (µg/m <sup>3</sup> )
					Initial	Final		Initial	Final		Initial	Final			
22-Feb-13	09:00	Cloudy	291.5	769.8	2.7364	2.7425	0.0061	1238.0	1239.0	1.0	1.22	1.22	1.22	73.4	83
22-Feb-13	11:00	Cloudy	291.9	770.4	2.7333	2.7419	0.0086	1239.0	1240.0	1.0	1.22	1.22	1.22	73.4	117
22-Feb-13	13:00	Cloudy	294.2	768.4	2.7353	2.7374	0.0021	1240.0	1241.0	1.0	1.22	1.22	1.22	73.0	29
28-Feb-13	08:00	Cloudy	292.6	763.1	2.7643	2.7737	0.0094	1265.0	1266.0	1.0	1.22	1.21	1.22	72.9	129
28-Feb-13	09:10	Cloudy	292.8	762.9	2.7845	2.7876	0.0031	1266.0	1267.0	1.0	1.21	1.21	1.21	72.9	43
28-Feb-13	10:20	Cloudy	293.0	762.7	2.7870	2.7916	0.0046	1267.0	1268.0	1.0	1.21	1.21	1.21	72.8	63
														Min	29
														Max	129
														Average	77

### Location AMS4 - San Tau

Sampling Date	Start Time	Weather Condition	Air Temp. (K)	Atmospheric Pressure, Pa (mmHg)	Filter Weight (g)		Particulate weight (g)	Elapse Time		Sampling Time(hrs.)	Flow Rate (m <sup>3</sup> /min.)		Av. flow (m <sup>3</sup> /min)	Total vol. (m <sup>3</sup> )	Conc. (µg/m <sup>3</sup> )
					Initial	Final		Initial	Final		Initial	Final			
22-Feb-13	09:00	Sunny	291.5	769.7	2.7173	2.7323	0.0150	769.0	770.0	1.0	1.23	1.23	1.23	73.7	204
22-Feb-13	13:00	Sunny	294.7	768.1	2.7048	2.7126	0.0078	770.0	771.0	1.0	1.22	1.22	1.22	73.1	107
22-Feb-13	14:05	Sunny	294.8	767.9	2.7212	2.7348	0.0136	771.0	772.0	1.0	1.22	1.22	1.22	73.1	186
28-Feb-13	08:00	Cloudy	292.4	763.5	2.6848	2.6953	0.0105	796.0	797.0	1.0	1.22	1.22	1.22	73.2	144
28-Feb-13	13:35	Cloudy	294.4	761.7	2.7148	2.7198	0.0050	797.0	798.0	1.0	1.21	1.21	1.21	72.8	69
28-Feb-13	14:37	Cloudy	294.6	761.5	2.7208	2.7252	0.0044	798.0	799.0	1.0	1.21	1.21	1.21	72.7	60
														Min	60
														Max	204
														Average	128

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**APPENDIX F**  
**24-HOUR TSP MONITORING RESULTS**

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## Appendix F - 24-hour TSP Impact Monitoring Results

### Location AMS1 - Sha Lo Wan

Sampling Date	Start Time	Weather Condition	Air Temp. (K)	Atmospheric Pressure, Pa (mmHg)	Filter Weight (g)		Particulate weight (g)	Elapse Time		Sampling Time(hrs.)	Flow Rate (m <sup>3</sup> /min.)		Av. flow (m <sup>3</sup> /min)	Total vol. (m <sup>3</sup> )	Conc. (µg/m <sup>3</sup> )
					Initial	Final		Initial	Final		Initial	Final			
22-Feb-13	14:05	Cloudy	294.4	768.2	2.7299	2.8517	0.1218	1241.0	1265.0	24.0	1.22	1.22	1.22	1750.3	70
28-Feb-13	11:35	Cloudy	293.7	764.1	2.7826	2.8169	0.0343	1268.0	1292.0	24.0	1.21	1.21	1.21	1747.7	20
														Min	20
														Max	70
														Average	45

### Location AMS4 - San Tau

Sampling Date	Start Time	Weather Condition	Air Temp. (K)	Atmospheric Pressure, Pa (mmHg)	Filter Weight (g)		Particulate weight (g)	Elapse Time		Sampling Time(hrs.)	Flow Rate (m <sup>3</sup> /min.)		Av. flow (m <sup>3</sup> /min)	Total vol. (m <sup>3</sup> )	Conc. (µg/m <sup>3</sup> )
					Initial	Final		Initial	Final		Initial	Final			
22-Feb-13	15:10	Cloudy	294.6	768.0	2.7271	2.8537	0.1266	772.0	796.0	24.0	1.22	1.22	1.22	1754.4	72
28-Feb-13	15:40	Cloudy	294.8	761.3	2.7488	2.8015	0.0527	799.0	823.0	24.0	1.21	1.21	1.21	1744.5	30
														Min	30
														Max	72
														Average	51

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**APPENDIX G**  
**NOISE MONITORING RESULTS**

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**Appendix G - Noise Monitoring Results**

<b>Location NMS 1 - Sha Tau Wan</b>								
Date	Weather	Time	Unit: dB (A) (5-min)			Average	Baseline Level	Construction Noise Level
			L <sub>eq</sub>	L <sub>10</sub>	L <sub>90</sub>	L <sub>eq</sub>	L <sub>eq</sub>	L <sub>eq</sub>
23-Feb-13	Sunny	14:30	67.8	78.2	45.5	65	66.9	65 Measured ≤ Limit Level
		14:35	65.0	76.6	41.9			
		14:40	67.2	79.8	47.3			
		14:45	48.1	55.2	42.8			
		14:50	44.5	48.0	43.0			
		14:55	64.2	73.9	44.8			

<b>Location NMS 4 - San Tau</b>								
Date	Weather	Time	Unit: dB (A) (5-min)			Average	Baseline Level	Construction Noise Level
			L <sub>eq</sub>	L <sub>10</sub>	L <sub>90</sub>	L <sub>eq</sub>	L <sub>eq</sub>	L <sub>eq</sub>
23-Feb-13	Sunny	15:10	62.5	65.3	45.4	59	56.0	59 Measured ≤ Limit Level
		15:15	53.2	56.2	43.7			
		15:20	54.0	57.3	45.1			
		15:25	53.8	57.1	46.0			
		15:30	58.4	61.1	47.8			
		15:35	61.6	65.8	46.0			

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**APPENDIX H  
WATER QUALITY MONITORING  
RESULTS**

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**Contract No. HY/2011/09**  
**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill**  
**Water Quality Monitoring Results on 22 February, 2013**

**(Mid-Ebb Tide)**

Location	Weather Condition	Sea Condition**	Sampling Time	Depth (m)	Water Temperature (°C)		pH		Salinity ppt		DO Saturation (%)		Dissolved Oxygen (mg/L)		Turbidity(NTU)		Suspended Solids (mg/L)							
					Value	Average	Value	Average	Value	Average	Value	Average	Value	Average	DA*	Value	Average	DA*	Value	Average	DA*			
CS1	Fine	Rough	11:10	Surface	1	18.3	18.3	8.3	8.3	31.4	31.4	74.1	68.0	5.8	5.3	5.2	2.9	3.0	4.0	3.0	3.0	3.4		
				Middle	6.5	18.3	18.3	8.3	8.3	31.4	31.4	63.8	62.4	5.0	5.0		3.7	3.6		3.7	3.5		3.3	
				Bottom	12	18.2	18.2	8.2	8.2	32.0	31.9	61.5	61.5	4.8	4.8		5.3	5.2		5.3	4.2		3.1	
CS2	Fine	Rough	11:57	Surface	1	19.1	19.1	8.5	8.5	29.8	30.0	88.1	86.5	6.8	6.7	6.6	2.5	2.4	2.9	1.8	2.3	2.8		
				Middle	3.5	18.6	18.6	8.4	8.4	30.6	30.7	84.6	81.5	6.6	6.5		3.0	2.7		2.9	2.2		2.3	
				Bottom	6	18.5	18.5	8.4	8.4	30.9	30.9	79.3	77.6	6.2	6.2		3.4	3.1		3.3	5.0		2.7	
IS1	Cloudy	Rough	10:53	Surface	1	18.5	18.5	8.4	8.4	30.9	30.9	108.7	105.1	8.5	8.2	8.2	4.2	3.9	5.7	3.9	3.6	3.8		
				Middle	5	18.4	18.4	8.3	8.3	31.1	31.1	106.3	99.3	8.3	8.1		3.9	4.4		4.2	4.3		4.3	
				Bottom	9	18.3	18.3	8.3	8.3	31.4	31.4	96.2	94.2	7.5	7.5		8.6	8.7		8.7	2.7		4.1	
IS2	Cloudy	Rough	10:36	Surface	1	18.5	18.5	8.4	8.4	30.9	30.9	130.3	129.4	10.2	10.1	10.1	4.2	4.0	4.8	2.4	2.6	3.3		
				Middle	3.5	18.4	18.4	8.3	8.3	31.1	31.1	128.8	127.6	10.1	10.0		5.0	4.9		5.0	3.8		3.6	
				Bottom	6	18.4	18.4	8.3	8.3	31.1	31.1	126.4	123.7	9.9	9.7		5.4	5.3		5.4	4.0		3.7	
IS3	Fine	Rough	10:33	Surface	1	18.5	18.5	8.3	8.3	31.0	31.0	64.2	66.4	5.0	5.2	5.2	2.6	2.7	3.4	3.7	3.7	4.0		
				Middle	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	-
				Bottom	4.5	18.5	18.5	8.3	8.3	31.3	31.2	68.7	70.1	5.4	5.5		4.2	3.9		4.1	3.7		4.8	
IS4	Cloudy	Rough	10:17	Surface	1	18.6	18.6	8.4	8.4	30.6	30.6	136.7	133.2	10.7	10.4	10.4	2.6	2.4	3.0	2.9	2.7	2.4		
				Middle	4	18.5	18.5	8.3	8.3	30.9	30.9	136.5	127.8	10.6	10.3		2.8	3.0		2.9	2.4		2.3	
				Bottom	7	18.4	18.4	8.3	8.3	30.9	31.0	132.8	121.6	10.4	10.0		3.6	3.6		3.6	1.8		2.5	
SR1	Fine	Rough	10:55	Surface	1	18.4	18.4	8.3	8.3	31.4	31.4	63.8	63.9	5.0	5.0	5.0	2.4	2.5	2.9	2.9	3.7	4.6		
				Middle	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	-
				Bottom	2	18.3	18.4	8.3	8.3	31.4	31.4	63.7	64.2	5.0	5.0		3.3	3.0		3.2	4.4		6.6	
SR2	Fine	Rough	10:22	Surface	-	-	-	-	-	-	-	-	-	-	5.5	-	-	6.4	-	-	4.5			
				Middle	1.1	18.8	18.8	8.3	8.3	30.4	30.4	69.4	72.3	5.4		5.5	6.3		6.5	6.4		3.6	5.3	
				Bottom	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	-	-
SR3	Fine	Rough	10:00	Surface	-	-	-	-	-	-	-	-	-	-	5.5	-	-	4.2	-	-	6.3			
				Middle	0.7	19.0	19.0	8.0	8.1	29.6	29.7	69.0	71.2	5.4		5.5	4.2		4.2	4.2		7.2	5.3	
				Bottom	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	-	-
SR6	Cloudy	Rough	12:29	Surface	1	19.3	19.3	8.5	8.5	29.1	29.1	110.0	99.1	104.6	8.5	8.1	8.1	2.6	2.4	4.1	1.9	2.2	2.7	
				Middle	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-
				Bottom	4.3	18.6	18.6	8.4	8.4	30.6	30.6	90.2	90.3	7.0	7.0	5.2		6.1	5.7		2.4	4.0		
SRA	Fine	Rough	10:09	Surface	1	19.0	19.0	8.3	8.3	30.3	30.3	73.9	75.2	5.7	5.8	5.9	2.5	2.2	2.6	3.0	3.4	3.5		
				Middle	5	18.9	18.9	8.3	8.3	30.5	30.5	76.9	77.1	6.0	6.0		2.2	2.2		2.2	2.9		3.6	
				Bottom	9	18.9	18.9	8.3	8.3	30.5	30.5	76.5	76.8	5.9	6.0		3.3	3.1		3.2	3.2		4.4	
ST1	Cloudy	Rough	11:12	Surface	1	18.6	18.6	8.4	8.4	30.8	30.8	93.6	88.2	90.9	7.3	7.1	7.0	4.6	4.7	5.8	2.9	3.3	4.7	
				Middle	5	18.4	18.4	8.3	8.3	31.1	31.1	89.2	87.0	7.0	6.8	6.9		5.0	5.0		5.0	5.5		5.3
				Bottom	9	18.2	18.2	8.3	8.3	31.5	31.5	82.9	84.7	6.5	6.6	6.6		7.7	7.4		7.6	5.3		5.4
ST2	Cloudy	Rough	11:38	Surface	1	18.8	18.8	8.4	8.4	30.3	30.3	90.6	86.1	88.4	7.1	6.9	6.8	2.8	3.2	4.0	3.0	2.7	3.2	
				Middle	4	18.6	18.6	8.4	8.4	30.8	30.8	85.1	84.4	6.6	6.6	6.6		3.9	3.3		3.6	2.7		3.4
				Bottom	7	18.5	18.5	8.3	8.3	30.9	30.9	78.8	79.6	6.1	6.2	6.2		5.4	5.5		5.5	3.9		3.5
ST3	Fine	Rough	11:25	Surface	1	18.4	18.4	8.3	8.3	31.2	31.2	52.1	58.4	55.3	4.1	4.4	4.5	3.2	2.8	3.9	2.7	2.8	3.7	
				Middle	7	18.3	18.3	8.3	8.3	31.4	31.3	57.0	59.0	4.4	4.6	4.5		2.5	2.3		2.4	4.4		4.0
				Bottom	13	18.3	18.3	8.3	8.3	31.6	31.6	57.7	58.6	4.5	4.6	4.6		6.2	6.2		6.2	3.8		4.4

Remarks: \*DA: Depth-Averaged  
 \*\*Calm: Small or no wave; Moderate: Between calm and rough; Rough: White capped or rougher.

**Contract No. HY/2011/09**  
**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill**  
**Water Quality Monitoring Results on 22 February, 2013**

**(Mid-Flood Tide)**

Location	Weather Condition	Sea Condition**	Sampling Time	Depth (m)	Water Temperature (°C)		pH		Salinity ppt		DO Saturation (%)		Dissolved Oxygen (mg/L)		Turbidity(NTU)		Suspended Solids (mg/L)										
					Value	Average	Value	Average	Value	Average	Value	Average	Value	Average	DA*	Value	Average	DA*	Value	Average	DA*						
CS1	Fine	Rough	15:24	Surface	1	18.5	18.5	8.3	8.3	31.4	31.4	54.2	50.8	4.2	4.0	4.0	1.9	2.0	2.1	3.3	3.0	2.9					
				Middle	7	18.4	18.4	8.3	8.3	31.4	31.4	52.0	48.3	4.1	3.8		4.0	2.2		1.8	2.0		2.8	1.9	2.4		
				Bottom	13	18.4	18.4	8.2	8.2	31.5	31.5	49.3	47.7	3.8	3.7		3.8	2.2		2.1	2.2		3.2	3.3	3.3		
CS2	Cloudy	Rough	17:15	Surface	1	19.2	19.2	8.5	8.5	30.2	30.2	75.3	76.4	75.9	5.8	5.9	6.2	2.3	2.3	4.1	2.7	3.0	3.4				
				Middle	3.5	19.2	19.2	8.5	8.5	30.2	30.3	84.3	80.1	82.2	6.5	6.2		6.4	2.5		2.4	2.5		4.2	4.1	4.2	
				Bottom	6	18.8	18.8	8.4	8.4	30.9	30.9	79.5	78.5	79.0	6.2	6.1		6.2	6.2		7.5	7.5		7.5	2.7	3.0	2.9
IS1	Fine	Rough	15:30	Surface	1	18.7	18.7	8.4	8.4	31.0	31.0	70.4	65.7	68.1	5.5	5.3	5.3	4.8	4.9	4.8	5.3	5.1	4.1				
				Middle	4.5	18.7	18.8	8.4	8.4	31.0	31.0	70.6	62.0	66.3	5.5	4.8		5.2	3.9		3.9	3.9		2.9	3.5	3.2	
				Bottom	8	18.3	18.3	8.3	8.3	31.4	31.5	66.0	56.1	61.1	5.2	4.4		4.8	4.8		5.3	5.8		5.6	3.6	4.3	4.0
IS2	Fine	Rough	15:08	Surface	1	18.9	18.9	8.4	8.4	30.9	30.9	81.9	81.2	81.6	6.3	6.3	6.3	4.5	4.6	4.4	3.1	3.6	3.8				
				Middle	3.5	18.8	18.8	8.4	8.4	30.9	30.9	80.9	80.4	80.7	6.3	6.3		6.3	3.5		3.3	3.4		4.7	4.0	4.4	
				Bottom	6	18.7	18.6	8.4	8.4	30.9	31.0	81.9	69.0	75.5	6.4	5.9		5.9	5.0		5.1	5.1		3.1	3.5	3.3	
IS3	Fine	Rough	16:03	Surface	1	19.4	19.4	8.4	8.4	31.2	31.2	61.8	62.0	61.8	4.8	4.8	4.8	2.3	2.4	3.9	2.9	3.1	3.8				
				Middle	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	-	-	
				Bottom	4.3	18.5	18.6	8.3	8.3	31.4	31.4	66.5	60.7	63.6	5.2	4.7		5.0	5.0		5.4	5.2		5.3	4.9	3.8	4.4
IS4	Fine	Rough	14:45	Surface	1	19.2	19.2	8.4	8.5	30.6	30.7	106.1	103.8	103.8	8.2	8.0	8.1	2.8	2.8	3.0	2.5	3.0	3.0				
				Middle	3.5	19.0	19.1	8.4	8.5	30.7	30.7	108.1	99.4	103.8	8.4	7.7		8.1	3.1		3.2	3.2		2.3	3.0	2.7	
				Bottom	6	18.7	18.7	8.4	8.4	30.8	30.8	105.2	95.8	100.5	8.2	7.4		7.8	7.8		2.6	3.1		2.9	3.2	3.2	3.2
SR1	Fine	Rough	15:36	Surface	-	-	-	-	-	-	-	-	-	-	-	3.7	-	-	8.1	-	-	7.9					
				Middle	1.3	18.9	18.9	8.4	8.4	31.5	30.2	30.9	48.6	47.7	3.8		3.6	3.7		8.0	8.1		8.1	7.3	8.4	7.9	
				Bottom	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	-	-	-	-
SR2	Fine	Rough	16:16	Surface	-	-	-	-	-	-	-	-	-	-	4.0	-	-	4.6	-	-	5.7						
				Middle	1	19.6	19.6	8.5	8.5	29.8	31.1	30.5	51.1	54.0		52.6	3.9		4.1	4.0		4.6	4.6	4.6	6.0	5.4	5.7
				Bottom	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	-	-	-	-	-
SR3	Fine	Rough	16:34	Surface	-	-	-	-	-	-	-	-	-	-	3.7	-	-	2.7	-	-	5.4						
				Middle	0.8	20.1	20.1	8.4	8.4	29.1	30.4	29.8	48.4	47.6		48.0	3.7		3.7	3.7		2.5	2.8	2.7	6.0	4.8	5.4
				Bottom	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	-	-	-	-	-
SR6	Fine	Rough	16:49	Surface	1	19.2	19.2	8.5	8.5	29.6	29.6	74.4	74.3	74.3	5.8	5.7	5.8	3.1	3.1	5.6	2.6	2.7	3.1				
				Middle	-	-	-	-	-	-	-	-	-	-	-	-		-	-		-	-		-	-	-	-
				Bottom	4.6	18.6	18.6	8.4	8.4	30.8	30.8	59.8	53.3	56.6	4.7	4.2		4.5	4.5		7.7	8.2		8.0	3.4	3.4	3.4
SRA	Fine	Rough	16:26	Surface	1	19.4	19.4	8.4	8.4	29.3	29.5	50.0	46.2	48.1	3.9	3.8	4.1	1.2	1.2	1.4	3.6	2.9	2.7				
				Middle	4.5	19.1	19.1	8.4	8.4	30.8	30.2	54.3	55.9	55.1	4.2	4.3		4.3	1.5		1.5	1.5		1.8	2.4	2.1	
				Bottom	8	18.6	18.6	8.3	8.3	31.1	31.1	54.2	57.0	55.6	4.4	4.4		4.4	1.4		1.3	1.4		3.5	2.4	3.0	
ST1	Fine	Rough	15:51	Surface	1	18.6	18.6	8.4	8.4	31.1	31.1	70.4	61.7	66.1	5.5	5.2	5.2	5.0	5.0	5.1	4.5	5.2	5.1				
				Middle	5	18.6	18.6	8.4	8.4	31.1	31.1	67.9	63.7	65.8	5.3	5.0		5.2	4.1		4.1	4.1		5.1	4.0	4.6	
				Bottom	9	18.3	18.3	8.3	8.3	31.5	31.5	60.3	58.2	59.3	4.7	4.5		4.6	4.6		6.2	6.4		6.3	5.2	5.9	5.6
ST2	Fine	Rough	16:18	Surface	1	19.2	19.2	8.5	8.5	30.3	30.3	70.1	71.3	70.7	5.4	5.5	5.1	3.4	3.7	3.7	2.8	3.2	3.4				
				Middle	4	18.9	19.0	8.5	8.5	30.7	30.6	58.8	57.5	58.2	4.6	4.5		4.6	3.2		3.5	3.4		4.5	3.9	4.2	
				Bottom	7	18.9	18.9	8.4	8.4	30.7	30.8	58.0	57.3	57.7	4.5	4.4		4.5	4.5		4.0	4.3		4.2	2.7	2.8	2.8
ST3	Fine	Rough	14:56	Surface	1	18.7	18.7	8.1	8.2	30.6	31.1	54.0	55.8	54.9	4.2	4.3	4.1	1.3	1.4	2.4	3.3	3.3	3.7				
				Middle	7	18.5	18.6	8.2	8.2	31.1	31.1	47.5	51.3	49.4	3.7	4.0		3.9	1.9		2.0	2.0		2.6	2.8	2.7	
				Bottom	13	18.3	18.3	8.2	8.2	31.5	31.6	43.6	50.5	47.1	3.4	3.9		3.7	3.7		3.8	3.8		3.8	4.5	5.5	5.0

Remarks: \*DA: Depth-Averaged  
\*\*Calm: Small or no wave; Moderate: Between calm and rough; Rough: White capped or rougher.

Contract No. HY/2011/09

Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill

Water Quality Monitoring Results on 25 February, 2013

(Mid-Ebb Tide)

Location	Weather Condition	Sea Condition**	Sampling Time	Depth (m)	Water Temperature (°C)		pH		Salinity ppt		DO Saturation (%)		Dissolved Oxygen (mg/L)		DA*	Turbidity(NTU)		Suspended Solids (mg/L)				
					Value	Average	Value	Average	Value	Average	Value	Average	Value	Average		Value	Average	Value	Average	Value	Average	DA*
CS1	Cloudy	Calm	12:25	Surface	1	18.3	18.3	8.4	8.4	31.5	31.5	64.9	65.1	5.1	5.1	5.1	2.4	2.5	3.1	3.4	4.8	
				Middle	6.5	18.2	18.2	8.3	8.3	31.9	31.9	64.8	64.7	5.1	5.1		3.3	4.0	4.7	5.1		
				Bottom	12	18.0	18.0	8.3	8.3	32.1	32.1	61.4	61.4	4.8	4.8		6.0	6.0	5.9	5.6		5.8
CS2	Cloudy	Calm	13:56	Surface	1	18.6	18.6	8.4	8.4	30.9	31.0	56.5	59.7	4.4	4.7	4.9	3.6	3.3	3.4	3.1	4.4	
				Middle	4	18.4	18.4	8.4	8.4	31.4	31.4	67.4	63.3	5.3	5.0		6.3	6.6	5.2	5.6		
				Bottom	7	18.3	18.3	8.3	8.3	31.5	31.5	59.3	57.3	4.6	4.5		7.3	7.3	6.2	3.0		4.6
IS1	Cloudy	Calm	12:05	Surface	1	18.3	18.5	8.4	8.4	31.3	31.2	72.4	69.5	5.7	5.5	5.3	5.1	5.4	5.2	4.8	7.7	
				Middle	5	18.1	18.1	8.3	8.3	31.7	31.7	67.2	64.5	5.3	4.8		8.6	8.4	7.1	10.0		8.6
				Bottom	9	18.1	18.1	8.3	8.3	31.7	31.7	62.2	64.3	4.9	5.0		9.6	9.4	9.8	9.6		9.7
IS2	Cloudy	Calm	11:47	Surface	1	18.5	18.5	8.4	8.4	31.2	31.2	76.5	74.4	6.0	5.8	5.7	4.8	4.9	4.6	4.6	7.0	
				Middle	3.5	18.1	18.1	8.3	8.3	31.7	31.7	75.3	71.1	5.9	5.6		8.0	8.4	6.9	7.5		7.2
				Bottom	6	18.1	18.1	8.3	8.3	31.7	31.8	68.3	63.1	5.3	5.1		9.5	9.1	9.3	9.2		9.3
IS3	Cloudy	Calm	11:42	Surface	1	18.5	18.5	8.3	8.3	31.8	31.8	63.6	64.1	4.9	5.0	5.1	3.0	3.1	8.0	5.8	6.8	
				Middle	3	18.3	18.3	8.3	8.3	31.9	32.0	66.7	66.6	5.2	5.2		5.4	5.4	5.0	4.9		5.0
				Bottom	5	18.2	18.2	8.3	8.3	31.9	32.0	65.6	65.9	5.1	5.1		6.3	6.2	8.0	8.9		8.5
IS4	Cloudy	Calm	11:27	Surface	1	18.4	18.4	8.4	8.4	31.5	31.5	84.2	82.5	6.6	6.5	6.6	4.8	5.1	4.5	6.2	6.2	
				Middle	3.5	18.3	18.3	8.4	8.4	31.6	31.6	85.3	84.7	6.6	6.6		5.4	5.5	7.0	7.5		7.3
				Bottom	6	18.2	18.2	8.4	8.4	31.7	31.7	87.2	83.6	6.8	6.5		7.4	7.6	5.3	6.7		6.0
SR1	Cloudy	Calm	12:15	Surface	-	-	-	-	-	-	-	-	-	-	5.4	-	-	-	-	8.8		
				Middle	1.4	18.3	18.3	8.3	8.3	32.1	32.1	69.7	69.5	5.4		5.4	6.4	6.6	9.1		8.4	8.8
				Bottom	-	-	-	-	-	-	-	-	-	-		-	-	-	-		-	-
SR2	Cloudy	Calm	11:34	Surface	-	-	-	-	-	-	-	-	-	-	5.3	-	-	-	-	5.8		
				Middle	1.1	18.6	18.6	8.4	8.4	31.1	31.1	66.1	67.7	5.1		5.3	2.8	2.7	5.1		6.5	5.8
				Bottom	-	-	-	-	-	-	-	-	-	-		-	-	-	-		-	-
SR3	Cloudy	Calm	11:20	Surface	-	-	-	-	-	-	-	-	-	-	5.7	-	-	-	-	4.0		
				Middle	0.8	19.1	19.1	8.3	8.3	30.6	30.6	73.6	73.9	5.7		5.7	2.5	2.6	3.9		4.1	4.0
				Bottom	-	-	-	-	-	-	-	-	-	-		-	-	-	-		-	-
SR6	Cloudy	Calm	13:33	Surface	1	18.9	18.9	8.4	8.4	30.5	30.6	71.1	68.7	5.5	5.3	5.3	5.3	5.4	4.9	5.1	5.2	
				Middle	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-		-
				Bottom	4.4	18.6	18.6	8.4	8.4	30.8	30.9	62.4	59.4	4.9	4.6		7.9	6.7	5.9	4.7		5.3
SRA	Cloudy	Calm	11:26	Surface	1	18.5	18.5	8.3	8.4	31.2	31.2	69.9	71.1	5.4	5.5	5.7	2.2	2.3	5.0	4.5	5.4	
				Middle	4.5	18.4	18.4	8.3	8.3	31.3	31.3	74.1	74.0	5.8	5.8		3.8	3.9	7.2	5.6		6.4
				Bottom	8	18.4	18.4	8.3	8.3	31.3	31.3	73.7	73.7	5.7	5.7		2.1	2.0	5.1	4.7		4.9
ST1	Cloudy	Calm	12:28	Surface	1	18.4	18.4	8.4	8.4	31.1	31.2	69.6	68.7	5.4	5.4	5.3	6.3	6.2	6.8	7.8	7.0	
				Middle	5	18.4	18.4	8.4	8.4	31.3	31.4	69.3	64.9	5.4	5.1		6.7	7.7	6.6	7.0		6.8
				Bottom	9	18.3	18.3	8.4	8.4	31.5	31.5	60.9	54.2	4.8	4.5		10.8	12.5	7.1	6.7		6.9
ST2	Cloudy	Calm	12:58	Surface	1	18.3	18.3	8.4	8.4	31.5	31.5	70.3	67.7	5.5	5.3	5.1	6.0	5.8	6.4	6.4	6.4	
				Middle	4	18.3	18.3	8.4	8.4	31.5	31.5	63.5	61.1	5.0	4.6		6.1	6.5	6.0	6.5		6.3
				Bottom	7	18.3	18.3	8.3	8.4	31.5	31.5	59.0	56.5	4.6	4.4		6.7	6.7	7.2	5.9		6.6
ST3	Cloudy	Calm	12:35	Surface	1	18.5	18.5	8.4	8.4	31.5	31.6	56.4	57.3	4.4	4.5	4.6	3.3	3.4	4.1	5.3	6.1	
				Middle	7	18.2	18.3	8.3	8.3	31.8	31.8	60.7	60.7	4.7	4.7		3.8	4.2	6.8	4.9		5.9
				Bottom	13	18.2	18.2	8.3	8.3	32.1	32.1	60.1	60.4	4.7	4.7		15.6	14.8	7.3	8.3		7.8

Remarks: \*DA: Depth-Averaged  
\*\*Calm: Small or no wave; Moderate: Between calm and rough; Rough: White capped or rougher.

(Mid-Flood Tide)

Location	Weather Condition	Sea Condition**	Sampling Time	Depth (m)	Water Temperature (°C)		pH		Salinity ppt		DO Saturation (%)		Dissolved Oxygen (mg/L)		Turbidity(NTU)		Suspended Solids (mg/L)			
					Value	Average	Value	Average	Value	Average	Value	Average	Value	Average	DA*	Value	Average	DA*	Value	Average
CS1	Cloudy	Calm	17:35	Surface	1	18.7 18.6	18.7	8.4 8.4	8.4	31.5 31.6	31.6	53.9 55.9	54.9	4.2 4.3	4.3	4.4	2.1 2.4	2.3	6.1 5.3	5.7
				Middle	6.5	18.3 18.3	18.3	8.3 8.3	8.3	31.8 31.8	31.8	56.3 56.4	56.4	4.4 4.4	4.4	4.4	4.8 4.8	4.8	4.3 4.0	4.2
				Bottom	12	18.2 18.2	18.2	8.3 8.3	8.3	31.9 31.9	31.9	56.1 56.8	56.5	4.4 4.4	4.4	4.4	7.3 7.1	7.2	4.9 4.9	4.9
CS2	Cloudy	Calm	17:06	Surface	1	19.2 19.2	19.2	8.4 8.4	8.4	29.8 30.0	29.9	120.9 124.5	122.7	9.4 9.7	9.6	9.8	3.3 3.0	3.2	3.4 4.3	3.9
				Middle	3.5	18.9 18.8	18.9	8.4 8.4	8.4	30.6 30.8	30.7	120.5 135.7	128.1	9.4 10.6	10.0	9.4	3.2 3.2	3.2	6.7 4.5	5.6
				Bottom	6	18.6 18.6	18.6	8.3 8.3	8.3	31.1 31.1	31.1	115.3 125.1	120.2	9.0 9.7	9.4	9.4	4.0 4.4	4.2	5.6 4.3	5.0
IS1	Cloudy	Calm	18:25	Surface	1	18.4 18.4	18.4	8.3 8.4	8.4	31.4 31.5	31.5	108.6 107.7	108.2	8.5 8.4	8.5	8.3	5.0 5.1	5.1	7.2 6.9	7.1
				Middle	5	18.3 18.3	18.3	8.3 8.3	8.3	31.5 31.5	31.5	111.8 94.6	103.2	8.7 7.4	8.1	8.1	5.1 4.7	4.9	4.4 4.8	4.6
				Bottom	9	18.2 18.2	18.2	8.3 8.3	8.3	31.5 31.6	31.6	99.4 91.6	95.5	7.8 7.2	7.5	7.5	8.6 9.6	9.1	5.5 6.5	6.0
IS2	Cloudy	Calm	18:40	Surface	1	18.6 18.6	18.6	8.4 8.4	8.4	31.1 31.3	31.2	112.8 108.6	110.7	8.8 8.4	8.6	8.3	4.2 3.8	4.0	3.6 3.8	3.7
				Middle	3.5	18.5 18.5	18.5	8.4 8.4	8.4	31.4 31.5	31.5	111.1 95.6	103.4	8.6 7.4	8.0	8.0	3.8 3.5	3.7	4.9 4.4	4.7
				Bottom	6	18.3 18.3	18.3	8.3 8.3	8.3	31.5 31.5	31.5	99.5 91.5	95.5	7.8 7.1	7.5	7.5	7.1 7.0	7.1	4.5 5.1	4.8
IS3	Cloudy	Calm	18:00	Surface	1	18.6 18.6	18.6	8.4 8.4	8.4	31.9 31.9	31.9	60.3 60.6	60.5	4.7 4.7	4.7	4.7	3.1 3.1	3.1	7.2 5.8	6.5
				Middle	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Bottom	4	18.4 18.5	18.5	8.3 8.3	8.3	32.0 32.0	32.0	61.0 61.1	61.1	4.7 4.7	4.7	4.7	3.6 3.8	3.7	4.9 4.6	4.8
IS4	Cloudy	Calm	18:59	Surface	1	18.5 18.5	18.5	8.4 8.4	8.4	31.4 31.6	31.5	89.2 99.0	94.1	6.9 7.7	7.3	7.8	4.2 3.9	4.1	6.3 3.7	5.0
				Middle	4	18.4 18.4	18.4	8.4 8.4	8.4	31.6 31.6	31.6	113.8 99.0	106.4	8.9 7.7	8.3	8.3	4.1 4.9	4.5	4.0 5.0	4.5
				Bottom	7	18.4 18.4	18.4	8.3 8.4	8.4	31.6 31.6	31.6	102.0 90.2	96.1	7.9 7.0	7.5	7.5	5.0 4.7	4.9	4.5 3.7	4.1
SR1	Cloudy	Calm	17:15	Surface	-	-	-	-	-	-	-	-	-	-	-	5.1	-	-	-	-
				Middle	1.1	18.9 18.8	18.9	8.2 8.2	8.2	31.3 31.3	31.3	67.8 63.4	65.6	5.2 4.9	5.1	5.1	4.8 5.0	4.9	8.3 7.3	7.8
				Bottom	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SR2	Cloudy	Calm	18:08	Surface	-	-	-	-	-	-	-	-	-	-	-	4.6	-	-	-	-
				Middle	0.8	19.0 19.0	19.0	8.4 8.4	8.4	31.5 31.6	31.6	60.0 60.1	60.1	4.6 4.6	4.6	4.6	3.4 3.4	3.4	6.6 6.4	6.5
				Bottom	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SR3	Cloudy	Calm	18:24	Surface	-	-	-	-	-	-	-	-	-	-	-	4.3	-	-	-	-
				Middle	1.1	18.9 18.9	18.9	8.4 8.4	8.4	31.3 31.3	31.3	54.9 55.1	55.0	4.2 4.3	4.3	4.3	11.9 12.0	12.0	44.5 50.5	47.5
				Bottom	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
SR6	Cloudy	Calm	17:30	Surface	1	19.2 19.2	19.2	8.4 8.4	8.4	29.7 29.9	29.8	118.7 118.2	118.5	9.2 9.2	9.2	9.2	5.0 4.4	4.7	4.5 5.8	5.2
				Middle	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
				Bottom	4.2	19.0 19.0	19.0	8.4 8.4	8.4	30.2 30.1	30.2	136.0 137.0	136.5	10.6 10.6	10.6	10.6	5.0 5.1	5.1	3.6 3.9	3.8
SRA	Cloudy	Calm	18:16	Surface	1	19.1 19.1	19.1	8.4 8.4	8.4	31.1 31.2	31.2	58.6 59.1	58.9	4.5 4.6	4.6	4.6	3.2 3.3	3.3	4.9 7.5	6.2
				Middle	3.5	18.9 18.9	18.9	8.4 8.4	8.4	31.2 31.2	31.2	58.5 58.5	58.5	4.5 4.5	4.5	4.5	2.9 2.9	2.9	5.0 6.1	5.6
				Bottom	6	18.9 18.9	18.9	8.4 8.4	8.4	31.2 31.2	31.2	57.7 57.7	57.7	4.5 4.5	4.5	4.5	5.1 5.3	5.2	5.1 6.3	5.7
ST1	Cloudy	Calm	18:13	Surface	1	18.6 18.6	18.6	8.4 8.4	8.4	31.0 31.2	31.1	114.8 112.7	113.8	8.9 8.8	8.9	8.8	3.6 3.4	3.5	4.7 4.4	4.6
				Middle	5	18.5 18.5	18.5	8.4 8.4	8.4	31.3 31.4	31.4	114.4 106.5	110.5	8.9 8.3	8.6	8.6	4.0 3.8	3.9	4.8 3.8	4.3
				Bottom	9	18.4 18.4	18.4	8.4 8.4	8.4	31.4 31.4	31.4	108.0 101.7	104.9	8.4 7.9	8.2	8.2	4.6 3.9	4.3	4.6 4.6	4.6
ST2	Cloudy	Calm	17:54	Surface	1	19.1 19.1	19.1	8.4 8.4	8.4	30.0 30.1	30.1	103.1 107.5	105.3	8.0 8.3	8.2	8.7	3.2 3.1	3.2	6.3 4.7	5.5
				Middle	4	19.0 18.9	19.0	8.4 8.4	8.4	30.4 30.6	30.5	108.3 126.3	117.3	8.4 9.8	9.1	9.1	3.7 3.3	3.5	4.5 3.7	4.1
				Bottom	7	18.5 18.5	18.5	8.4 8.4	8.4	31.2 31.3	31.3	106.2 123.8	115.0	8.3 9.6	9.0	9.0	7.9 8.5	8.2	4.7 4.0	4.4
ST3	Cloudy	Calm	17:25	Surface	1	19.2 18.9	19.1	8.4 8.4	8.4	31.1 31.3	31.2	44.5 46.4	45.5	3.4 3.6	3.5	3.8	1.4 1.5	1.5	4.0 4.5	4.3
				Middle	7.5	18.2 18.2	18.2	8.3 8.3	8.3	31.8 31.8	31.8	50.9 50.9	50.9	4.0 4.0	4.0	4.0	3.3 3.6	3.5	4.2 5.3	4.8
				Bottom	14	18.1 18.1	18.1	8.3 8.3	8.3	31.9 31.9	31.9	51.0 51.0	51.0	4.0 4.0	4.0	4.0	9.7 9.8	9.8	5.3 6.1	5.7



Contract No. HY/2011/09  
 Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
 Water Quality Monitoring Results on 27 February, 2013

(Mid-Ebb Tide)

Location	Weather Condition	Sea Condition**	Sampling Time	Depth (m)	Water Temperature (°C)		pH		Salinity ppt		DO Saturation (%)		Dissolved Oxygen (mg/L)		Turbidity(NTU)		Suspended Solids (mg/L)							
					Value	Average	Value	Average	Value	Average	Value	Average	Value	Average	DA*	Value	Average	DA*	Value	Average	DA*			
CS1	Sunny	Calm	13:00	Surface	1	18.9	18.9	8.4	8.4	30.6	30.6	78.4	78.6	6.2	6.3	6.3	3.7	3.7	5.9	6.2	6.6			
				Middle	6.5	18.7	18.7	8.3	8.3	30.9	30.9	76.9	77.1	6.1	6.2		5.7	5.4				7.6	6.9	
				Bottom	12	18.4	18.4	8.3	8.3	31.5	31.5	76.2	76.2	6.1	6.1		6.7	6.8				6.1	7.0	6.6
CS2	Sunny	Calm	14:25	Surface	1	20.1	20.1	8.4	8.4	28.8	28.8	86.7	86.0	6.6	6.6	6.5	3.5	3.5	6.3	6.0	6.6			
				Middle	4	19.3	19.3	8.4	8.4	29.0	29.6	80.7	80.7	6.3	6.3		7.0	7.8				5.1	5.5	
				Bottom	7	19.2	19.2	8.4	8.4	30.2	29.7	80.7	79.3	6.2	6.2		8.6	8.4				5.8	10.2	8.4
IS1	Sunny	Calm	13:15	Surface	1	19.4	19.4	8.4	8.4	29.5	29.6	85.1	85.2	6.6	6.6	6.4	3.3	3.4	4.4	3.6	3.8			
				Middle	3.5	18.9	18.9	8.4	8.4	30.2	30.2	78.8	79.0	6.1	6.2		4.8	4.8				3.1	2.9	
				Bottom	6	18.8	18.8	8.4	8.4	30.5	30.5	77.4	77.3	6.0	6.0		5.0	4.9				3.5	4.8	
IS2	Sunny	Calm	13:02	Surface	1	19.0	19.0	8.4	8.4	29.2	29.8	86.1	86.4	6.7	6.7	6.7	6.5	6.4	7.2	6.3	5.2			
				Middle	4	18.8	18.8	8.4	8.4	30.5	30.5	87.4	87.4	6.7	6.7		7.0	7.0				8.0	6.3	
				Bottom	7	18.8	18.8	8.4	8.4	30.6	30.6	88.9	89.3	6.8	6.9		8.4	8.3				4.5	4.7	
IS3	Sunny	Calm	13:20	Surface	1	19.9	19.9	8.5	8.5	29.6	29.6	81.9	81.9	6.4	6.4	6.4	9.5	9.1	7.4	6.8	6.9			
				Middle	-	-	-	-	-	-	-	-	-	-	-		-	-				-	-	-
				Bottom	4	19.5	19.5	8.4	8.4	30.0	30.0	79.7	80.5	6.3	6.4		5.6	5.7				7.4	7.1	
IS4	Sunny	Calm	12:42	Surface	1	19.4	19.4	8.4	8.4	29.7	29.8	78.3	78.2	6.3	6.3	6.1	3.6	3.6	3.6	4.8	5.3			
				Middle	4	19.2	19.2	8.4	8.4	30.1	30.1	74.6	74.7	5.8	5.8		3.5	3.6				4.3	4.2	
				Bottom	7	19.2	19.2	8.4	8.4	30.2	30.2	77.3	77.9	6.3	6.3		3.7	3.7				6.7	5.6	
SR1	Sunny	Calm	12:31	Surface	-	-	-	-	-	-	-	-	-	-	6.9	-	-	6.8	7.2	6.9	6.9			
				Middle	1.3	19.4	19.4	8.3	8.3	30.7	30.7	86.5	87.4	6.8		6.9	6.7					6.8	6.5	6.9
				Bottom	-	-	-	-	-	-	-	-	-	-		-	-					-	-	-
SR2	Sunny	Calm	13:30	Surface	-	-	-	-	-	-	-	-	-	-	6.0	-	-	8.0	10.3	11.9	11.9			
				Middle	0.8	20.4	20.6	8.4	8.4	30.7	30.7	75.4	77.0	5.9		6.0	7.8					8.1	13.4	-
				Bottom	-	-	-	-	-	-	-	-	-	-		-	-					-	-	-
SR3	Sunny	Calm	13:55	Surface	-	-	-	-	-	-	-	-	-	-	5.9	-	-	3.2	6.1	6.7	6.7			
				Middle	1.0	20.5	20.5	8.4	8.4	30.8	30.8	75.6	75.7	5.9		5.9	3.5					2.9	7.2	6.7
				Bottom	-	-	-	-	-	-	-	-	-	-		-	-					-	-	-
SR6	Sunny	Calm	14:50	Surface	1	20.3	20.3	8.4	8.4	30.0	30.0	81.8	81.8	6.2	6.2	6.2	4.5	4.4	6.2	3.8	5.2			
				Middle	-	-	-	-	-	-	-	-	-	-	-		-	-				-	-	-
				Bottom	4	19.4	19.4	8.4	8.4	30.1	30.1	79.6	79.4	6.1	6.1		8.6	7.4				5.1	6.2	5.7
SRA	Sunny	Calm	13:40	Surface	1	19.8	19.8	8.4	8.4	30.5	30.5	77.3	77.3	6.1	6.1	6.1	3.2	3.2	3.7	5.0	5.4			
				Middle	4	19.7	19.7	8.4	8.4	30.6	30.6	76.7	77.0	6.0	6.1		4.0	3.3				6.9	7.0	
				Bottom	7	19.4	19.4	8.4	8.4	30.7	30.7	76.3	76.3	6.0	6.0		4.4	4.0				6.1	6.8	6.5
ST1	Sunny	Calm	13:33	Surface	1	20.3	20.3	8.4	8.4	29.7	29.7	80.5	80.4	6.1	6.1	6.1	2.6	2.6	3.4	6.2	5.8			
				Middle	5	19.3	19.3	8.4	8.4	28.8	29.4	78.8	79.0	6.1	6.1		2.8	3.1				6.1	5.5	
				Bottom	9	18.6	18.6	8.4	8.4	31.1	31.1	76.7	75.3	6.0	5.9		4.3	4.4				6.9	7.0	
ST2	Sunny	Calm	13:49	Surface	1	19.2	19.2	8.4	8.4	30.5	30.4	85.5	85.2	6.6	6.6	6.5	6.6	6.6	8.2	4.4	5.3			
				Middle	4	18.8	18.8	8.4	8.4	30.7	30.8	81.0	80.4	6.3	6.3		7.6	7.5				3.1	3.9	
				Bottom	7	18.6	18.6	8.4	8.4	31.0	31.0	77.2	77.0	6.0	6.0		10.4	10.6				4.5	4.5	
ST3	Sunny	Calm	12:42	Surface	1	18.8	18.9	8.4	8.4	30.5	30.4	80.3	80.6	6.4	6.4	6.4	4.3	4.0	5.8	4.3	4.4			
				Middle	7.5	18.8	18.8	8.3	8.3	30.8	30.8	79.6	79.1	6.3	6.3		6.4	7.4				5.8	5.5	
				Bottom	14	18.5	18.5	8.3	8.3	31.5	31.5	78.6	78.5	6.3	6.3		6.3	6.4				5.6	6.2	5.9

**Contract No. HY/2011/09**  
**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill**  
**Water Quality Monitoring Results on 27 February, 2013**

**(Mid-Flood Tide)**

Location	Weather Condition	Sea Condition**	Sampling Time	Depth (m)	Water Temperature (°C)		pH		Salinity ppt		DO Saturation (%)		Dissolved Oxygen (mg/L)		DA*	Turbidity(NTU)		Suspended Solids (mg/L)				
					Value	Average	Value	Average	Value	Average	Value	Average	Value	Average		Value	Average	DA*	Value	Average	Value	Average
CS1	Fine	Calm	08:20	Surface	1	19.2	19.2	8.4	8.4	29.8	29.8	79.6	80.7	6.3	6.4	6.5	4.4	4.7	4.1	4.1	4.8	
				Middle	6.5	18.9	19.0	8.4	8.4	30.5	30.5	83.0	83.2	6.6	6.6		4.7	4.7	4.4	4.6		
				Bottom	12	18.8	18.8	8.4	8.4	30.8	30.8	83.1	83.1	6.6	6.6		5.5	5.6	5.5	5.7		
CS2	Fine	Calm	08:42	Surface	1	19.4	19.4	8.4	8.4	30.2	29.0	80.9	83.4	6.4	6.5	6.4	4.1	4.2	6.3	5.9	7.2	
				Middle	4	19.2	19.2	8.4	8.4	30.5	30.6	79.3	79.5	6.3	6.2		10.5	10.8	6.6	6.3		
				Bottom	7	19.2	19.2	8.4	8.4	30.6	30.6	80.9	80.4	6.3	6.3		18.0	17.7	7.3	10.7		
IS1	Fine	Calm	07:37	Surface	1	19.2	19.2	8.4	8.4	30.4	30.4	85.8	86.5	6.6	6.7	6.4	4.6	4.6	6.2	5.3	6.5	
				Middle	3.5	19.1	19.1	8.4	8.4	30.5	29.3	77.1	78.1	6.0	6.1		10.3	10.4	8.7	6.5		
				Bottom	6	19.1	19.1	8.4	8.4	30.6	30.6	77.2	77.3	6.0	6.1		16.2	18.8	6.3	6.0		
IS2	Fine	Calm	07:27	Surface	1	19.3	19.3	8.3	8.3	27.6	28.8	78.0	77.7	6.1	6.1	6.1	12.0	11.4	7.1	7.0	6.7	
				Middle	3.5	19.2	19.2	8.3	8.3	30.4	30.4	76.2	76.3	6.0	6.0		7.5	7.7	6.7	6.4		
				Bottom	6	19.2	19.2	8.3	8.3	30.5	30.5	75.2	75.0	5.9	5.9		15.7	15.8	6.0	6.6		
IS3	Fine	Calm	08:00	Surface	1	19.3	19.3	8.4	8.4	30.4	30.4	86.0	85.6	6.8	6.8	6.8	6.7	6.3	3.5	3.9	4.1	
				Middle	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-		-
				Bottom	3	19.3	19.3	8.4	8.4	30.5	30.5	85.3	85.4	6.7	6.7		6.0	6.1	5.3	3.6		
IS4	Fine	Calm	07:08	Surface	1	19.3	19.3	8.2	8.2	30.2	30.2	77.1	77.5	6.0	6.1	6.2	3.1	3.2	6.4	7.9	7.1	
				Middle	4	19.3	19.3	8.2	8.2	30.2	30.2	78.9	79.3	6.2	6.2		3.2	3.2	6.6	8.3		
				Bottom	7	19.3	19.3	8.2	8.2	30.2	30.2	80.0	80.3	6.3	6.3		3.3	3.3	6.0	6.9		
SR1	Fine	Calm	08:36	Surface	-	-	-	-	-	-	-	-	-	-	5.9	-	-	-	-	5.3		
				Middle	1.3	19.0	19.0	8.3	8.3	31.4	31.4	73.6	73.9	5.8		5.9	9.4	8.8	5.3		5.3	
				Bottom	-	-	-	-	-	-	-	-	-	-		-	-	-	-		-	-
SR2	Fine	Calm	07:27	Surface	-	-	-	-	-	-	-	-	-	-	6.9	-	-	-	-	4.3		
				Middle	0.6	19.6	19.6	8.2	8.2	30.8	30.8	86.1	87.4	6.8		6.9	3.2	3.3	5.0		3.5	
				Bottom	-	-	-	-	-	-	-	-	-	-		-	-	-	-		-	-
SR3	Fine	Calm	07:13	Surface	-	-	-	-	-	-	-	-	-	-	6.5	-	-	-	-	5.0		
				Middle	0.5	19.5	19.5	8.4	8.4	30.7	30.7	80.5	80.5	6.5		6.5	5.5	5.8	5.0		5.0	
				Bottom	-	-	-	-	-	-	-	-	-	-		-	-	-	-		-	-
SR6	Fine	Calm	09:10	Surface	1	19.6	19.6	8.4	8.4	28.8	28.8	83.7	84.0	6.5	6.5	6.5	3.6	3.7	5.7	3.5	5.8	
				Middle	-	-	-	-	-	-	-	-	-	-	-		-	-	-	-		-
				Bottom	4	19.5	19.5	8.4	8.4	30.0	30.1	84.0	84.3	6.5	6.5		6.5	6.6	5.3	8.5		
SRA	Fine	Calm	07:20	Surface	1	19.5	19.5	8.4	8.4	30.8	30.8	78.0	78.0	6.3	6.3	6.3	9.4	8.9	3.8	4.6	4.3	
				Middle	4	19.5	19.5	8.4	8.4	30.8	30.8	77.9	77.8	6.3	6.3		5.0	5.5	4.1	5.0		
				Bottom	7	19.5	19.5	8.4	8.4	30.8	30.8	77.5	77.5	6.3	6.3		4.9	4.9	4.0	4.4		
ST1	Fine	Calm	07:57	Surface	1	19.3	19.3	8.4	8.4	30.0	30.1	90.0	90.6	7.0	7.0	7.0	5.8	5.7	12.0	11.2	10.9	
				Middle	4.5	19.2	19.2	8.4	8.4	30.1	30.1	89.9	90.1	6.9	7.0		7.9	7.9	12.0	11.0		
				Bottom	8	19.2	19.2	8.4	8.4	30.3	30.3	89.1	89.1	6.9	6.9		20.0	18.4	9.5	9.7		
ST2	Fine	Calm	08:10	Surface	1	19.3	19.3	8.4	8.4	29.9	28.6	81.3	81.9	6.3	6.4	6.6	9.2	9.0	12.6	12.5	12.2	
				Middle	3.5	19.3	19.3	8.4	8.4	30.0	30.0	86.4	86.7	6.7	6.7		12.0	12.4	12.4	13.0		
				Bottom	6	19.3	19.3	8.4	8.4	30.0	30.0	87.4	87.5	6.8	6.8		20.5	20.9	11.6	11.3		
ST3	Fine	Calm	08:30	Surface	1	19.3	19.3	8.4	8.4	28.7	28.8	81.0	81.1	6.5	6.5	6.4	4.3	4.4	4.1	5.1	5.6	
				Middle	7	18.9	18.9	8.4	8.4	30.4	30.5	79.4	79.3	6.3	6.3		5.3	5.4	4.7	6.0		
				Bottom	13	18.8	18.8	8.4	8.4	30.6	30.6	78.1	78.2	6.2	6.2		6.6	6.6	5.7	6.4		

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**APPENDIX I  
DOLPHIN MONITORING REPORT  
(FEBRUARY 2013)**

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**Contract No. HY/2011/09**  
**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road –**  
**Section between HKSAR Boundary and Scenic Hill Dolphin**  
**Monthly Monitoring**

*First Monthly Progress Report (February 2013)*

Submitted by

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

13 March 2013

**1. Introduction**

- 1.1. The Hong Kong Link Road (HKLR) serves to connect the Hong Kong-Zhuhai-Macao Bridge (HZMB) Main Bridge at the Hong Kong Special Administrative Region (HKSAR) Boundary and the HZMB Hong Kong Boundary Crossing Facilities (HKBCF) located at the northeastern waters of the Hong Kong International Airport.
- 1.2. According to the updated Environmental Monitoring and Audit (EM&A) Manual (for HKLR), monthly line-transect vessel surveys for Chinese White Dolphin should be conducted to cover the West Lantau survey area as in AFCD annual marine mammal monitoring programme.
- 1.3. In November 2012, Hong Kong Cetacean Research Project (HKCRP) has been commissioned by Dragages – China Harbour – VSL JV to conduct this 34-month dolphin monitoring study in order to collect data on Chinese White Dolphins during the construction phase (i.e. impact period) of the HKLR09 project in West Lantau (WL) survey area, and to analyze the collected survey data to monitor distribution, encounter rate, abundance, activities and occurrence of dolphin calves. Photo-identification will also be collected from individual Chinese White Dolphins to examine their individual range patterns and core area use.
- 1.4. From the monitoring results, any changes in dolphin occurrence within the study area will be examined for possible causes, and appropriate actions and additional mitigation measures will be recommended as necessary.

1.5. This report is the first monthly progress report under the HKLR09 construction phase dolphin monitoring programme, summarizing the results of the surveys findings during the month of February 2013.

## 2. Monitoring Methodology

### 2.1. Vessel-based Line-transect Survey

2.1.1. According to the requirement of the updated EM&A manual, dolphin monitoring programme should cover all transect lines in WL survey area (see Figure 1) twice per month throughout the entire construction period. The co-ordinates of all transect lines are shown in Table 1.

Table 1. Co-ordinates of transect lines in WL survey area

Line No.		Easting	Northing		Line No.		Easting	Northing
1	Start Point	803750	818500		7	Start Point	799800	810450
1	End Point	803750	815500		7	End Point	801400	810450
2	Start Point	803750	815500		8	Start Point	801300	809450
2	End Point	802860	815500		8	End Point	799500	809450
3	Start Point	801880	814500		9	Start Point	799400	808450
3	End Point	803700	814500		9	End Point	801430	808450
4	Start Point	803200	813600		10	Start Point	801500	807450
4	End Point	801500	813600		10	End Point	799600	807450
5	Start Point	800800	812450		11	Start Point	800300	806500
5	End Point	803300	812450		11	End Point	801750	806500
6	Start Point	802500	811500		12	Start Point	801760	805450
6	End Point	800400	811500		12	End Point	800600	805450

2.1.2. The survey team used standard line-transect methods (Buckland et al. 2001) to conduct the systematic vessel surveys, and followed the same technique of data collection that has been adopted over the last 16 years of marine

mammal monitoring surveys in Hong Kong developed by HKCRP (see Hung 2012). For each monitoring vessel survey, a 15-m inboard vessel (*Standard 31516*) with an open upper deck (about 4.5 m above water surface) was used to make observations from the flying bridge area.

- 2.1.3. Two experienced observers (a data recorder and a primary observer) made up the on-effort survey team, and the survey vessel transited different transect lines at a constant speed of 13-15 km per hour. The data recorder searched with unaided eyes and filled out the datasheets, while the primary observer searched for dolphins and porpoises continuously through 7 x 50 *Steiner* marine binoculars. Both observers searched the sea ahead of the vessel, between 270° and 90° (in relation to the bow, which is defined as 0°). One to two additional experienced observers were available on the boat to work in shift (i.e. rotate every 30 minutes) in order to minimize fatigue of the survey team members. All observers were experienced in small cetacean survey techniques and identifying local cetacean species.
- 2.1.4. During on-effort survey periods, the survey team recorded effort data including time, position (latitude and longitude), weather conditions (Beaufort sea state and visibility), and distance traveled in each series (a continuous period of search effort) with the assistance of a handheld GPS (*Garmin eTrex Legend*).
- 2.1.5. Data including time, position and vessel speed were also automatically and continuously logged by handheld GPS throughout the entire survey for subsequent review.
- 2.1.6. When dolphins were sighted, the survey team would end the survey effort, and immediately record the initial sighting distance and angle of the dolphin group from the survey vessel, as well as the sighting time and position. Then the research vessel was diverted from its course to approach the animals for species identification, group size estimation, assessment of group composition, and behavioural observations. The perpendicular distance (PSD) of the dolphin group to the transect line was later calculated from the initial sighting distance and angle.
- 2.1.7. Survey effort being conducted along the parallel transect lines that were perpendicular to the coastlines (as indicated in Figure 1) was labeled as

“primary” survey effort, while the survey effort being conducted along the connecting lines between parallel lines was labeled as “secondary” survey effort. According to HKCRP long-term dolphin monitoring data, encounter rates of Chinese white dolphins deduced from effort and sighting data collected along primary and secondary lines were similar in survey areas around Lantau Island. Therefore, primary and secondary survey effort were both presented as on-effort survey effort in this report.

- 2.1.8. Encounter rates of Chinese white dolphins (number of on-effort sightings per 100 km of survey effort) were calculated in WL survey area in relation to the amount of survey effort conducted during each month of monitoring survey. Only data collected under Beaufort 3 or below condition would be used for encounter rate analysis. Dolphin encounter rates were calculated using primary survey effort alone, as well as the combined survey effort from both primary and secondary lines.

## 2.2. *Photo-identification Work*

- 2.2.1. When a group of Chinese White Dolphins were sighted during the line-transect survey, the survey team would end effort and approach the group slowly from the side and behind to take photographs of them. Every attempt was made to photograph every dolphin in the group, and even photograph both sides of the dolphins, since the colouration and markings on both sides may not be symmetrical.
- 2.2.2. Two professional digital cameras (*Canon EOS 7D* and *60D* models), each equipped with long telephoto lenses (100-400 mm zoom), were available on board for researchers to take sharp, close-up photographs of dolphins as they surfaced. The images were shot at the highest available resolution and stored on Compact Flash memory cards for downloading onto a computer.
- 2.2.3. All digital images taken in the field were first examined, and those containing potentially identifiable individuals were sorted out. These photographs would then be examined in greater detail, and were carefully compared to the existing Chinese White Dolphin photo-identification catalogue maintained by HKCRP since 1995.
- 2.2.4. Chinese White Dolphins can be identified by their natural markings, such as nicks, cuts, scars and deformities on their dorsal fin and body, and their

unique spotting patterns were also used as secondary identifying features (Jefferson 2000).

- 2.2.5. All photographs of each individual were then compiled and arranged in chronological order, with data including the date and location first identified (initial sighting), re-sightings, associated dolphins, distinctive features, and age classes entered into a computer database.

### **3. Monitoring Results**

#### *3.1. Vessel-based Line-transect Survey*

- 3.1.1. During the month of February 2013, two complete sets of systematic line-transect vessel surveys were conducted on the 19<sup>th</sup> and 25<sup>th</sup>, to cover all transect lines in WL survey area twice. The survey routes of each survey day were presented in Figures 2-3.
- 3.1.2. From these surveys, a total of 65.80 km of survey effort was collected, with 83.3% of the total survey effort being conducted under favourable weather conditions (i.e. Beaufort Sea State 3 or below with good visibility) (Appendix I). Out of the 65.80 km of survey effort, the total survey effort conducted on primary lines (the vertical lines perpendicular to the coastlines) was 43.45 km, while the effort on secondary lines (the lines connecting the primary lines) was 22.35 km. Survey effort conducted on primary and secondary lines were both considered as on-effort survey data.
- 3.1.3. During the monitoring surveys in February 2013, only one group of four Chinese White Dolphins was sighted (Appendix II). The lone dolphin group was associated with an operating shrimp trawler adjacent to the western border of Hong Kong. The dolphins were engaged in feeding activities following closely behind the shrimp trawler.
- 3.1.4. Distribution of dolphin sighting made during February's surveys was shown in Figure 4. The lone dolphin group was sighted in the offshore waters of central portion of West Lantau (Figure 4).
- 3.1.5. No dolphin sighting was made along or near the alignment of HKLR09 during this month's monitoring surveys.
- 3.1.6. During February's surveys, encounter rates of Chinese white dolphins



deduced from the survey effort and on-effort sighting data made under favourable conditions (Beaufort 3 or below) are shown in Table 2.

Table 2 Dolphin encounter rates (sightings per 100 km of survey effort) in February's surveys

	<b>Encounter rate (STG)</b> (no. of on-effort dolphin sightings per 100 km of survey effort)		<b>Encounter rate (ANI)</b> (no. of dolphins from all on-effort sightings per 100 km of survey effort)	
	<b>Primary Lines Only</b>	<b>Both Primary and Secondary Lines</b>	<b>Primary Lines Only</b>	<b>Both Primary and Secondary Lines</b>
<b>West Lantau</b>	2.9	1.8	11.6	7.3

### 3.2. Photo-identification Work

3.2.1. As the single dolphin group was sighted across the Hong Kong-Guangdong Province, no photograph was taken from the dolphins feeding behind the shrimp trawler which was moving away from Hong Kong waters. As a result, no photograph was taken during February's surveys and no photo-identification data can be presented for this month.

### 3.3. Conclusion

3.3.1. During this month of dolphin monitoring, no major marine construction activity was being carried out under this contract. No adverse impact on Chinese white dolphins was noticeable from general observations.

3.3.2. Due to the monthly variation in dolphin occurrence within the study area, it would be more appropriate to draw conclusion on whether any impacts on dolphins have been detected related to the construction activities of this project in the quarterly EM&A report, where comparison on distribution, group size and encounter rates of dolphins between the quarterly impact monitoring period and baseline monitoring period will be made.

## 4. References

- Buckland, S. T., Anderson, D. R., Burnham, K. P., Laake, J. L., Borchers, D. L., and

Thomas, L. 2001. Introduction to distance sampling: estimating abundance of biological populations. Oxford University Press, London.

- Hung, S. K. 2012. Monitoring of marine mammals in Hong Kong waters – data collection: final report (2011-12). An unpublished report submitted to the Agriculture, Fisheries and Conservation Department of Hong Kong SAR Government, 120 pp.
- Jefferson, T. A. 2000. Population biology of the Indo-Pacific hump-backed dolphin in Hong Kong waters. Wildlife Monographs 144:1-65.

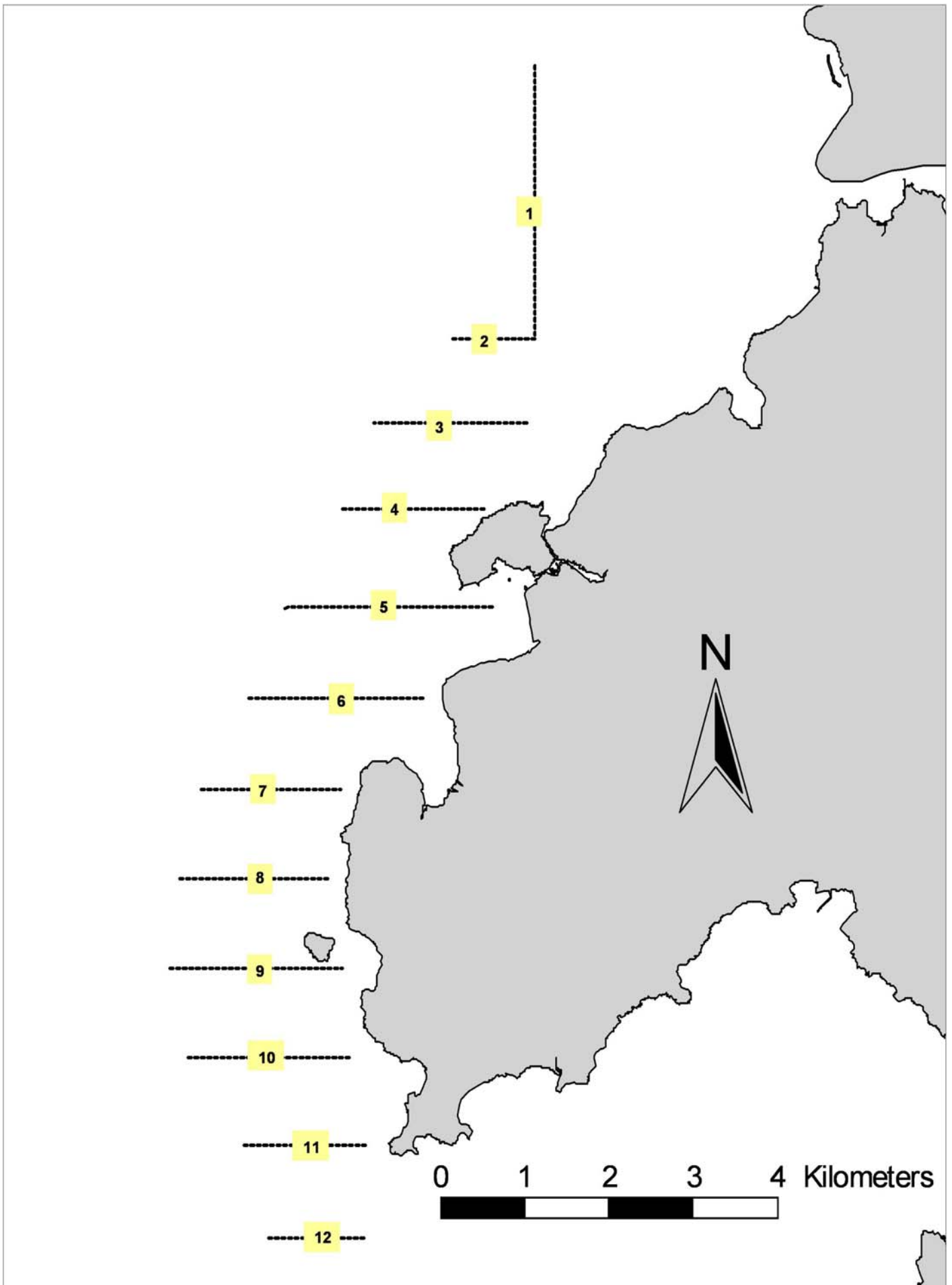


Figure 1. Transect Line Layout in West Lantau Survey Area

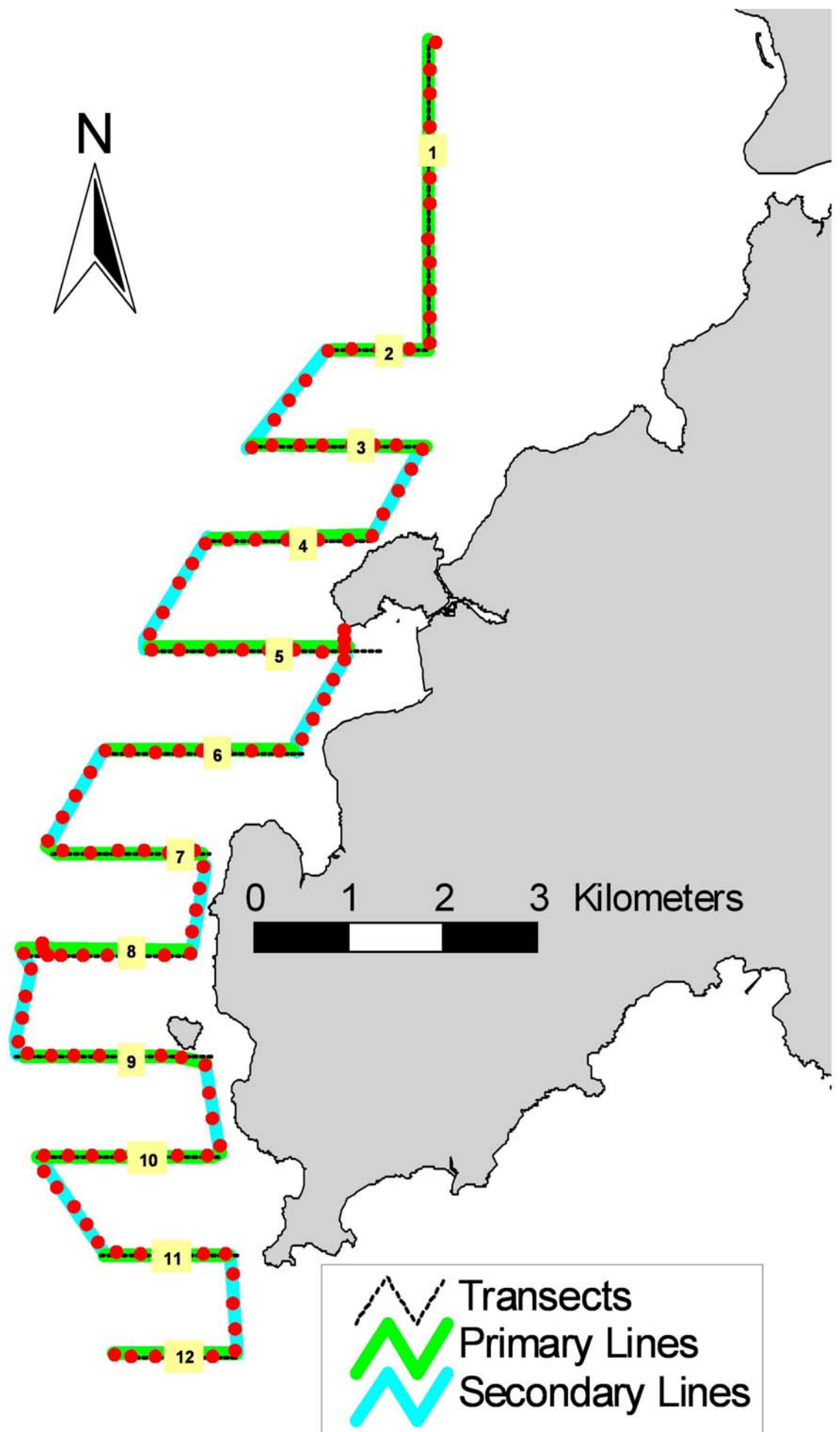


Figure 2. Survey Route on February 19<sup>th</sup>, 2013 (note: red dots represent the tracked positions of survey boat logged continuously by GPS throughout the course of the survey)

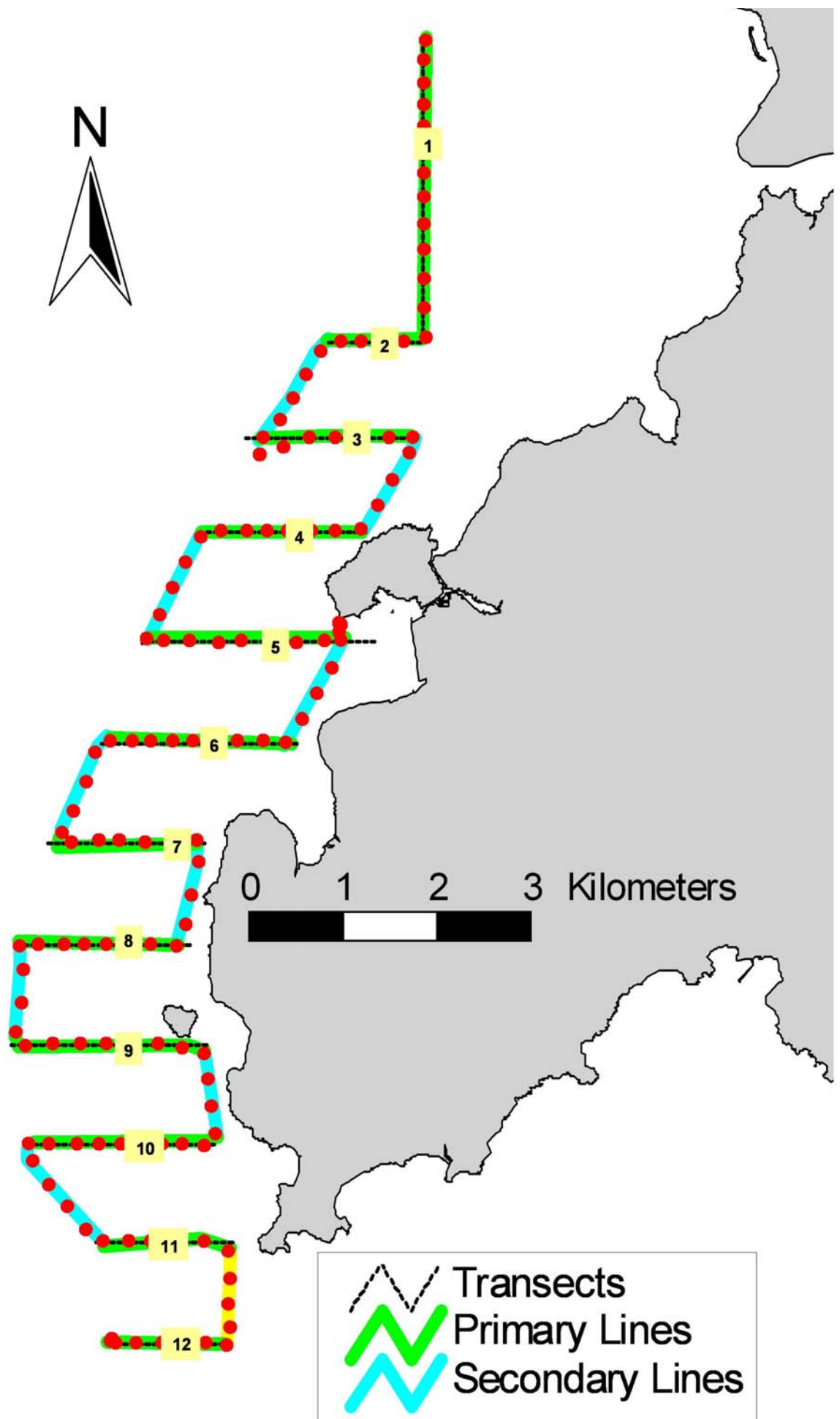


Figure 3. Survey Route on February 25<sup>th</sup>, 2013 (note: red dots represent the tracked positions of survey boat logged continuously by GPS throughout the course of the survey)

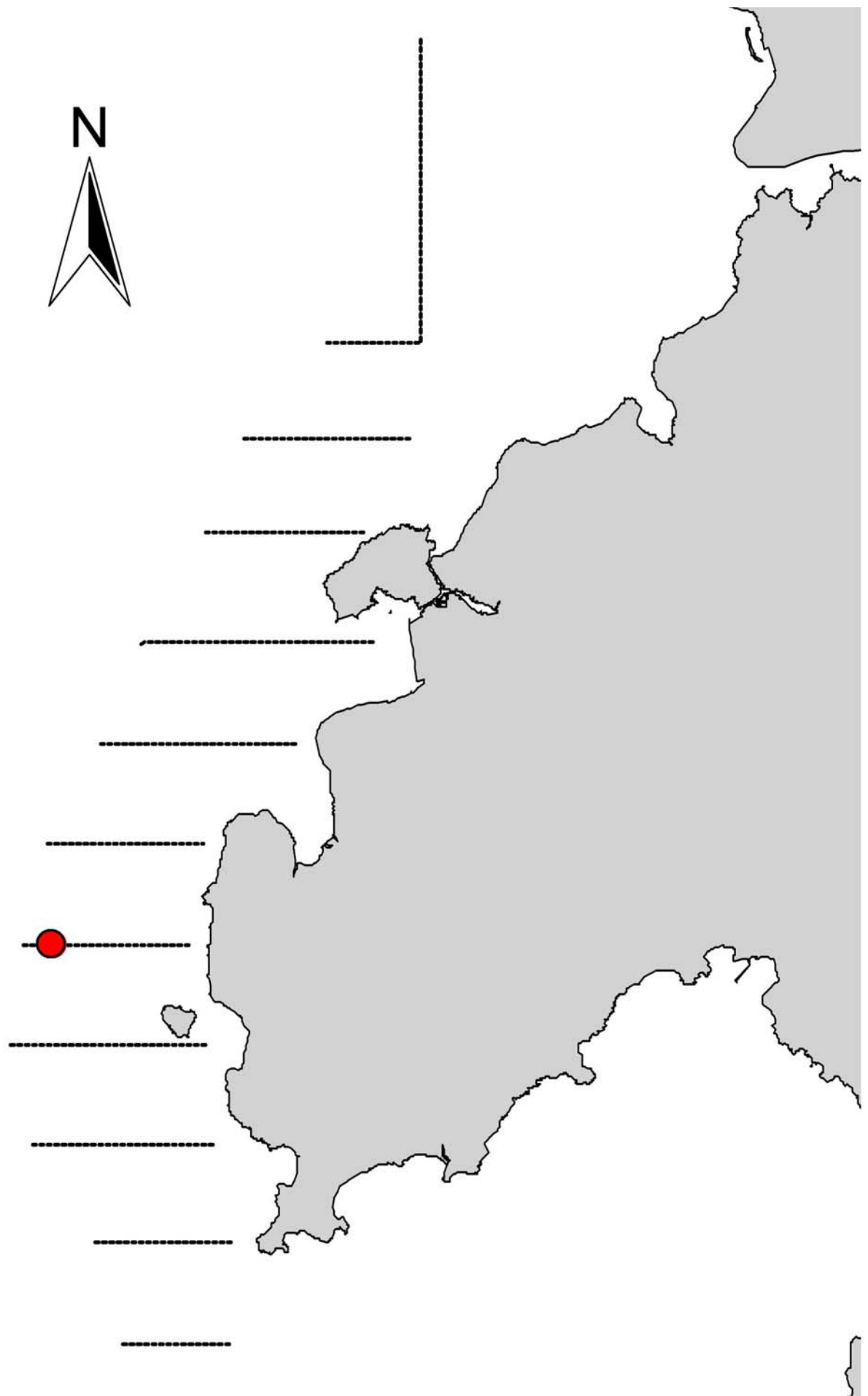


Figure 4. Distribution of Chinese White Dolphin Sighting During February 2013 HKLR09 Monitoring Surveys

## Appendix I. HKLR09 Survey Effort Database (February 2013)

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

DATE	AREA	BEAU	EFFORT	SEASON	VESSEL	TYPE	P/S
19-Feb-13	W LANTAU	0	6.0	WINTER	STANDARD31516	HKLR	P
19-Feb-13	W LANTAU	1	7.5	WINTER	STANDARD31516	HKLR	P
19-Feb-13	W LANTAU	2	3.1	WINTER	STANDARD31516	HKLR	P
19-Feb-13	W LANTAU	3	5.1	WINTER	STANDARD31516	HKLR	P
19-Feb-13	W LANTAU	0	2.4	WINTER	STANDARD31516	HKLR	S
19-Feb-13	W LANTAU	1	3.4	WINTER	STANDARD31516	HKLR	S
19-Feb-13	W LANTAU	2	3.1	WINTER	STANDARD31516	HKLR	S
19-Feb-13	W LANTAU	3	2.2	WINTER	STANDARD31516	HKLR	S
25-Feb-13	W LANTAU	2	6.2	WINTER	STANDARD31516	HKLR	P
25-Feb-13	W LANTAU	3	6.8	WINTER	STANDARD31516	HKLR	P
25-Feb-13	W LANTAU	4	8.8	WINTER	STANDARD31516	HKLR	P
25-Feb-13	W LANTAU	2	6.3	WINTER	STANDARD31516	HKLR	S
25-Feb-13	W LANTAU	3	2.7	WINTER	STANDARD31516	HKLR	S
25-Feb-13	W LANTAU	4	2.2	WINTER	STANDARD31516	HKLR	S

## Appendix II. HKLR09 Chinese White Dolphin Sighting Database (February 2013)

(Abbreviations: STG# = Sighting Number; HRD SZ = Dolphin Herd Size; BEAU = Beaufort Sea State; PSD = Perpendicular Distance; ND = Not Determined; BOAT ASSOC. = Fishing Boat Association; P/S: Sighting Made on Primary/Secondary Line)

DATE	STG #	TIME	HRD SZ	AREA	BEAU	PSD	EFFORT	TYPE	NORTHING	EASTING	SEASON	BOAT ASSOC.	P/S
19-Feb-13	1	1159	4	W LANTAU	3	533	ON	HKLR	809434	799834	WINTER	SHRIMP	P



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**APPENDIX J**  
**WIND DATA**

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## Appendix J - Wind Data

Date	Time	Wind Speed m/s	Direction
22-Feb-2013	00:00	1.1	WNW
22-Feb-2013	01:00	0.6	NW
22-Feb-2013	02:00	0.5	NW
22-Feb-2013	03:00	0.7	W
22-Feb-2013	04:00	0.5	SSW
22-Feb-2013	05:00	0.6	SW
22-Feb-2013	06:00	0.7	SW
22-Feb-2013	07:00	0.4	SW
22-Feb-2013	08:00	1.6	NNE
22-Feb-2013	09:00	2	WSW
22-Feb-2013	10:00	2	SW
22-Feb-2013	11:00	2.4	WNW
22-Feb-2013	12:00	3.4	ENE
22-Feb-2013	13:00	3.4	SW
22-Feb-2013	14:00	3	SW
22-Feb-2013	15:00	2.3	WSW
22-Feb-2013	16:00	2.3	E
22-Feb-2013	17:00	2	SW
22-Feb-2013	18:00	1.8	WSW
22-Feb-2013	19:00	1.3	SW
22-Feb-2013	20:00	1.1	N
22-Feb-2013	21:00	1	WSW
22-Feb-2013	22:00	0.8	SW
22-Feb-2013	23:00	0.7	W
23-Feb-2013	00:00	0.9	W
23-Feb-2013	01:00	0.9	WNW
23-Feb-2013	02:00	1.1	WNW
23-Feb-2013	03:00	0.8	WNW
23-Feb-2013	04:00	0.7	W
23-Feb-2013	05:00	0.9	W
23-Feb-2013	06:00	0.9	WNW
23-Feb-2013	07:00	0.9	WSW
23-Feb-2013	08:00	1.2	N
23-Feb-2013	09:00	3.3	WNW
23-Feb-2013	10:00	3.5	SSW
23-Feb-2013	11:00	3.3	SW
23-Feb-2013	12:00	2.9	SSW
23-Feb-2013	13:00	3.1	SW
23-Feb-2013	14:00	2.7	W
23-Feb-2013	15:00	2	WSW
23-Feb-2013	16:00	2.4	N
23-Feb-2013	17:00	1.9	NE
23-Feb-2013	18:00	1.4	NNE
23-Feb-2013	19:00	1.1	ENE
23-Feb-2013	20:00	1.1	NE
23-Feb-2013	21:00	0.8	SW
23-Feb-2013	22:00	0.4	NNE
23-Feb-2013	23:00	0.4	NE
24-Feb-2013	00:00	0.4	NNE
24-Feb-2013	01:00	0.6	SSE
24-Feb-2013	02:00	0.3	ENE
24-Feb-2013	03:00	0.3	ENE
24-Feb-2013	04:00	0.3	ESE
24-Feb-2013	05:00	0.3	ENE

## Appendix J - Wind Data

Date	Time	Wind Speed m/s	Direction
24-Feb-2013	06:00	0.3	W
24-Feb-2013	07:00	0.2	NE
24-Feb-2013	08:00	0.5	WSW
24-Feb-2013	09:00	1.5	SSW
24-Feb-2013	10:00	1.8	WNW
24-Feb-2013	11:00	2.3	NNE
24-Feb-2013	12:00	1.8	ESE
24-Feb-2013	13:00	1.9	E
24-Feb-2013	14:00	2.1	SE
24-Feb-2013	15:00	2.8	N
24-Feb-2013	16:00	2.8	N
24-Feb-2013	17:00	1.7	SW
24-Feb-2013	18:00	1.4	WNW
24-Feb-2013	19:00	0.9	WNW
24-Feb-2013	20:00	0.4	SW
24-Feb-2013	21:00	0.5	NW
24-Feb-2013	22:00	0.7	WNW
24-Feb-2013	23:00	0.9	W
25-Feb-2013	00:00	0.7	WNW
25-Feb-2013	01:00	0.5	WNW
25-Feb-2013	02:00	0.7	WNW
25-Feb-2013	03:00	0.5	WSW
25-Feb-2013	04:00	0.5	WNW
25-Feb-2013	05:00	0.7	WNW
25-Feb-2013	06:00	0.4	WNW
25-Feb-2013	07:00	0.3	WNW
25-Feb-2013	08:00	0.8	WNW
25-Feb-2013	09:00	1.7	SW
25-Feb-2013	10:00	2.5	WSW
25-Feb-2013	11:00	2.6	WSW
25-Feb-2013	12:00	2.5	WNW
25-Feb-2013	13:00	2.3	WNW
25-Feb-2013	14:00	2.3	W
25-Feb-2013	15:00	2.1	W
25-Feb-2013	16:00	2.3	WNW
25-Feb-2013	17:00	2.6	SW
25-Feb-2013	18:00	2.2	WNW
25-Feb-2013	19:00	2.2	W
25-Feb-2013	20:00	1.9	SSW
25-Feb-2013	21:00	1.6	WNW
25-Feb-2013	22:00	2.1	WNW
25-Feb-2013	23:00	1.3	WSW
26-Feb-2013	00:00	2.4	WNW
26-Feb-2013	01:00	2.1	WNW
26-Feb-2013	02:00	1	SW
26-Feb-2013	03:00	1.1	WSW
26-Feb-2013	04:00	1.2	SW
26-Feb-2013	05:00	1.9	WSW
26-Feb-2013	06:00	1.6	WSW
26-Feb-2013	07:00	2	WNW
26-Feb-2013	08:00	2.9	WNW
26-Feb-2013	09:00	3.4	WNW
26-Feb-2013	10:00	2.8	WNW
26-Feb-2013	11:00	3.9	W

## Appendix J - Wind Data

Date	Time	Wind Speed m/s	Direction
26-Feb-2013	12:00	3.3	W
26-Feb-2013	13:00	3.6	W
26-Feb-2013	14:00	3.4	W
26-Feb-2013	15:00	3.7	W
26-Feb-2013	16:00	3.5	WSW
26-Feb-2013	17:00	3.2	WNW
26-Feb-2013	18:00	3.3	WSW
26-Feb-2013	19:00	2.9	SW
26-Feb-2013	20:00	2.4	WSW
26-Feb-2013	21:00	2.3	WNW
26-Feb-2013	22:00	2.4	WSW
26-Feb-2013	23:00	2.9	W
27-Feb-2013	00:00	1.4	WSW
27-Feb-2013	01:00	1.7	W
27-Feb-2013	02:00	1.6	WSW
27-Feb-2013	03:00	1.6	WNW
27-Feb-2013	04:00	1.3	SSW
27-Feb-2013	05:00	1	WNW
27-Feb-2013	06:00	1.3	WNW
27-Feb-2013	07:00	1.1	SW
27-Feb-2013	08:00	0.8	W
27-Feb-2013	09:00	1.1	WSW
27-Feb-2013	10:00	1.2	WSW
27-Feb-2013	11:00	1.6	WSW
27-Feb-2013	12:00	1.6	WSW
27-Feb-2013	13:00	1.3	WSW
27-Feb-2013	14:00	1.7	WNW
27-Feb-2013	15:00	2.1	WSW
27-Feb-2013	16:00	1.9	WSW
27-Feb-2013	17:00	1.4	W
27-Feb-2013	18:00	0.9	WNW
27-Feb-2013	19:00	1.2	WNW
27-Feb-2013	20:00	1	WSW
27-Feb-2013	21:00	0.7	ESE
27-Feb-2013	22:00	1.7	WSW
27-Feb-2013	23:00	1.4	W
28-Feb-2013	00:00	2.1	W
28-Feb-2013	01:00	1.4	WNW
28-Feb-2013	02:00	1.7	W
28-Feb-2013	03:00	2.1	WNW
28-Feb-2013	04:00	2.1	W
28-Feb-2013	05:00	1.8	SSE
28-Feb-2013	06:00	1.3	SSW
28-Feb-2013	07:00	1.3	WNW
28-Feb-2013	08:00	1.3	W
28-Feb-2013	09:00	1.9	W
28-Feb-2013	10:00	1.8	W
28-Feb-2013	11:00	1.8	WNW
28-Feb-2013	12:00	2.5	W
28-Feb-2013	13:00	2.6	W
28-Feb-2013	14:00	1.8	WNW
28-Feb-2013	15:00	2.1	NW
28-Feb-2013	16:00	1.8	W
28-Feb-2013	17:00	1.5	SW

## Appendix J - Wind Data

Date	Time	Wind Speed m/s	Direction
28-Feb-2013	18:00	1.4	W
28-Feb-2013	19:00	1.3	NNW
28-Feb-2013	20:00	1.9	W
28-Feb-2013	21:00	1.8	SW
28-Feb-2013	22:00	2	W
28-Feb-2013	23:00	1.8	WNW

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**APPENDIX K  
EVENT ACTION PLANS**

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## Event / Action Plan for Air Quality

EVENT	ACTION			
	ET	IEC	SO	CONTRACTOR
<b>ACTION LEVEL</b>				
1. Exceedance for one sample	<ol style="list-style-type: none"> <li>1. Identify source, investigate the causes of exceedance and propose remedial measures;</li> <li>2. Inform IEC and SO;</li> <li>3. Repeat measurement to confirm finding;</li> <li>4. Increase monitoring frequency to daily.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method.</li> </ol>	<ol style="list-style-type: none"> <li>1. Notify Contractor.</li> </ol>	<ol style="list-style-type: none"> <li>1. Rectify any unacceptable practice;</li> <li>2. Amend working methods if appropriate.</li> </ol>
2. Exceedance for two or more consecutive samples	<ol style="list-style-type: none"> <li>1. Identify source;</li> <li>2. Inform IEC and SO;</li> <li>3. Advise the SO on the effectiveness of the proposed remedial measures;</li> <li>4. Repeat measurements to confirm findings;</li> <li>5. Increase monitoring frequency to daily;</li> <li>6. Discuss with IEC and Contractor on remedial actions required;</li> <li>7. If exceedance continues, arrange meeting with IEC and SO;</li> <li>8. If exceedance stops, cease additional monitoring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method;</li> <li>3. Discuss with ET and Contractor on possible remedial measures;</li> <li>4. Advise the ET on the effectiveness of the proposed remedial measures;</li> <li>5. Supervise Implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> </ol>	<ol style="list-style-type: none"> <li>1. Submit proposals for remedial to SO within 3 working days of notification;</li> <li>2. Implement the agreed proposals;</li> <li>3. Amend proposal if appropriate.</li> </ol>

**LIMIT LEVEL**

<p>1.Exceedance for one sample</p>	<ol style="list-style-type: none"> <li>1. Identify source, investigate the causes of exceedance and propose remedial measures;</li> <li>2. Inform SO, Contractor and EPD;</li> <li>3. Repeat measurement to confirm finding;</li> <li>4. Increase monitoring frequency to daily;</li> <li>5. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and SO informed of the results.</li> </ol>	<ol style="list-style-type: none"> <li>1. Check monitoring data submitted by ET;</li> <li>2. Check Contractor's working method;</li> <li>3. Discuss with ET and Contractor on possible remedial measures;</li> <li>4. Advise the SO on the effectiveness of the proposed remedial measures;</li> <li>5. Supervise implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. Ensure remedial measures properly implemented.</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance;</li> <li>2. Submit proposals for remedial actions to IEC within 3 working days of notification;</li> <li>3. Implement the agreed proposals;</li> <li>4. Amend proposal if appropriate.</li> </ol>
<p>2.Exceedance for two or more consecutive samples</p>	<ol style="list-style-type: none"> <li>1. Notify IEC, SO, Contractor and EPD;</li> <li>2. Identify source;</li> <li>3. Repeat measurement to confirm findings;</li> <li>4. Increase monitoring frequency to daily;</li> <li>5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented;</li> <li>6. Arrange meeting with IEC and SO to discuss the remedial actions to</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss amongst SO, ET, and Contractor on the potential remedial actions;</li> <li>2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the SO accordingly;</li> <li>3. Supervise the implementation of remedial</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. In consultation with the IEC, agree with the Contractor on the remedial measures to be implemented;</li> <li>4. Ensure remedial measures properly implemented;</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance;</li> <li>2. Submit proposals for remedial actions to IEC within 3 working days of notification;</li> <li>3. Implement the agreed proposals;</li> <li>4. Resubmit proposals if problem still not under control;</li> <li>5. Stop the relevant portion of works as determined by the SO until the exceedance is</li> </ol>



	<p>be taken;</p> <p>7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and SO informed of the results;</p> <p>8. If exceedance stops, cease additional monitoring.</p>	<p>measures.</p>	<p>5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.</p>	<p>abated.</p>
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## Event / Action Plan for Construction Noise

EVENT	ACTION			
	ET	IEC	SO	CONTRACTOR
Action Level	<ol style="list-style-type: none"> <li>1. Identify source, investigate the causes of exceedance and propose remedial measures;</li> <li>2. Notify IEC and Contractor;</li> <li>3. Report the results of investigation to the IEC, SO and Contractor;</li> <li>4. Discuss with the Contractor and formulate remedial measures;</li> <li>5. Increase monitoring frequency to check mitigation effectiveness.</li> </ol>	<ol style="list-style-type: none"> <li>1. Review the analysed results submitted by the ET;</li> <li>2. Review the proposed remedial measures by the Contractor and advise the SO accordingly;</li> <li>3. Supervise the implementation of remedial measures.</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. Require Contractor to propose remedial measures for the analysed noise problem;</li> <li>4. Ensure remedial measures are properly implemented</li> </ol>	<ol style="list-style-type: none"> <li>1. Submit noise mitigation proposals to IEC;</li> <li>2. Implement noise mitigation proposals.</li> </ol>
Limit Level	<ol style="list-style-type: none"> <li>1. Identify source;</li> <li>2. Inform IEC, SO, EPD and Contractor;</li> <li>3. Repeat measurements to confirm findings;</li> <li>4. Increase monitoring frequency;</li> <li>5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented;</li> <li>6. Inform IEC, SO and EPD</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss amongst SO, ET, and Contractor on the potential remedial actions;</li> <li>2. Review Contractors remedial actions whenever necessary to assure their effectiveness and advise the SO accordingly;</li> <li>3. Supervise the implementation of</li> </ol>	<ol style="list-style-type: none"> <li>1. Confirm receipt of notification of failure in writing;</li> <li>2. Notify Contractor;</li> <li>3. Require Contractor to propose remedial measures for the analysed noise</li> </ol>	<ol style="list-style-type: none"> <li>1. Take immediate action to avoid further exceedance;</li> <li>2. Submit proposals for remedial actions to IEC within 3 working days of notification;</li> <li>3. Implement the agreed proposals;</li> <li>4. Resubmit proposals if problem still not under control;</li> </ol>

EVENT	ACTION			
	ET	IEC	SO	CONTRACTOR
	<p>the causes and actions taken for the exceedances;</p> <p>7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and SO informed of the results;</p> <p>8. If exceedance stops, cease additional monitoring.</p>	<p>remedial measures.</p>	<p>problem;</p> <p>4. Ensure remedial measures properly implemented;</p> <p>5. If exceedance continues, consider what portion of the work is responsible and instruct the Contractor to stop that portion of work until the exceedance is abated.</p>	<p>5. Stop the relevant portion of works as determined by the SO until the exceedance is abated.</p>

### Event and Action Plan for Water Quality

Event	ET Leader	IEC	SO	Contractor
Action level being exceeded by one sampling day	<p>Repeat <i>in situ</i> measurement on next day of exceedance to confirm findings;</p> <p>Identify source(s) of impact;</p> <p>Inform IEC, contractor and SO;</p> <p>Check monitoring data, all plant, equipment and Contractor's working methods.</p>	<p>Check monitoring data submitted by ET and Contractor's working methods.</p>	<p>Confirm receipt of notification of non-compliance in writing;</p> <p>Notify Contractor.</p>	<p>Inform the SO and confirm notification of the non-compliance in writing;</p> <p>Rectify unacceptable practice;</p> <p>Amend working methods if appropriate.</p>
Action level being exceeded by two or more consecutive sampling days	<p>Repeat measurement on next day of exceedance to confirm findings;</p> <p>Identify source(s) of impact;</p> <p>Inform IEC, contractor, SO and EPD;</p> <p>Check monitoring data, all plant, equipment and Contractor's working methods;</p> <p>Ensure mitigation measures are implemented;</p> <p>Increase the monitoring frequency to daily until no exceedance of Action level;</p>	<p>Check monitoring data submitted by ET and Contractor's working method;</p> <p>Discuss with ET and Contractor on possible remedial actions;</p> <p>Review the proposed mitigation measures submitted by Contractor and advise the SO accordingly;</p> <p>Supervise the implementation of mitigation measures.</p>	<p>Discuss with IEC on the proposed mitigation measures;</p> <p>Ensure mitigation measures are properly implemented;</p> <p>Assess the effectiveness of the implemented mitigation measures.</p>	<p>Inform the Supervising Officer and confirm notification of the non-compliance in writing;</p> <p>Rectify unacceptable practice;</p> <p>Check all plant and equipment and consider changes of working methods;</p> <p>Submit proposal of additional mitigation measures to SO within 3 working days of notification and discuss with ET, IEC and SO;</p> <p>Implement the agreed mitigation measures.</p>
Limit level being exceeded by one sampling day	<p>Repeat measurement on next day of exceedance to confirm findings;</p> <p>Identify source(s) of impact;</p> <p>Inform IEC, contractor, SO and EPD;</p> <p>Check monitoring data, all plant, equipment and Contractor's working methods;</p> <p>Discuss mitigation measures with IEC, SO and Contractor;</p>	<p>Check monitoring data submitted by ET and Contractor's working method;</p> <p>Discuss with ET and Contractor on possible remedial actions;</p> <p>Review the proposed mitigation measures submitted by Contractor and advise the SO accordingly.</p>	<p>Confirm receipt of notification of failure in writing;</p> <p>Discuss with IEC, ET and Contractor on the proposed mitigation measures;</p> <p>Request Contractor to review the working methods.</p>	<p>Inform the SO and confirm notification of the non-compliance in writing;</p> <p>Rectify unacceptable practice;</p> <p>Check all plant and equipment and consider changes of working methods;</p> <p>Submit proposal of mitigation measures to SO within 3 working days of notification and discuss with ET, IEC and SO.</p>

Event	ET Leader	IEC	SO	Contractor
<p>Limit level being exceeded by two or more consecutive sampling days</p>	<p>Repeat measurement on next day of exceedance to confirm findings;</p> <p>Identify source(s) of impact;</p> <p>Inform IEC, contractor, SO and EPD;</p> <p>Check monitoring data, all plant, equipment and Contractor's working methods;</p> <p>Discuss mitigation measures with IEC, SO and Contractor;</p> <p>Ensure mitigation measures are implemented;</p>	<p>Check monitoring data submitted by ET and Contractor's working method;</p> <p>Discuss with ET and Contractor on possible remedial actions;</p> <p>Review the Contractor's mitigation measures whenever necessary to assure their effectiveness and advise the SO accordingly;</p> <p>Supervise the implementation of mitigation measures.</p>	<p>Discuss with IEC, ET and Contractor on the proposed mitigation measures;</p> <p>Request Contractor to critically review the working methods;</p> <p>Make agreement on the mitigation measures to be implemented;</p> <p>Ensure mitigation measures are properly implemented;</p> <p>Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the construction activities until no exceedance of Limit level.</p>	<p>Take immediate action to avoid further exceedance;</p> <p>Submit proposal of mitigation measures to SO within 3 working days of notification and discuss with ET, IEC and SO;</p> <p>Implement the agreed mitigation measures;</p> <p>Resubmit proposals of mitigation measures if problem still not under control;</p> <p>As directed by the Supervising Officer, to slow down or to stop all or part of the construction activities until no exceedance of Limit level.</p>

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**APPENDIX L**  
**SUMMARY OF EXCEEDANCE**

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**Contract No. HY/2011/09**

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road –  
Section between HKSAR Boundary and Scenic Hill**

**Exceedance Report**

**(A) Exceedance Report for Air Quality (1 hour TSP)**  
(NIL in the reporting period)

**(B) Exceedance Report for Air Quality (24 hours TSP)**  
(NIL in the reporting period)

**(C) Exceedance Report for Construction Noise**  
(NIL in the reporting period)

**(D) Exceedance Report for Water Quality**

<b>Environmental Monitoring</b>	<b>Parameter</b>	<b>No. of Exceedance</b>		<b>No. of Exceedance related to the Construction Activities of this Contract</b>	
		<b>Action Level</b>	<b>Limit Level</b>	<b>Action Level</b>	<b>Limit Level</b>
Water Quality	Dissolved Oxygen (DO) (Surface & Middle)	7	6	0	0
	Dissolved Oxygen (DO) (Bottom)	10	0	0	0
	Turbidity	7	26	0	0
	Suspended Solids (SS)	5	30	0	0

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

Date of Water Quality Monitoring: 22 February 2013

**Part A – Exceedance Summary Tables**

**Table I: Parameter(s) – Dissolved Oxygen (DO) / ~~Turbidity (TURB)~~ / ~~Suspended Solids (SS)~~**

Station(s)	Tide	Baseline Action Level	Baseline Limit Level	Baseline Action Level	Baseline Limit Level	Dissolved Oxygen (mg/L)		Justification*	Validity (Yes/No)
		Surface and Middle		Bottom		Surface and Middle	Bottom		
ST3	Mid-ebb	5.0	4.2	4.7	3.6	<b><i>4.5</i></b>	<b><i>4.6</i></b>	(1), & (5)	No
IS3	Mid-flood					<b><i>4.8</i></b>	-	(1), (3), & (5)	No
SR1						<b><i>3.7</i></b>	-	(1), (3), (4) & (5)	No
SR2						<b><i>4.0</i></b>	-	(1), (3), & (5)	No
SR3						<b><i>3.7</i></b>	-	(1), (3), & (5)	No
SR6						-	<b><i>4.5</i></b>	(1), (3), & (5)	No
SRA						<b><i>4.1</i></b>	<b><i>4.4</i></b>	(1), (3), & (5)	No
ST1						-	<b><i>4.6</i></b>	(1), (3), & (5)	No
ST2						-	<b><i>4.5</i></b>	(1), (3), & (5)	No
ST3						<b><i>4.1</i></b>	<b><i>3.7</i></b>	(1), (3), (4) & (5)	No

Note: ***Bold Italic*** means Action Level exceedance  
***Bold Italic with underline*** means Limit Level exceedance

- \*Remarks
- (1) – No major marine construction activity was conducted.
  - (2) – No pollution discharge from construction activity was observed.
  - (3) – Control Station value already exceeded either the Baseline Action or Limit Levels.
  - (4) – Monitoring station is situated at the upstream of the construction sites.
  - (5) – Other(s): Please specify - Only GI works were being carried out during the sampling period.



**Contract No. HY/2011/09**

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Part B – Conclusion:** No direct evidence that the exceedances were due to the Contract, therefore the exceedances are considered due to the other external factors rather than the contract works.

**Part C – Recommendation:** As the exceedances were not related to the contract works, no further action to be required.

Contract No. HY/2011/09

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Location Plan:**



Reviewed by: Dr. H.F. Chan

Title: Environmental Team Leader

Date: 6 March 2013

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

Date of Water Quality Monitoring: 22 February 2013

**Part A – Exceedance Summary Tables**

**Table I: Parameter(s) – ~~Dissolved Oxygen (DO)~~ / Turbidity (TURB) / ~~Suspended Solids (SS)~~**

Station(s)	Tide	Baseline Action Level (NTU)	Baseline Limit Level (NTU)	Control Station(s)	Depth-average Value at Control Stations (NTU)	120% of Control Station Action Level (NTU)	130% of Control Station Limit Level (NTU)	Depth-average Measured Value (NTU)	Justification*	Validity (Yes/No)
IS1	Mid-ebb	27.5	47.0	CS2	2.9	3.5	3.8	<u>5.7</u>	(1), (4) & (6)	No
IS2								<u>4.8</u>	(1), (4) & (6)	No
SR2								<u>6.4</u>	(1), (4) & (6)	No
SR3								<u>4.2</u>	(1), (4) & (6)	No
SR6								<u>4.1</u>	(1), (4), (5) & (6)	No
ST1								<u>5.8</u>	(1), (4) & (6)	No
ST2								<u>4.0</u>	(1), (4), (5) & (6)	No
ST3								<u>3.9</u>	(1), (4) & (6)	No
IS1	Mid-flood	27.5	47.0	CS1	2.1	2.5	2.7	<u>4.8</u>	(1), (4) & (6)	No
IS2								<u>4.4</u>	(1), (4) & (6)	No
IS3								<u>3.9</u>	(1), (4) & (6)	No
IS4								<u>3.0</u>	(1), (4) & (6)	No
SR1								<u>8.1</u>	(1), (4), (5) & (6)	No
SR2								<u>4.6</u>	(1), (4) & (6)	No
SR3								<u>2.7</u>	(1), (4) & (6)	No
SR6								<u>5.6</u>	(1), (4) & (6)	No
ST1	<u>5.1</u>	(1), (4) & (6)	No							
ST2	<u>3.7</u>	(1), (4) & (6)	No							

Note: ***Bold Italic*** means Action Level exceedance  
***Bold Italic with underline*** means Limit Level exceedance

**Contract No. HY/2011/09**

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

- \*Remarks
- (1) – No major marine construction activity was conducted.
  - (2) – No pollution discharge from construction activity was observed.
  - (3) – Control Station value already exceeded either the Baseline Action or Limit Levels.
  - (4) – The exceeded results were similar or within the ranges baseline monitoring results. (Please refer to Table II & Table III)
  - (5) – Monitoring station is situated at the upstream of the construction sites.
  - (6) – Other(s): Please specify - Only GI works were being carried out during the sampling period.

**Table II – Summary of Baseline Water Quality Monitoring Results during Mid-Ebb Tide**

Station(s)	Turbidity (NTU)	
	Min	Max
IS1	5.1	41.7
IS2	6.7	24.0
SR2	3.9	23.5
SR3	4.6	65.7
SR6	6.1	37.0
ST1	6.2	27.8
ST2	8.7	33.8
ST3	5.1	157.6

**Table III – Summary of Baseline Water Quality Monitoring Results during Mid-Flood Tide**

Station(s)	Turbidity (NTU)	
	Min	Max
IS1	5.8	99.3
IS2	7.0	39.4
IS3	7.8	29.4
IS4	9.1	29.2
SR1	5.7	37.2
SR2	8.0	22.9
SR3	7.7	19.7
SR6	7.3	45.7
ST1	6.4	34.7
ST2	7.7	33.6

**Contract No. HY/2011/09**

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Part B – Conclusion:** No direct evidence that the exceedances were due to the Contract, therefore the exceedances are considered due to the other external factors rather than the contract works.

**Part C – Recommendation:** As the exceedances were not related to the contract works, no further action to be required.

Contract No. HY/2011/09

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Location Plan:**



Reviewed by: Dr. H.F. Chan

Title: Environmental Team Leader

Date: 6 March 2013

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

Date of Water Quality Monitoring: 22 February 2013

**Part A – Exceedance Summary Tables**

**Table I: Parameter(s) – ~~Dissolved Oxygen (DO)~~ / Turbidity (TURB) / Suspended Solids (SS)**

Station(s)	Tide	Baseline Action Level (mg/L)	Baseline Limit Level (mg/L)	Control Station(s)	Depth-average Value at Control Stations (mg/L)	120% of Control Station Action Level (mg/L)	130% of Control Station Limit Level (mg/L)	Depth-average Measured Value (mg/L)	Justification*	Validity (Yes/No)
IS1	Mid-ebb	23.5	34.4	CS2	2.8	3.4	3.6	<b><u>3.8</u></b>	(1), (4) & (6)	No
IS3								<b><u>4.0</u></b>	(1), (4) & (6)	No
SR1								<b><u>4.6</u></b>	(1), (4) & (6)	No
SR2								<b><u>4.5</u></b>	(1), (4) & (6)	No
SR3								<b><u>6.3</u></b>	(1), (4) & (6)	No
SRA								<b><u>3.5</u></b>	(1), (4) & (6)	No
ST1								<b><u>4.7</u></b>	(1), (4) & (6)	No
ST3								<b><u>3.7</u></b>	(1), (4) & (6)	No
IS1	Mid-flood	23.5	34.4	CS1	2.9	3.5	3.8	<b><u>4.1</u></b>	(1), (4) & (6)	No
IS2								<b><u>3.8</u></b>	(1), (4) & (6)	No
IS3								<b><u>3.8</u></b>	(1), (4) & (6)	No
SR1								<b><u>7.9</u></b>	(1), (4), (5) & (6)	No
SR2								<b><u>5.7</u></b>	(1), (4) & (6)	No
SR3								<b><u>5.4</u></b>	(1), (4) & (6)	No
ST1								<b><u>5.1</u></b>	(1), (4) & (6)	No
ST3								<b><u>3.7</u></b>	(1), (4), (5) & (6)	No

Note: ***Bold Italic*** means Action Level exceedance  
***Bold Italic with underline*** means Limit Level exceedance

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

- \*Remarks
- (1) – No major marine construction activity was conducted.
  - (2) – No pollution discharge from construction activity was observed.
  - (3) – Control Station value already exceeded either the Baseline Action or Limit Levels.
  - (4) – The exceeded results were similar or within the ranges baseline monitoring results. (Please refer to Table II & Table III)
  - (5) – Monitoring station is situated at the upstream of the construction sites.
  - (6) – Other(s): Please specify - Only GI works were being carried out during the sampling period.

**Table II – Summary of Baseline Water Quality Monitoring Results during Mid-Ebb Tide**

Station(s)	Suspended Solids (mg/L)	
	Min	Max
IS1	6.3	19.5
IS3	10.0	28.3
SR1	6.5	39.5
SR2	7.0	53.0
SR3	6.7	31.0
SRA	3.5	17.3
ST1	7.0	25.5
ST3	6.0	31.0

**Table III – Summary of Baseline Water Quality Monitoring Results during Mid-Flood Tide**

Station(s)	Suspended Solids (mg/L)	
	Min	Max
IS1	8.9	25.7
IS2	9.3	21.3
IS3	7.8	28.5
SR1	8.4	31.5
SR2	8.5	32.5
SR3	7.6	28.0
ST1	7.6	20.0
ST3	8.2	43.3



**Contract No. HY/2011/09**

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Part B – Conclusion:** No direct evidence that the exceedances were due to the Contract, therefore the exceedances are considered due to the other external factors rather than the contract works.

**Part C – Recommendation:** As the exceedances were not related to the contract works, no further action to be required.

Contract No. HY/2011/09

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Location Plan:**



Reviewed by: Dr. H.F. Chan

Title: Environmental Team Leader

Date: 6 March 2013

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

Date of Water Quality Monitoring: 25 February 2013

**Part A – Exceedance Summary Tables**

**Table I: Parameter(s) – Dissolved Oxygen (DO) / ~~Turbidity (TURB)~~ / ~~Suspended Solids (SS)~~**

Station(s)	Tide	Baseline Action Level	Baseline Limit Level	Baseline Action Level	Baseline Limit Level	Dissolved Oxygen (mg/L)		Justification*	Validity (Yes/No)
		Surface and Middle		Bottom		Surface and Middle	Bottom		
ST1	Mid-ebb	5.0	4.2	4.7	3.6	-	<b>4.5</b>	(1), (3), (5)	No
ST2						-	<b>4.5</b>	(1), (3), (4) & (5)	No
ST3						<b>4.6</b>	-	(1), (3), (5)	No
IS3	Mid-flood					<b>4.7</b>	-	(1), (3), (5)	No
SR2						<b>4.6</b>	-	(1), (3), (5)	No
SR3						<b>4.3</b>	-	(1), (3), (5)	No
SRA						<b>4.6</b>	<b>4.5</b>	(1), (3), (5)	No
ST3						<b><u>3.8</u></b>	<b>4.0</b>	(1), (3), (4) & (5)	No

Note: ***Bold Italic*** means Action Level exceedance  
***Bold Italic with underline*** means Limit Level exceedance

- \*Remarks
- (1) – No major marine construction activity was conducted.
  - (2) – No pollution discharge from construction activity was observed.
  - (3) – Control Station value already exceeded either the Baseline Action or Limit Levels.
  - (4) – Monitoring station is situated at the upstream of the construction sites.
  - (5) – Other(s): Please specify - Only GI works were being carried out during the sampling period.

**Contract No. HY/2011/09**

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Part B – Conclusion:** No direct evidence that the exceedances were due to the Contract, therefore the exceedances are considered due to the other external factors rather than the contract works.

**Part C – Recommendation:** As the exceedances were not related to the contract works, no further action to be required.

Contract No. HY/2011/09

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Location Plan:**



Reviewed by: Dr. H.F. Chan

Title: Environmental Team Leader

Date: 7 March 2013

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

Date of Water Quality Monitoring: 25 February 2013

**Part A – Exceedance Summary Tables**

**Table I: Parameter(s) – ~~Dissolved Oxygen (DO)~~ / Turbidity (TURB) / ~~Suspended Solids (SS)~~**

Station(s)	Tide	Baseline Action Level (NTU)	Baseline Limit Level (NTU)	Control Station(s)	Depth-average Value at Control Stations (NTU)	120% of Control Station Action Level (NTU)	130% of Control Station Limit Level (NTU)	Depth-average Measured Value (NTU)	Justification*	Validity (Yes/No)
IS1	Mid-ebb	27.5	47.0	CS2	5.8	7.0	7.5	<b><i>7.8</i></b>	(1), (4) & (6)	No
IS2								<b><i>7.5</i></b>	(1), (4) & (6)	No
ST1								<b><i>8.4</i></b>	(1), (4) & (6)	No
ST3								<b><i>7.5</i></b>	(1), (4) & (6)	No
IS1	Mid-flood			CS1	4.8	5.8	6.2	<b><i>6.4</i></b>	(1), (4) & (6)	No
SR3								<b><i>12.0</i></b>	(1), (4) & (6)	No

Note: ***Bold Italic*** means Action Level exceedance  
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- \*Remarks
- (1) – No major marine construction activity was conducted.
  - (2) – No pollution discharge from construction activity was observed.
  - (3) – Control Station value already exceeded either the Baseline Action or Limit Levels.
  - (4) – The exceeded results were similar or within the ranges baseline monitoring results. (Please refer to Table II & Table III)
  - (5) – Monitoring station is situated at the upstream of the construction sites.
  - (6) – Other(s): Please specify - Only GI works were being carried out during the sampling period.

**Contract No. HY/2011/09**

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Table II – Summary of Baseline Water Quality Monitoring Results during Mid-Ebb Tide**

Station(s)	Turbidity (NTU)	
	Min	Max
IS1	5.1	41.7
IS2	6.7	24.0
ST1	6.2	27.8
ST3	5.1	157.6

**Table III – Summary of Baseline Water Quality Monitoring Results during Mid-Flood Tide**

Station(s)	Turbidity (NTU)	
	Min	Max
IS1	5.8	99.3
SR3	7.7	19.7

**Part B – Conclusion:** No direct evidence that the exceedances were due to the Contract, therefore the exceedances are considered due to the other external factors rather than the contract works.

**Part C – Recommendation:** As the exceedances were not related to the contract works, no further action to be required.

Contract No. HY/2011/09

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Location Plan:**



Reviewed by: Dr. H.F. Chan

Title: Environmental Team Leader

Date: 7 March 2013



Contract No. HY/2011/09

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

Date of Water Quality Monitoring: 25 February 2013

**Part A – Exceedance Summary Tables**

**Table I: Parameter(s) – ~~Dissolved Oxygen (DO)~~ / Turbidity (TURB) / Suspended Solids (SS)**

Station(s)	Tide	Baseline Action Level (mg/L)	Baseline Limit Level (mg/L)	Control Station(s)	Depth-average Value at Control Stations (mg/L)	120% of Control Station Action Level (mg/L)	130% of Control Station Limit Level (mg/L)	Depth-average Measured Value (mg/L)	Justification*	Validity (Yes/No)
IS1	Mid-ebb	23.5	34.4	CS2	4.4	5.3	5.7	<u>7.7</u>	(1), (4) & (6)	No
IS2								<u>7.0</u>	(1), (4) & (6)	No
IS3								<u>6.8</u>	(1), (4) & (6)	No
IS4								<u>6.2</u>	(1), (4) & (6)	No
SR1								<u>8.8</u>	(1), (4) & (6)	No
SR2								<u>5.8</u>	(1), (4) & (6)	No
SRA								<u>5.4</u>	(1), (4) & (6)	No
ST1								<u>7.0</u>	(1), (4) & (6)	No
ST2								<u>6.4</u>	(1), (4), (5) & (6)	No
ST3								<u>6.1</u>	(1), (4) & (6)	No
SR1	Mid-flood			CS1	4.9	5.9	6.4	<u>7.8</u>	(1), (4), (5) & (6)	No
SR2								<u>6.5</u>	(1), (4) & (6)	No
SR3								<u>47.5</u>	(1), (4) & (6)	No

Note: ***Bold Italic*** means Action Level exceedance  
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**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

- \*Remarks
- (1) – No major marine construction activity was conducted.
  - (2) – No pollution discharge from construction activity was observed.
  - (3) – Control Station value already exceeded either the Baseline Action or Limit Levels.
  - (4) – The exceeded results were similar or within the ranges baseline monitoring results. (Please refer to Table II & Table III)
  - (5) – Monitoring station is situated at the upstream of the construction sites.
  - (6) – Other(s): Please specify - Only GI works were being carried out during the sampling period.

**Table II – Summary of Baseline Water Quality Monitoring Results during Mid-Ebb Tide**

Station(s)	Suspended Solids (mg/L)	
	Min	Max
IS1	6.3	19.5
IS2	5.3	20.1
IS3	10.0	28.3
IS4	9.3	24.3
SR1	6.5	39.5
SR2	7.0	53.0
SRA	3.5	17.3
ST1	7.0	25.5
ST2	4.3	16.8
ST3	6.0	31.0

**Table III – Summary of Baseline Water Quality Monitoring Results during Mid-Flood Tide**

Station(s)	Suspended Solids (mg/L)	
	Min	Max
IS1	8.9	25.7
SR1	8.4	31.5
SR2	8.5	32.5
SR3	7.6	28.0

**Contract No. HY/2011/09**

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Part B – Conclusion:** No direct evidence that the exceedances were due to the Contract, therefore the exceedances are considered due to the other external factors rather than the contract works.

**Part C – Recommendation:** As the exceedances were not related to the contract works, no further action to be required.

Contract No. HY/2011/09

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Location Plan:**



Reviewed by: Dr. H.F. Chan

Title: Environmental Team Leader

Date: 7 March 2013

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

Date of Water Quality Monitoring: 27 February 2013

**Part A – Exceedance Summary Tables**

**Table I: Parameter(s) – ~~Dissolved Oxygen (DO)~~ / Turbidity (TURB) / ~~Suspended Solids (SS)~~**

Station(s)	Tide	Baseline Action Level (NTU)	Baseline Limit Level (NTU)	Control Station(s)	Depth-average Value at Control Stations (NTU)	120% of Control Station Action Level (NTU)	130% of Control Station Limit Level (NTU)	Depth-average Measured Value (NTU)	Justification*	Validity (Yes/No)			
SR2	Mid-ebb	27.5	47.0	CS2	6.6	7.9	8.6	<b>8.0</b>	(1), (4) & (6)	No			
ST2								<b>8.2</b>	(1), (4), (5) & (6)	No			
IS1	Mid-flood			CS1				5.0	6.0	6.5	<b><u>10.8</u></b>	(1), (4) & (6)	No
IS2											<b><u>11.6</u></b>	(1), (4) & (6)	No
IS3											<b>6.2</b>	(1), (4) & (6)	No
SR1											<b><u>8.8</u></b>	(1), (4), (5) & (6)	No
SRA											<b>6.4</b>	(1), (4) & (6)	No
ST1											<b><u>10.9</u></b>	(1), (4) & (6)	No
ST2		<b><u>14.0</u></b>	(1), (4) & (6)		No								

Note: ***Bold Italic*** means Action Level exceedance  
***Bold Italic with underline*** means Limit Level exceedance

- \*Remarks
- (1) – No major marine construction activity was conducted.
  - (2) – No pollution discharge from construction activity was observed.
  - (3) – Control Station value already exceeded either the Baseline Action or Limit Levels.
  - (4) – The exceeded results were similar or within the ranges baseline monitoring results. (Please refer to Table II & Table III)
  - (5) – Monitoring station is situated at the upstream of the construction sites.
  - (6) – Other(s): Please specify - Only GI works were being carried out during the sampling period.

**Contract No. HY/2011/09**

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Table II – Summary of Baseline Water Quality Monitoring Results during Mid-Ebb Tide**

Station(s)	Turbidity (NTU)	
	Min	Max
SR2	3.9	23.5
ST2	8.7	33.8

**Table III – Summary of Baseline Water Quality Monitoring Results during Mid-Flood Tide**

Station(s)	Turbidity (NTU)	
	Min	Max
IS1	5.8	99.3
IS2	7.0	39.4
IS3	7.8	29.4
SR1	5.7	37.2
SRA	7.9	14.4
ST1	6.4	34.7
ST2	7.7	33.6

**Part B – Conclusion:** No direct evidence that the exceedances were due to the Contract, therefore the exceedances are considered due to the other external factors rather than the contract works.

**Part C – Recommendation:** As the exceedances were not related to the contract works, no further action to be required.

Contract No. HY/2011/09

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Location Plan:**



Reviewed by: Dr. H.F. Chan

Title: Environmental Team Leader

Date: 7 March 2013

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

Date of Water Quality Monitoring: 27 February 2013

**Part A – Exceedance Summary Tables**

**Table I: Parameter(s) – ~~Dissolved Oxygen (DO)~~ / ~~Turbidity (TURB)~~ / Suspended Solids (SS)**

Station(s)	Tide	Baseline Action Level (mg/L)	Baseline Limit Level (mg/L)	Control Station(s)	Depth-average Value at Control Stations (mg/L)	120% of Control Station Action Level (mg/L)	130% of Control Station Limit Level (mg/L)	Depth-average Measured Value (mg/L)	Justification*	Validity (Yes/No)
SR2	Mid-ebb	23.5	34.4	CS2	6.6	7.9	8.6	<b><u>11.9</u></b>	(1), (4) & (6)	No
IS1	Mid-flood			CS1	4.8	5.8	6.2	<b><u>6.5</u></b>	(1), (4) & (6)	No
IS2								<b><u>6.7</u></b>	(1), (4) & (6)	No
IS4								<b><u>7.1</u></b>	(1), (4) & (6)	No
ST1								<b><u>10.9</u></b>	(1), (4) & (6)	No
ST2								<b><u>12.2</u></b>	(1), (4) & (6)	No

Note: ***Bold Italic*** means Action Level exceedance  
***Bold Italic with underline*** means Limit Level exceedance

- \*Remarks
- (1) – No major marine construction activity was conducted.
  - (2) – No pollution discharge from construction activity was observed.
  - (3) – Control Station value already exceeded either the Baseline Action or Limit Levels.
  - (4) – The exceeded results were similar or within the ranges baseline monitoring results. (Please refer to Table II & Table III)
  - (5) – Monitoring station is situated at the upstream of the construction sites.
  - (6) – Other(s): Please specify - Only GI works were being carried out during the sampling period.



**Contract No. HY/2011/09**

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Table II – Summary of Baseline Water Quality Monitoring Results during Mid-Ebb Tide**

Station(s)	Suspended Solids (mg/L)	
	Min	Max
SR2	7.0	53.0

**Table III – Summary of Baseline Water Quality Monitoring Results during Mid-Flood Tide**

Station(s)	Suspended Solids (mg/L)	
	Min	Max
IS1	8.9	25.7
IS2	9.3	21.3
IS4	8.6	20.3
ST1	7.6	20.0
ST2	7.7	23.0

**Part B – Conclusion:** No direct evidence that the exceedances were due to the Contract, therefore the exceedances are considered due to the other external factors rather than the contract works.

**Part C – Recommendation:** As the exceedances were not related to the contract works, no further action to be required.

Contract No. HY/2011/09

**Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill  
- Notification of Environmental Quality Limit Exceedances**

**Location Plan:**



Reviewed by: Dr. H.F. Chan

Title: Environmental Team Leader

Date: 7 March 2013

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**APPENDIX M**  
**SITE AUDIT SUMMARY**

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Contract HY/2011/09

Hong Kong-Zhuhai-Macao Bridge

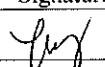

Hong Kong Link Road-Section between HKSAR Boundary and Scenic Hill

Weekly Site Inspection Record Summary

Inspection Information

Checklist Reference Number	130226
Date	26 February 2013 (Tuesday)
Time	13:30 – 14:45

Ref. No.	Non-Compliance	Related Item No.
-	None identified	-
Ref. No.	Remarks/Observations	Related Item No.
	<b>A. Water Quality</b>	
	• No environmental deficiency was identified during site inspection.	
	<b>B. Ecology</b>	
	• No environmental deficiency was identified during site inspection.	
	<b>C. Air Quality</b>	
	• No environmental deficiency was identified during site inspection.	
	<b>D. Noise</b>	
	• No environmental deficiency was identified during site inspection.	
	<b>E. Waste / Chemical Management</b>	
	• No environmental deficiency was identified during site inspection.	
	<b>F. Permits/Licences</b>	
	• No environmental deficiency was identified during site inspection.	
	<b>G. Others</b>	
	• Follow-up on previous site audit session (Ref. No. 130219), all environmental deficiencies were improved/rectified by contractor during the site inspection.	

	Name	Signature	Date
Recorded by	Ivy Tam		26 February 2013
Checked by	Dr. Priscilla Choy		26 February 2013

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**APPENDIX N  
UPDATED ENVIRONMENTAL  
MITIGATION IMPLEMENTATION  
SCHEDULE (EMIS)**

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EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
<b>Air Quality</b>							
S5.5.6.1	A1	1) The contractor shall follow the procedures and requirements given in the Air Pollution Control (Construction Dust) Regulation	Good construction site practices to control the dust impact at the nearby sensitive receivers to within the relevant criteria.	Contractor	All construction sites	Construction stage	^
S5.5.6.2	A2	2) Proper watering of exposed spoil should be undertaken throughout the construction phase: <ul style="list-style-type: none"> <li>• Any excavated or stockpile of dusty material should be covered entirely by impervious sheeting or sprayed with water to maintain the entire surface wet and then removed or backfilled or reinstated where practicable within 24 hours of the excavation or unloading;</li> <li>• Any dusty materials remaining after a stockpile is removed should be wetted with water and cleared from the surface of roads;</li> <li>• A stockpile of dusty material should not be extend beyond the pedestrian barriers, fencing or traffic cones.</li> <li>• The load of dusty materials on a vehicle leaving a construction site should be covered entirely by impervious sheeting to ensure that the dusty materials do not leak from the vehicle;</li> <li>• Where practicable, vehicle washing facilities with high pressure water jet should be provided at every discernible or designated vehicle exit point. The area where vehicle washing takes place and the road section between the washing facilities and the exit point should be paved with concrete, bituminous materials or hardcores;</li> </ul>	Good construction site practices to control the dust impact at the nearby sensitive receivers to within the relevant criteria.	Contractor	All construction sites	Construction stage	^  ^  ^  ^  ^
S5.5.6.2	A2	<ul style="list-style-type: none"> <li>• When there are open excavation and reinstatement works, hoarding</li> </ul>	Good construction site	Contractor	All construction	Construction	^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
		<p>of not less than 2.4m high should be provided as far as practicable along the site boundary with provision for public crossing. Good site practice shall also be adopted by the Contractor to ensure the conditions of the hoardings are properly maintained throughout the construction period;</p> <ul style="list-style-type: none"> <li>• The portion of any road leading only to construction site that is within 30m of a vehicle entrance or exit should be kept clear of dusty materials;</li> <li>• Surfaces where any pneumatic or power-driven drilling, cutting, polishing or other mechanical breaking operation takes place should be sprayed with water or a dust suppression chemical continuously;</li> <li>• Any area that involves demolition activities should be sprayed with water or a dust suppression chemical immediately prior to, during and immediately after the activities so as to maintain the entire surface wet;</li> <li>• Where a scaffolding is erected around the perimeter of a building under construction, effective dust screens, sheeting or netting should be provided to enclose the scaffolding from the ground floor level of the building, or a canopy should be provided from the first floor level up to the highest level of the scaffolding;</li> <li>• Any skip hoist for material transport should be totally enclosed by impervious sheeting;</li> <li>• Every stock of more than 20 bags of cement or dry pulverised fuel ash (PFA) should be covered entirely by impervious sheeting or placed in an area sheltered on the top and the 3 sides;</li> </ul>	<p>practices to control the dust impact at the nearby sensitive receivers to within the relevant criteria.</p>		sites	stage	<p style="text-align: center;">^</p> <p style="text-align: center;">^</p> <p style="text-align: center;">^</p> <p style="text-align: center;">N/A</p> <p style="text-align: center;">^</p> <p style="text-align: center;">^</p>

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
S5.5.6.2	A2	<ul style="list-style-type: none"> <li>Cement or dry PFA delivered in bulk should be stored in a closed silo fitted with an audible high level alarm which is interlocked with the material filling line and no overfilling is allowed;</li> <li>Loading, unloading, transfer, handling or storage of bulk cement or dry PFA should be carried out in a totally enclosed system or facility, and any vent or exhaust should be fitted with an effective fabric filter or equivalent air pollution control system; and</li> <li>Exposed earth should be properly treated by compaction, turfing, hydroseeding, vegetation planting or sealing with latex, vinyl, bitumen, shotcrete or other suitable surface stabiliser within six months after the last construction activity on the construction site or part of the construction site where the exposed earth lies.</li> </ul>	Good construction site practices to control the dust impact at the nearby sensitive receivers to within the relevant criteria.	Contractor	All construction sites	Construction stage	N/A  ^  ^
S5.5.6.3	A3	3) The Contractor should undertake proper watering on all exposed spoil (with at least 8 times per day) throughout the construction phase.	Control construction dust	Contractor	All construction sites	Construction stage	^
S5.5.6.4	A5	5) Implement regular dust monitoring under EM&A programme during the construction stage.	Monitor the 24 hr and 1hr TSP levels at the representative dust monitoring stations to ensure compliance with relevant criteria throughout the construction period.	Contractor	Selected representative dust monitoring station	Construction stage	^
S5.5.7.1	A6	The following mitigation measures should be adopted to prevent fugitive dust emissions for concrete batching plant: <ul style="list-style-type: none"> <li>Loading, unloading, handling, transfer or storage of any dusty</li> </ul>	Monitor the 24 hr and 1hr TSP levels at the representative dust	Contractor	Selected representative dust	Construction stage	N/A



EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
		<p>materials should be carried out in totally enclosed system;</p> <ul style="list-style-type: none"> <li>All dust-laden air or waste gas generated by the process operations should be properly extracted and vented to fabric filtering system to meet the emission limits for TSP;</li> <li>Vents for all silos and cement/pulverised fuel ash (PFA) weighing scale should be fitted with fabric filtering system;</li> <li>The materials which may generate airborne dusty emissions should be wetted by water spray system;</li> <li>All receiving hoppers should be enclosed on three sides up to 3m above unloading point;</li> <li>All conveyor transfer points should be totally enclosed;</li> <li>All access and route roads within the premises should be paved and wetted; and</li> <li>Vehicle cleaning facilities should be provided and used by all concrete trucks before leaving the premises to wash off any dust on the wheels and/or body.</li> </ul>	<p>monitoring stations to ensure compliance with relevant criteria throughout the construction period.</p>		monitoring station		<p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p>
S5.5.2.7	A7	<p>The following mitigation measures should be adopted to prevent fugitive dust emissions at barging point:</p> <ul style="list-style-type: none"> <li>All road surface within the barging facilities will be paved;</li> <li>Dust enclosures will be provided for the loading ramp;</li> <li>Vehicles will be required to pass through designated wheels wash facilities; and</li> <li>Continuous water spray at the loading points.</li> </ul>	Control construction dust	Contractor	All construction sites	Construction stage	<p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p>
<b>Construction Noise (Air borne)</b>							
S6.4.10	N1	1) Use of good site practices to limit noise emissions by considering the	Control construction airborne	Contractor	All construction	Construction	

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
		<p>following:</p> <ul style="list-style-type: none"> <li>• only well-maintained plant should be operated on-site and plant should be serviced regularly during the construction programme;</li> <li>• machines and plant (such as trucks, cranes) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;</li> <li>• plant known to emit noise strongly in one direction, where possible, be orientated so that the noise is directed away from nearby NSRs;</li> <li>• silencers or mufflers on construction equipment should be properly fitted and maintained during the construction works;</li> <li>• mobile plant should be sited as far away from NSRs as possible and practicable;</li> <li>• material stockpiles, mobile container site officer and other structures should be effectively utilised, where practicable, to screen noise from on-site construction activities.</li> </ul>	noise by means of good site practices		sites	stage	^  ^  ^  ^  ^
S6.4.11	N2	2) Install temporary hoarding located on the site boundaries between noisy construction activities and NSRs. The conditions of the hoardings shall be properly maintained throughout the construction period.	Reduce the construction noise levels at low-level zone of NSRs through partial screening.	Contractor	All construction sites	Construction stage	^
S6.4.12	N3	3) Install movable noise barriers (typically density @14kg/m <sup>2</sup> ), acoustic mat or full enclosure close to noisy plants including air compressor, generators, saw.	Screen the noisy plant items to be used at all construction sites	Contractor	For plant items listed in Appendix 6D of the EIA report at all construction sites	Construction stage	^
S6.4.13	N4	4) Select "Quiet plants" which comply with the BS 5228 Part 1 or TM	Reduce the noise levels of	Contractor	For plant items	Construction	^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
		standards.	plant items		listed in Appendix 6D of the EIA report at all construction sites	stage	
S6.4.14	N5	5) Sequencing operation of construction plants where practicable.	Operate sequentially within the same work site to reduce the construction airborne noise	Contractor	All construction sites where practicable	Construction stage	^
	N6	6) Implement a noise monitoring under EM&A programme.	Monitor the construction noise levels at the selected representative locations	Contractor	Selected representative noise monitoring station	Construction stage	^
<b>Waste Management (Construction Waste)</b>							
S8.3.8	WM1	<u>Construction and Demolition Material</u> The following mitigation measures should be implemented in handling the waste: <ul style="list-style-type: none"> <li>Maintain temporary stockpiles and reuse excavated fill material for backfilling and reinstatement;</li> <li>Carry out on-site sorting;</li> <li>Make provisions in the Contract documents to allow and promote the use of recycled aggregates where appropriate;</li> <li>Adopt 'Selective Demolition' technique to demolish the existing structures and facilities with a view to recovering broken concrete effectively for recycling purpose, where possible;</li> <li>Implement a trip-ticket system for each works contract to ensure that</li> </ul>	Good site practice to minimize the waste generation and recycle the C&D materials as far as practicable so as to reduce the amount for final disposal	Contractor	All construction sites	Construction stage	^  ^  ^  ^  ^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
		<p>the disposal of C&amp;D materials are properly documented and verified; and</p> <ul style="list-style-type: none"> <li>Implement an enhanced Waste Management Plan similar to ETWBTC (Works) No. 19/2005 – “Environmental Management on Construction Sites” to encourage on-site sorting of C&amp;D materials and to minimize their generation during the course of construction.</li> <li>In addition, disposal of the C&amp;D materials onto any sensitive locations such as agricultural lands, etc. should be avoided. The Contractor shall propose the final disposal sites to the Project Proponent and get its approval before implementation</li> </ul>					<p>^</p> <p>^</p>
S8.3.9 - S8.3.11	WM2	<p><u>C&amp;D Waste</u></p> <ul style="list-style-type: none"> <li>Standard formwork or pre-fabrication should be used as far as practicable in order to minimise the arising of C&amp;D materials. The use of more durable formwork or plastic facing for the construction works should be considered. Use of wooden hoardings should not be used, as in other projects. Metal hoarding should be used to enhance the possibility of recycling. The purchasing of construction materials will be carefully planned in order to avoid over ordering and wastage.</li> <li>The Contractor should recycle as much of the C&amp;D materials as possible on-site. Public fill and C&amp;D waste should be segregated and stored in different containers or skips to enhance reuse or recycling of materials and their proper disposal. Where practicable, concrete and masonry can be crushed and used as fill. Steel reinforcement bar can be used by scrap steel mills. Different</li> </ul>	<p>Good site practice to minimize the waste generation and recycle the C&amp;D materials as far as practicable so as to reduce the amount for final disposal</p>	Contractor	All construction sites	Construction stage	<p>^</p> <p>^</p>



EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
		waste collection service and can supply the necessary storage containers; or be to a reuser of the waste, under approval from the EPD.					
S8.3.16	WM4	<u>Sewage</u> <ul style="list-style-type: none"> <li>• Adequate numbers of portable toilets should be provided for the workers. The portable toilets should be maintained in a state, which will not deter the workers from utilizing these portable toilets. Night soil should be collected by licensed collectors regularly.</li> </ul>	Proper handling of sewage from worker to avoid odour, pest and litter impacts	Contractor	All construction sites	Construction stage	^
S8.3.17	WM5	<u>General Refuse</u> <ul style="list-style-type: none"> <li>• General refuse generated on-site should be stored in enclosed bins or compaction units separately from construction and chemical wastes.</li> <li>• A reputable waste collector should be employed by the Contractor to remove general refuse from the site, separately from construction and chemical wastes, on a daily basis to minimize odour, pest and litter impacts. Burning of refuse on construction sites is prohibited by law.</li> <li>• Aluminium cans are often recovered from the waste stream by individual collectors if they are segregated and made easily accessible. Separate labelled bins for their deposit should be provided if feasible.</li> <li>• Office wastes can be reduced through the recycling of paper if volumes are large enough to warrant collection. Participation in a local collection scheme should be considered by the Contractor. In addition, waste separation facilities for paper, aluminum cans,</li> </ul>	Minimize production of the general refuse and avoid odour, pest and litter impacts	Contractor	All construction sites	Construction stage	^  ^  ^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
		<p>plastic bottles etc., should be provided.</p> <ul style="list-style-type: none"> <li>Training should be provided to workers about the concepts of site cleanliness and appropriate waste management procedure, including reduction, reuse and recycling of wastes.</li> </ul>					^
<b>Water Quality (Construction Phase)</b>							
S9.11.1 – S9.11.1.2	W1	<ul style="list-style-type: none"> <li>Mitigation during the marine works to reduce impacts to within acceptable levels have been recommended and will comprise a series of measures that restrict the method and sequencing of dredging/backfilling, as well as protection measures. Details of the measures are provided below and summarised in the Environmental Mitigation Implementation Schedule in EM&amp;A Manual.</li> <li>Export for dredged spoils from NWWCZ avoiding exerting high demand on the disposal facilities in the NWWCZ and, hence, minimise potential cumulative impacts;</li> <li>For the marine viaducts of HKLR, the bored piling will be undertaken within a metal casing;</li> <li>where public fill is proposed for filling below -2.5mPD, the fine content in the public fill will be controlled to 25%;</li> <li>single layer silt curtains will be applied around all works;</li> <li>during the first two months of dredging work for HKLR, the silt-removal efficiency of the silt-curtains shall be verified by examining the results of water quality monitoring points. The water quality monitoring points to be selected for the above shall be those close to the locations of the initial period of dredging work. Details in this regard shall be determined by the ENPO to be established,</li> </ul>	To control construction water quality	Contractor	During seawall dredging and filling	Construction stage	N/A  N/A  N/A  N/A  N/A





EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
		<ul style="list-style-type: none"> <li>• all vessels shall be sized such that adequate clearance is maintained between vessels and the sea bed at all states of the tide to ensure that undue turbidity is not generated by turbulence from vessel movement or propeller wash; and</li> <li>• the works shall not cause foam, oil, grease, litter or other objectionable matter to be present in the water within and adjacent to the works site.</li> </ul>					<p>N/A</p> <p>N/A</p>
S9.11.1.3	W2	<p><u>Land Works</u></p> <p>General construction activities on land should also be governed by standard good working practice. Specific measures to be written into the works contracts should include:</p> <ul style="list-style-type: none"> <li>• wastewater from temporary site facilities should be controlled to prevent direct discharge to surface or marine waters;</li> <li>• sewage effluent and discharges from on-site kitchen facilities shall be directed to Government sewer in accordance with the requirements of the WPCO or collected for disposal offsite. The use of soakaways shall be avoided;</li> <li>• storm drainage shall be directed to storm drains via adequately designed sand/silt removal facilities such as sand traps, silt traps and sediment basins. Channels, earth bunds or sand bag barriers should be provided on site to properly direct stormwater to such silt removal facilities. Catchpits and perimeter channels should be constructed in advance of site formation works and earthworks;</li> <li>• silt removal facilities, channels and manholes shall be maintained and any deposited silt and grit shall be removed regularly, including</li> </ul>	To control construction water quality	Contractor	During seawall dredging and filling	Construction stage	<p>^</p> <p>N/A</p> <p>^</p> <p>^</p>



EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
		<ul style="list-style-type: none"> <li>• wastewater generated from concreting, plastering, internal decoration, cleaning work and other similar activities, shall be screened to remove large objects;</li> <li>• vehicle and plant servicing areas, vehicle wash bays and lubrication facilities shall be located under roofed areas. The drainage in these covered areas shall be connected to foul sewers via a petrol interceptor in accordance with the requirements of the WPCO or collected for off site disposal;</li> <li>• the contractors shall prepare an oil / chemical cleanup plan and ensure that leakages or spillages are contained and cleaned up immediately;</li> <li>• waste oil should be collected and stored for recycling or disposal, in accordance with the Waste Disposal Ordinance;</li> <li>• all fuel tanks and chemical storage areas should be provided with locks and be sited on sealed areas. The storage areas should be surrounded by bunds with a capacity equal to 110% of the storage capacity of the largest tank; and</li> <li>• surface run-off from bunded areas should pass through oil/grease traps prior to discharge to the stormwater system.</li> </ul>					<p style="text-align: center;">^</p> <p style="text-align: center;">^</p> <p style="text-align: center;">^</p> <p style="text-align: center;">^</p> <p style="text-align: center;">^</p> <p style="text-align: center;">^</p>
S9.14	W3	Implement a water quality monitoring programme	Control water quality	Contractor	At identified monitoring location	During construction period	^
<b>Ecology (Construction Phase)</b>							
S10.7	E1	<ul style="list-style-type: none"> <li>• Good site practices to avoid runoff entering woodland habitats in Scenic Hill</li> </ul>	Avoid potential disturbance on habitat of Romer's Tree	Designer; Contractor	Scenic Hill	During construction	^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
		<ul style="list-style-type: none"> <li>Reinstate works areas in Scenic Hill</li> <li>Avoid stream modification in Scenic Hill</li> </ul>	Frog in Scenic Hill				N/A ^
S10.7	E2	<ul style="list-style-type: none"> <li>Use closed grab in dredging works.</li> <li>Install silt curtain during the construction.</li> <li>Limit dredging and works fronts.</li> <li>Good site practices</li> <li>Strict enforcement of no marine dumping.</li> <li>Site runoff control</li> <li>Spill response plan</li> </ul>	Minimise marine water quality impacts	Contractor	Seawall,	During construction	N/A N/A N/A ^ ^ ^ ^
S10.7	E3	<ul style="list-style-type: none"> <li>Reprovision of replacement Artificial Reefs (of the same volume as the existing ARs inside Marine Exclusion Zone)</li> </ul>	Mitigate water quality impacts on the existing ARs	Project proponent	To be determined	Construction phase or operation phase	N/A
S10.7	E4	Watering to reduce dust generation; prevention of siltation of freshwater habitats; Site runoff should be desilted, to reduce the potential for suspended sediments, organics and other contaminants to enter streams and standing freshwater	Prevent Sedimentation from Land-based works areas	Contractor	Land-based works areas	During construction	^
S10.7	E5	Good site practices, including strictly following the permitted works hours, using quieter machines where practicable, and avoiding excessive lightings during night time	Prevent disturbance to terrestrial fauna and habitats	Contractor	Land-based works areas	During construction	^
S10.7	E6	<ul style="list-style-type: none"> <li>Dolphin Exclusion Zone;</li> <li>Dolphin watching plan</li> </ul>	Minimize temporary marine habitat loss impact to dolphins	Contractor	Marine works	During marine works	N/A
S10.7	E7	<ul style="list-style-type: none"> <li>Decouple compressors and other equipment on working vessels</li> <li>Avoidance of percussive piling</li> <li>Marine underwater noise monitoring</li> </ul>	Minimise marine noise impacts on dolphins	Contractor	Marine works	During marine works	^ ^ ^

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
		<ul style="list-style-type: none"> <li>Temporal suspension of drilling bored pile casing in rock during peak dolphin calving season in May and June</li> </ul>					N/A
S10.7	E8	<ul style="list-style-type: none"> <li>Control vessel speed</li> <li>Skipper training.</li> <li>Predefined and regular routes for working vessels; avoid Brothers Islands.</li> </ul>	Minimise marine traffic disturbance on dolphins	Contractor	Marine traffic	During marine works	^ ^ ^
S10.10	E9	<ul style="list-style-type: none"> <li>Dolphin vessel monitoring</li> </ul>	Minimise marine traffic disturbance on dolphins	Contractor	North Lantau and West Lantau	Prior to construction, during construction, and 1 year after operation	^
<b>Fisheries</b>							
S11.7	F1	<ul style="list-style-type: none"> <li>Reprovision of replacement Artificial Reefs(of the same volume as the existing ARs inside Marine Exclusion Zone)</li> </ul>	Mitigate water quality impacts on the existing ARs	Project proponent	To be determined	Construction phase or operation phase	N/A
S11.7	F2	<ul style="list-style-type: none"> <li>Reduce re-suspension of sediments</li> <li>Limit dredging and works fronts.</li> <li>Good site practices</li> <li>Strict enforcement of no marine dumping</li> <li>Spill response plan</li> </ul>	Minimise marine water quality impacts	Contractor	Seawall,	During construction	N/A N/A ^ ^ ^
<b>Landscape &amp; Visual (Construction Phase)</b>							
S14.3.3.3	LV2	<p>Mitigate both Landscape and Visual Impacts</p> <ul style="list-style-type: none"> <li>G1. Grass-hydroseed bare soil surface and stock pile areas.</li> </ul>	Minimise visual & landscape impact	Contractor	HKLR	Construction stage	N/A

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
		<ul style="list-style-type: none"> <li>• G2. Add planting strip and automatic irrigation system if appropriate at some portions of bridge or footbridge to screen bridge and traffic.</li> <li>• G3. For HKLR, providing aesthetic design on the viaduct, tunnel portals, at-grade roads (e.g. subtle colour tone and slim form for viaduct, featured form of tunnel portals, roadside planting along at-grade roads and landscape berm on) to beautify the HKLR alignment.</li> <li>• G5. Vegetation reinstatement and upgrading to disturbed areas.</li> <li>• G6. Maximize new tree, shrub and other vegetation planting to compensate tree felled and vegetation removed.</li> <li>• G7. Provide planting area around peripheral of and within HKLR for tree screening buffer effect.</li> <li>• G8. Plant salt tolerant native tree and shrubs etc along the planter strip at affected seawall.</li> <li>• G9. Reserve of loose natural granite rocks for re-use. Provide new coastline to adopt “natural-look” by means of using armour rocks in the form of natural rock materials and planting strip area accommodating screen buffer to enhance “natural-look” of the new coastline (see Figure 14.4.2 for example).</li> </ul>					<p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p> <p>N/A</p>
S14.3.3.3	LV3	<p><u>Mitigate Visual Impacts</u></p> <ul style="list-style-type: none"> <li>• V1.Minimize time for construction activities during construction period.</li> <li>• V2.Provide screen hoarding at the portion of the project site / works areas / storage areas near VSRs who have close low-level views to the Project during HKLR construction.</li> </ul>					<p>^</p> <p>^</p>

EIA Ref.	EM&A Log Ref	Recommended Mitigation Measures	Objectives of the recommended Measures & Main Concerns to address	Who to implement the measures?	Location of the measures	When to Implement the measures?	Implementation Status
<b>EM&amp;A</b>							
S15.2.2	EM1	An Independent Environmental Checker needs to be employed as per the EM&A Manual.	Control EM&A Performance	Project Proponent	All construction sites	Construction stage	^
S15.5 - S15.6	EM2	1) An Environmental Team needs to be employed as per the EM&A Manual. 2) Prepare a systematic Environmental Management Plan to ensure effective implementation of the mitigation measures. 3) An environmental impact monitoring needs to be implementing by the Environmental Team to ensure all the requirements given in the EM&A Manual are fully complied with.	Perform environmental monitoring & auditing	Contractor	All construction sites	Construction stage	^  ^  ^

Remarks: ^ Compliance of mitigation measure  
 \* Recommendation was made during site audit but improved/rectified by the contractor  
 N/A Not Applicable at this stage as no such site activities were conducted in the reporting period (e.g. concrete batching plan, barging point, seawall dredging and filling, bored piling, landscaping works etc)

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**APPENDIX O  
WASTE GENERATION IN THE  
REPORTING PERIOD**

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Forecast of Total Quantities of C&D Materials to be Generated from the Contract <sup>10</sup>										
Total Quantity Generated	Hard Rock and Large Broken	Reused in the Contract	Reused in other Projects <sup>5</sup>	Disposed as Public Fill <sup>6</sup>	Imported Fill <sup>7</sup>	Metals	Paper/ cardboard packaging	Plastics (see note <sup>3</sup> )	Chemical Waste	Others, e.g. (General refuse) <sup>8</sup>
( in 000 m <sup>3</sup> )	( in 000 m <sup>3</sup> )	( in 000 m <sup>3</sup> )	( in 000 m <sup>3</sup> )	( in 000 m <sup>3</sup> )	( in 000 m <sup>3</sup> )	( in 000 Kg)	( in 000 Kg)	( in 000 Kg)	( in 000 Kg)	( in 000 m <sup>3</sup> )
0.0	124.366		124.366				9.681			2.940

Notes:

- (1) The performance targets are given in ER Appendix 8J Clause 14 and the EM&A Manual.
- (2) The waste flow table shall also include C&D materials to be imported for use at the Site.
- (3) Plastics refer to plastic bottles/containers, plastic sheets/foam from packaging material
- (4) The Contractor shall also submit the latest forecast of the total amount of C&D materials expected to be generated from the Works, together with a breakdown of the nature where the total amount of C&D materials expected to be generated from the Works is equal to or exceeding 50,000 m<sup>3</sup>. (ER Part 8 Clause 8.8.5 (d) (ii) refers).
- (5) The materials reused in other Project shall not be treated as waste under the Waste Disposal Ordinance (CAP354).
- (6) According to the EIA Appendix 8B, the density of rock (bulked) is 2.0 tonnes/m<sup>3</sup>,
- (7) According to the EIA Appendix 8B, the density of soil (bulked) is 1.8 tonnes/m<sup>3</sup>.
- (8) Assuming the loading quantities of a 30 tonne truck is 8.0m<sup>3</sup>
- (9) Assuming the loading quantities of a 24 tonne truck is 6.5m<sup>3</sup>
- (10) The forecast of C&D materials to be generated from the Contract is sourced from the works program in January 2013.
- (11) The construction works commencement date for this Contract is 22 February 2013.

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**APPENDIX P  
COMPLAINT LOG**

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**Appendix P - Complaint Log**

<b>Log Ref.</b>	<b>Date/Location</b>	<b>Received Date</b>	<b>Details of Complaint</b>	<b>Investigation/ Mitigation Action</b>	<b>Status</b>
N/A	N/A	N/A	N/A	N/A	N/A

**Remarks:** No environmental complaint was received in the reporting period.