



Maeda - CRGL - SELI Joint Venture

Contract No. DC/2007/12 - Design and  
Construction of Tsuen Wan Drainage Tunnel

Monthly EM&A Report (July 2012)

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**Report No** EB000364R0831

**F.C. Tsang**

**Certified By** ET Leader

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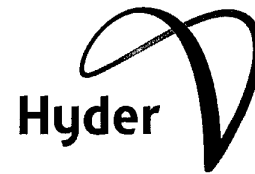
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**Report No** EB000364R0831

**Date** 14 August 2012

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# CONTENTS

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EXECUTIVE SUMMARY .....	1
1 INTRODUCTION .....	4
2 PROJECT INFORMATION.....	5
2.1 Project Organization and Management Structure.....	5
2.2 Construction Progress.....	5
2.3 Mitigation Measures .....	6
2.4 Statuses of Licences and Permits .....	6
3 SUMMARY OF EM&A REQUIREMENT .....	7
3.1 Air Quality.....	7
3.2 Noise .....	11
3.3 Water Quality.....	14
4 MONITORING RESULT .....	20
4.1 Air Quality.....	20
4.2 Noise .....	22
4.3 Water Quality Monitoring .....	23
4.4 Summary of Project-Related Exceedances .....	36
5 WASTE MANAGEMENT .....	37
6 NON-COMPLIANCE AND DEFICIENCY .....	38
6.1 Site Audit by ET.....	38
7 COMPLAINT.....	39
8 SUMMARY OF NOTIFICATION OF SUMMONS, SUCCESSFUL PROSECUTIONS AND CORRECTIVE ACTIONS .....	40
9 FUTURE KEY ISSUE .....	41

## TABLES

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Table 3-1	Air Quality Monitoring Equipment
Table 3-2	Air Quality Monitoring Locations
Table 3-3	Action & Limit Levels for Air Quality
Table 3-4	Event/Action Plan for Air Quality
Table 3-5	Noise Monitoring Equipment
Table 3-6	Noise Monitoring Locations
Table 3-7	Action & Limit Levels for Air Borne Noise
Table 3-8	Event/Action Plan for Airborne Noise
Table 3-9	Water Quality Monitoring Equipment
Table 3-10	Water Quality Monitoring Locations
Table 3-11	Action/Limit Levels for Water Quality
Table 3-12	Event/Action Plan for Water Quality
Table 4-1	Air Quality Monitoring Results
Table 4-2	Air Borne Noise Monitoring Results
Table 4-3	Summary of Exceedances for I-1
Table 4-4	Summary of Exceedances for I-2
Table 4-5	Summary of Exceedances for I-3
Table 4-6	Water Quality Monitoring Results
Table 4-7	Summary of Project-Related Exceedances
Table 5-1	Waste Generated in July 2012
Table 6-1	Site Inspections by ET
Table 7-1	Cumulative Statistics of Environmental Complaints
Table 8-1	Cumulative Statistics of Notification of Summons and Successful Prosecutions and Convictions

## APPENDICES

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Appendix A	Site Map and Works Area
Appendix B	Organization Chart
Appendix C	Construction Programme
Appendix D	Implementation Status of Environmental Mitigation Measures
Appendix E	Status of License and Permit
Appendix F	Calibration Certificates
Appendix G	Monitoring Locations
Appendix H	EM&A Schedule
Appendix I	Monitoring Results
Appendix J	Interim Notifications of Environmental Quality Limits Exceedances
Appendix K	Complaint Log

## EXECUTIVE SUMMARY

- Drainage Services Department (DSD) has awarded the contract for the Design and Construction of Tsuen Wan Drainage Tunnel (hereafter referred to as the “Project”) to Maeda-CRGL-SELI Joint Venture (MCSJV). MCSJV has appointed Hyder Consulting Limited (HCL) as the Environmental Team (ET) to undertake the Environmental Monitoring and Audit (EM&A) works in accordance with the EM&A Manual and Environmental Permit (EP). Commencement of the construction work had been notified to the Environmental Protection Department (EPD) in January 2008. This Monthly EM&A Report summarises the EM&A works undertaken in July 2012.
- According to the EM&A Manual, there are four designated air quality monitoring locations, five designated noise monitoring locations and five water quality monitoring locations during the construction phase: (i) Sik Sik Yuen Ho Fung College (ASR 1, NSR 1 and Intake I-1); (ii) Hong Hoi Chee Hong Temple (ASR 3, NSR 3 and Intake I-2); (iii) Squatters (NSR 6 and Intake I-3); (iv) Beach Tower (Long Beach Gardens) (ASR 8, NSR 8 and Outfall O-1); and (v) Greenview Terrace (Block 1) (ASR 9, NSR 9 and Outfall O-1).
- During the non restricted hours, major construction activities undertaken by the Contractor at Tsuen Wan Drainage Tunnel included site cleaning and tidying at Outfall, I-1, I-2 and I-3; excavation, concrete breaking for open tapered channel, cascade and box culvert construction at Outfall; construction of reinforced concrete (RC) structure of buttress wall and opened tapered channel at Outfall; construction of de-aeration chamber RC structure at I-3; drilling hole and excavation for main adit tunnel at I-3; backfilling for de-aeration chamber and vortex drop shaft (VDS) at I-3; construction of man access shaft RC structure at I-3; construction of vortex drop shaft RC structure at I-3; excavation and construction of road drainage at I-3; tree planting at I-3; blasting and excavation of main adit tunnel at I-2; construction of man access shaft and deaeration chamber RC structure at I-2; installation of erosion control mat and associated landscaping works at portion G at I-2; modification works of 1500 mm step-channel outlet at portion G at I-2; installation of steel works at portion G at I-2; construction of remaining box culvert RC structure at I-1; installation of waterproof membrane, screeding and rendering for tiling works at I-1; and grouting and segment repair works at Tunnel.
- No exceedances have been recorded for air quality monitoring during the reporting month.
- No exceedances have been recorded for noise monitoring during the reporting month.
- Exceedances for river water quality monitoring are summarised in the following table:

Parameter	Action Level Exceedance	Limit Level Exceedance
DO	Nil	Nil
Turbidity	Nil	Two records at I-1 on 23 July 2012 and 25 July 2012; four records at I-2 on 5 July 2012, 18 July 2012, 25 July 2012 and 27 July 2012; five records at I-3 on 5 July 2012, 18 July 2012, 23 July 2012, 25 July 2012 and 27 July 2012
SS	One record at I-1 on 18 July 2012; two records at I-2 on 27 July 2012 and 30 July 2012	Three records at I-1 on 9 July 2012, 23 July 2012 and 25 July 2012; three records at I-2 on 5 July 2012, 7 July 2012 and 25 July 2012; four records at I-3 on 18 July 2012, 23 July 2012, 25 July 2012 and 27 July 2012

- Marine water quality monitoring for dredging and marine works has been terminated since 1 May 2012. As such, there was no marine water quality monitoring in this reporting month.
- The status of waste generation in the reporting month is:
  - A total of 1,930.6 m<sup>3</sup> C&D material was disposed of to public fill at Tuen Mun. No inert C&D material was reused in this Contract and about 480.0 m<sup>3</sup> inert C&D material was reused in other Contracts. Detail information could be referred to Section 5.1.1 of this report.
  - About 20.8 m<sup>3</sup> general waste was disposed of to NENT Landfill;
  - No paper/cardboard was recycled in the reporting month;
  - No metal was generated in the reporting month;
  - No plastic waste was disposed of in the reporting month; and
  - About 13,400 kg chemical waste was disposed of in the reporting month.
- In this reporting month, two site inspections were carried out by ET and Independent Environmental Checker (IEC) respectively, to ensure proper implementation of environmental mitigation measures specified in the EM&A Manual and compliance with environmental legislation. All observations, which were recorded on the site inspection checklists, were passed to the Contractor together with the ET's recommendations.
- As advised by the Contractor and verified by ET:
  - No non-compliance regarding the site inspection was received in the reporting month;
  - No environmental complaint was received during the reporting month; and
  - No summons and prosecution was received in the reporting month.
- The major construction works for the upcoming three months will be:
  - Site cleaning and tidying at Outfall, I-1, I-2 and I-3;
  - Excavation and construction of cascade and open tapered channel at outfall;
  - Excavation and construction of box culvert at outfall;
  - Construction of buttress wall at outfall;
  - Slope reinstatement works at outfall;
  - Finishing works for spiral ramp at outfall;
  - Construction of vehicular access from spiral ramp to box culvert at outfall;
  - Excavation and construction of permanent access road at I-3;
  - Construction of road drainage works at I-3;
  - Excavation and construction of main adit tunnel at I-3;
  - Construction of vortex drop shaft RC structure at I-3;
  - Construction of man access shaft RC structures at I-3;
  - Construction of de-aeration chamber RC structure at I-3;
  - Construction of 85 degree cut slope above access road at I-3;
  - Tree planting at I-3;

- Excavation and construction of main adit tunnel at I-2;
- Construction of vortex drop shaft RC structure at I-2;
- Construction of man access shaft and man access adit RC structure at I-2;
- Construction of de-aeration chamber RC structure at I-2;
- Drainage works and outstanding landscaping works at portion G at I-2;
- Construction of remaining box culvert RC structure at I-1;
- Construction of skin wall and ramp at I-1;
- Finishing works for spiral ramp at I-1; and
- Grouting and segment repair works at Tunnel.



# 1 INTRODUCTION

- 1.1.1 The Drainage Services Department (DSD) proposed to construct a tunnel with an internal diameter of 6.5 m and a length of 5.13 km, with the purpose to alleviate the flooding risk in Tsuen Wan and Kwai Chung.
- 1.1.2 This project is a Designated Project under Schedule 2 Part I Category Q, of the Environmental Impact Assessment Ordinance (EIAO) as part of the proposed Tsuen Wan Drainage Tunnel (TWDT) passes underneath the existing Tai Mo Shan Country Park. An Environmental Impact Assessment (EIA) Study has therefore been undertaken to provide information on the nature and extent of environmental impacts arising from the construction and operation of the proposed designated project and related activities taking place concurrently. From the EIA, the recommendations for monitoring contained herein are made.
- 1.1.3 The Maeda-CRGL-SELI Joint Venture (MCSJV) was awarded by DSD with the Contract – Design and Construction of Tsuen Wan Drainage Tunnel.
- 1.1.4 Hyder was commissioned by the MCSJV as the Environmental Team (ET) to implement an EM&A programme in accordance with the EM&A Manual. The proposed tunnel section flows from the junction of Shing Mun Road and Wo Yi Hop Road and discharges to south of Yau Kom Tau underneath Castle Peak Road as shown in Appendix A.
- 1.1.5 The construction works of the Project was commenced in January 2008. This is the fifty-second monthly EM&A report summarising the impact monitoring results and audit findings of the EM&A programme in July 2012.

## 2 PROJECT INFORMATION

### 2.1 Project Organization and Management Structure

2.1.1 The organization chart and lines of communication with respect to the on-site environmental management are shown in Appendix B.

### 2.2 Construction Progress

2.2.1 The overall project programme from the detail design to completion of all civil works shall take approximately 54 months. The construction programme is presented in Appendix C.

2.2.2 The major construction activities undertaken in the reporting month were:

- Site cleaning and tidying at Outfall, I-1, I-2 and I-3;
- Excavation, concrete breaking for open tapered channel, cascade and box culvert construction at Outfall;
- Construction of reinforced concrete (RC) structure of buttress wall and opened tapered channel at Outfall;
- Construction of de-aeration chamber RC structure at I-3;
- Drilling hole and excavation for main adit tunnel at I-3;
- Backfilling for de-aeration chamber and vortex drop shaft (VDS) at I-3;
- Construction of man access shaft RC structure at I-3;
- Construction of vortex drop shaft RC structure at I-3;
- Excavation and construction of road drainage at I-3;
- Tree planting at I-3;
- Blasting and excavation of main adit tunnel at I-2;
- Construction of man access shaft and deaeration chamber RC structure at I-2;
- Installation of erosion control mat and associated landscaping works at portion G at I-2;
- Modification works of 1500 mm step-channel outlet at portion G at I-2;
- Installation of steel works at portion G at I-2;
- Construction of remaining box culvert RC structure at I-1;
- Installation of waterproof membrane, screeding and rendering for tiling works at I-1;  
and
- grouting and segment repair works at Tunnel.

2.2.3 No marine mud dredging works for basin scheme at portion E was conducted in the reporting month, as all marine work were completed on 30 March 2012.

2.2.4 Rock splitting at main adit (MA) within noise enclosure at I-2, erecting formwork for vortex drop shaft at I-3, and dismantling and re-erecting of scaffold for VDS at I-3 were undertaken during the restricted hours in the reporting period.

## 2.3 Mitigation Measures

2.3.1 The implemented environmental mitigation measures and their statuses are given in Appendix D.

## 2.4 Statuses of Licences and Permits

2.4.1 A summary of relevant permits and licences for the Project is given in Appendix E.

## 3 SUMMARY OF EM&A REQUIREMENT

### 3.1 Air Quality

#### Air Quality Parameters

- 3.1.1 One-hour total suspended particulates (TSP) levels were measured at the designated air quality monitoring locations in accordance with the EM&A Manual. Information such as date of monitoring, duration, weather condition, equipment used and monitoring results were recorded on the field data sheet developed for the Project. The monitoring results are presented in Section 4.

#### Monitoring Methodology

- 3.1.2 One-hour TSP monitoring was carried out under typical weather conditions (with no adverse weather such as typhoon signal or rain storm warning) three times every six days using High Volume Air Samplers (HVASs). Monitoring was conducted in accordance with the standard sampling method as set out in High Volume Method for Total Suspended Particulates, Part 50 Chapter 1 Appendix B, Title 40 of the Code of Federal Regulations of the USEPA.
- 3.1.3 After each sampling, the filter paper loaded with dust was kept in a clean and tightly sealed plastic bag. The filter paper was then re-conditioned in desiccators for 24 hours before obtaining the weight under laboratory conditions.
- 3.1.4 The average concentrations of the TSP were calculated based on the following information obtained from monitoring:
- Flow rate;
  - Weight of the filter paper before and after sampling; and
  - Sampling period indicated by the elapsed-time meter.
- 3.1.5 All samples were kept in good condition (i.e. stored in sealed plastic bags, with brief description of the monitoring dates and locations) for a period of 6 months before disposal. Sample analysis was carried out by ALS Technichem (HK) Pty Limited (HOKLAS Registration Number 066).

#### Monitoring Equipment and Calibration

- 3.1.6 High Volume Air Samplers (HVASs) were used for 1-hour TSP monitoring to comply with the USEPA specifications in Appendix B Part 5 - Reference Method for the Determination of Suspended Particulate Matter in the Atmosphere (High-Volume Method) of the Code of Federal Regulation dated June 1, 1991.
- 3.1.7 All HVASs were calibrated before commencement of monitoring using standard orifice 5-points calibration method with orifice calibrator to determine the actual flow rate of each HVAS. This was used for the calculation of the TSP level. Calibration Kit Model - TE5025A was used for calibration of the HVAS. Recalibration of the HVAS was carried out after motor maintenance, at least once every six months, which was about the expected life of carbon brush. The air quality monitoring equipment used during the

reporting month is shown in Table 3-1 below. The calibration certificates are included in Appendix F.

Equipment Type	Model	Serial Number	Calibration Orifice Number	Location
HVAS	BM2000HX	4994	1785	ASR 1
HVAS	BM2000HX	5875	1785	ASR 3
HVAS	TE5005X	1059	1785	ASR 8
HVAS	TE5005X	1713	1785	ASR 9

**Table 3-1 Air Quality Monitoring Equipment**

## Monitoring Location

3.1.8 Four designated air quality monitoring locations were identified in the contract specific EM&A manual. They are listed in Table 3-2 below and shown in Appendix G.

Monitoring Station ID	Name of Premises	Floor Level
ASR1	Sik Sik Yuen Ho Fung College	G/F
ASR3	Hong Hoi Chee Hong Temple	Podium
ASR8	Beach Tower (Long Beach Garden)	G/F
ASR9	Greenview Terrace (Block 1)	G/F

**Table 3-2 Air Quality Monitoring Locations**

## Action and Limit Levels

3.1.9 The Action and Limit Levels for the 1-hour TSP monitoring are shown in Table 3-3. In case exceedances of Action and/or Limit levels for air quality occur, Event Contingency Plans (ECPs) would be implemented. The ECPs for Action and Limit levels exceedances are shown in Table 3-4.

Station	1-hour TSP Level in $\mu\text{g}/\text{m}^3$	
	Action Level	Limit Level
ASR 1	307	500
ASR 3	327	500
ASR 8	337	500
ASR 9	329	500

**Table 3-3 Action & Limit Levels for Air Quality**

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

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

**Table 3-4 Event/Action Plan for Air Quality**

## 3.2 Noise

### Noise Parameters

- 3.2.1 The construction noise level was measured in terms of equivalent A-weighted sound pressure level ( $L_{eq}$ ) measured in decibels (dB(A)). Monitoring of  $L_{eq(30\text{ min})}$  was carried out at the noise monitoring locations on a weekly basis during normal construction working hours (0700-1900 hours from Monday to Saturday except public holidays). For all other time periods (i.e. restricted hours),  $L_{eq(5\text{ min})}$  would be employed for comparison with the Noise Control Ordinance (NCO) criteria if necessary.
- 3.2.2 The two statistical sound levels  $L_{10}$  and  $L_{90}$ , the level exceeded for 10 and 90 percent of the time respectively, were also recorded during monitoring. Major noise sources observed, both on-site and off-site, were recorded on the field data sheet. All measurements were recorded and presented to the nearest 0.1 dB(A) in this report. Results are presented in Section 4.

### Monitoring Methodology

- 3.2.3 Sound level meters, which comply with the International Electrotechnical Commission Publication 651:1979 (Type 1) and 804:1985 (Type 1) specifications as referred to the Technical Memorandum (TM) issued under the Noise Control Ordinance, were used. Noise levels for the A-weighted levels  $L_{eq(30\text{ min})}$ ,  $L_{10}$  and  $L_{90}$  were measured throughout the impact monitoring. An average, by sound power, of six consecutive 5-minute readings was used to provide  $L_{eq(30\text{ min})}$  for non-restricted hours (0700-1900 hours from Monday to Saturday except public holidays). A facade correction of 3 dB(A) was applied to the measurements that were carried out under free field conditions.
- 3.2.4 During the impact monitoring, parameters such as dates, weather condition, equipment used, measurement results and major noise sources were recorded on the field data record sheet. Monitoring would not be carried out in the presence of fog, rain or strong wind with a steady speed exceeding 5 m/s. In relation to the monitored noise levels, other noise sources such as road traffic might make a significant contribution to the overall noise environment. Therefore, noise monitoring activities would take into account such influencing factors, which were not present during the baseline monitoring period.

### Monitoring Equipment and Calibration

- 3.2.5 Rion Precision Sound Level Meters of Type NL-31 and B&K Integrating Sound Level Meter of Type 2238 in compliance with the International Electrotechnical Commission Publication specifications (Paragraph 3.2.3) were used for noise monitoring in this reporting month.
- 3.2.6 Prior to and following each noise measurement, the accuracy of the sound level meters was checked using an acoustic calibrator generating a known sound pressure level at a known frequency. Measurements were considered as valid only if the calibration levels from before and after the noise measurement agreed to within 1.0 dB(A). Sound level meters and calibrators were calibrated annually to ensure they performed to the same level of accuracy as stated in the manufacturer's specifications. The noise monitoring



equipment used during the reporting month are shown in Table 3-5 below. The calibration certificates are included in Appendix F.

Equipment Type	Manufacturer	Type Number	Serial Number	Location
Sound Level Meter	Rion	NL-31	00410224	NSR1, NSR3, NSR6, NSR8 and NSR9
Sound Level Meter	B&K	2238	2448529	
Sound Level Calibrator	Rion	NC-73	10486660	
Sound Level Calibrator	B&K	4231	2699361	

**Table 3-5 Noise Monitoring Equipment**

## Monitoring Location

3.2.7

Five designated noise monitoring locations were identified in the contract specific EM&A Manual. They are listed in Table 3-6 below and shown in Appendix G. All the locations below are in facade measurement.

Monitoring Station ID	Name of Premises	Floor Level
NSR1	Sik Sik Yuen Ho Fung College	G/F
NSR3	Hong Hoi Chee Hong Temple	Podium
NSR6	Squatters	G/F
NSR8	Beach Tower (Long Beach Garden)	G/F
NSR9	Greenview Terrace (Block 1)	Podium (up to 6 July 2009) Roof* (since 16 July 2009)

\* The noise monitoring location of NSR9 had been adjusted to rooftop since 16 July 2009.

**Table 3-6 Noise Monitoring Locations**

## Action and Limit Levels

3.2.8

The Action and Limit levels for construction noise are defined in Table 3-7. If non-compliance of the criteria occurs, actions in accordance with the Action Plan in Table 3-8 would be carried out.

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

\* For educational establishments the limit level shall be 70 dB(A) and reduced to 65 dB(A) during examination periods between 0700 and 1900 hours on normal weekdays.

**Table 3-7 Action & Limit Levels for Air Borne Noise**

Event	Action			
	ET Leader	IEC	SOR	Contractor
Action Level	<ul style="list-style-type: none"> <li>• Notify IEC and the Contractor.</li> <li>• Carry out investigation.</li> <li>• Report the results of investigation to IEC and the Contractor.</li> <li>• Discuss with the Contractor and formulate remedial measures.</li> <li>• Increase monitoring frequency to check mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>• Review with analysed results submitted by ET.</li> <li>• Review the proposed remedial measures by the Contractor and advise SOR accordingly.</li> <li>• Supervise the implementation of remedial measures.</li> </ul>	<ul style="list-style-type: none"> <li>• Confirm receipt of notification of exceedance in writing.</li> <li>• Notify the Contractor.</li> <li>• Require the Contractor to propose remedial measures for the analysed noise problem.</li> <li>• Ensure remedial measures are properly implemented.</li> </ul>	<ul style="list-style-type: none"> <li>• Submit noise mitigation proposals to IEC.</li> <li>• Implement noise mitigation proposals.</li> </ul>
Limit Level	<ul style="list-style-type: none"> <li>• Identify the source.</li> <li>• Notify IEC, SOR, EPD and the Contractor.</li> <li>• Repeat measurement to confirm findings.</li> <li>• Increase monitoring frequency.</li> <li>• Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented.</li> <li>• Inform IEC, SOR, and EPD the causes and actions taken for the exceedances.</li> <li>• Assess effectiveness of the Contractor's remedial actions and keep IEC, EPD and SOR informed of the results.</li> <li>• If exceedance stops, cease additional monitoring.</li> </ul>	<ul style="list-style-type: none"> <li>• Discuss amongst SOR, ET Leader and the Contractor on the potential remedial actions.</li> <li>• Review the Contractor's remedial actions whenever necessary to assure their effectiveness and advise SOR accordingly.</li> <li>• Supervise the implementation of remedial measures.</li> </ul>	<ul style="list-style-type: none"> <li>• Confirm receipt of notification of exceedance in writing.</li> <li>• Notify the Contractor.</li> <li>• Require the Contractor to propose remedial measures for the analysed noise problem.</li> <li>• Ensure remedial measures are properly implemented.</li> <li>• If exceedance continues, consider what activity of the work is responsible and instruct the Contractor to stop that activity of work until the exceedance is abated.</li> </ul>	<ul style="list-style-type: none"> <li>• Take immediate action to avoid further exceedance.</li> <li>• Submit proposals for remedial actions to IEC within 3 working days of notification.</li> <li>• Implement the agreed proposals.</li> <li>• Resubmit proposals if problem still not under control.</li> <li>• Stop the relevant activity of works as determined by the SOR until the exceedance is abated.</li> </ul>

**Table 3-8 Event/Action Plan for Airborne Noise**

## 3.3 Water Quality

- 3.3.1 The water quality impact would be insignificant with the protection measures recommended in Section 5.6 of the EIA report. However, in view of the sensitive nature of the rivers/streams and bathing beaches near the Project site, it is suggested that a programme of monitoring should be established to confirm the effectiveness of these mitigation measures in protecting these water bodies.

### Water Quality Parameters

- 3.3.2 Monitoring for dissolved oxygen (DO), temperature, turbidity, pH and suspended solids (SS) should be undertaken at designated monitoring locations. It should be noted that DO, temperature, turbidity and pH should be measured in-situ whereas SS is assayed in a laboratory.
- 3.3.3 In association with the water quality parameters, other relevant data should also be measured, such as monitoring location/position, time, weather conditions, and any special phenomena and description of work underway at the construction site etc.

### Monitoring Methodology

- 3.3.4 In accordance with the EM&A Manual, the water quality monitoring for all specified parameters were measured at all designated monitoring locations including control points at an interval of 3 days per week. DO, temperature, turbidity, pH and SS measurements were undertaken at designated monitoring locations.
- 3.3.5 It should be noted that water samples for all monitoring parameters were collected, stored, preserved and analysed according to Standard Methods, APHA 17 ed. and/or methods agreed by the Director of Environmental Protection.
- 3.3.6 Each sample was analysed in accordance with the APHA Standard Methods for the Examination of Water and Wastewater, 18<sup>th</sup> edition, or an equivalent method approved by the EPD. In any circumstance, the sample testing should comply with a comprehensive quality assurance and quality control programme. The laboratory should be prepared to demonstrate the quality programmes to the EPD when requested.

### Monitoring Equipment and Calibration

- 3.3.7 All the water samples collected were transferred to clearly labelled and pre-cleaned sample containers with necessary preservatives immediately after collection. The sample containers were provided by a HOKLAS accredited laboratory. About 1 L of samples was collected for all laboratory analysis. Following sampling, samples should be stored in a cool box at temperature between 0 and 4 °C, and transported to the laboratory within the sample retention time as advised by the laboratory under proper chain-of-custody system. The water quality monitoring equipment used during the reporting month is shown in Table 3-9 below.

Equipment Type	Manufacturer	Model	Quantity
DO / Temperature Meter	YSI	55/12	1
DO / Temperature/ pH Meter	YSI	Professional Plus	1
pH Meter	Hanna	HI-8014	1
Turbidimeter	EUTECH	TN-100	1

**Table 3-9 Water Quality Monitoring Equipment**

3.3.8 All in-situ monitoring equipment were checked and calibrated prior to use. They were calibrated by a laboratory accredited under HOKLAS or any other international accreditation scheme, and subsequently re-calibrated at 3 monthly intervals throughout all stages of the water quality monitoring. Responses of sensors and electrodes were checked with certified standard solutions before each use. Wet bulb calibrations for all DO meters were carried out before measurement at each monitoring location. For the on-site calibration of field equipment, BS 127:1993, "Guide to field and on-site test methods for the analysis of waters" was observed. The calibration certificates are included in Appendix F.

## Monitoring Location

3.3.9 Five designated impact monitoring locations (three river stations and two marine stations) and five control locations (three river control stations and two marine control stations) were identified in the contract specific EM&A Manual for river and marine water quality monitoring. These monitoring stations are listed in Table 3-10 below and shown in Appendix G.

Monitoring Station ID	Name of Premises
<i>River</i>	
I-1	Intake I-1
I-1-C	Control of Intake I-1
I-2	Intake I-2
I-2-C	Control of Intake I-2
I-3	Intake I-3
I-3-C*	Control of Intake I-3
<i>Marine</i>	
O-1 (FT) and (ET)	Outfall O-1 during Flood Tide and Ebb Tide
O-1-C (FT)	Control of Outfall O-1 during Flood Tide
O-1-C (ET)	Control of Outfall O-1 during Ebb Tide

\*The upper stream location (I-3-C\*) had been relocated from end of February 2009 due to coarse stone blockage.

**Table 3-10 Water Quality Monitoring Locations**

- 3.3.10 Note that there were two control stations for Outfall O-1, one for sampling during flood tide and one for sampling during ebb tide. Only one of these control stations for Outfall O-1 was sampled during each sampling. Control station to be sampled was determined based on the tidal information provided by the Hong Kong Observatory.
- 3.3.11 Referring to Section 4.4 of the approved Contract Specific EM&A Manual (Report No. EB000364R0273, dated 6 January 2010), while the construction of the Outfall requires minor dredging, water quality monitoring at the Outfall shall be undertaken during the period of the dredging works. As advised by the Contractor, all relevant marine works at Portion E of the site were completed in April 2012. As such, the ET submitted a proposal to EPD on 30 April 2012 to terminate the marine water quality monitoring effective from 1 May 2012. EPD had no objection to the proposal in their reply on 7 May 2012.

## Action and Limit Levels

- 3.3.12 The Action and Limit levels for water quality monitoring parameters are defined in Table 3-11. In case of any exceedance, appropriate actions would be undertaken in accordance with the Event and Action Plan as described in Table 3-12.

Parameters	Action	Limit
DO in mg/L (Surface, Middle and Bottom)	<p><u>Surface and Middle</u> 5%-ile of baseline data for surface and middle layer.</p> <p><u>Bottom</u> 5%-ile of baseline data for bottom layer.</p>	<p><u>Surface and Middle</u> 4 mg/L except 5 mg/L for Fish Culture Zone or 1%-ile of baseline data for surface and middle layer</p> <p><u>Bottom</u> 2 mg/L or 1%-ile of baseline data for bottom layer</p>
SS in mg/L (depth-averaged)	95%-ile of baseline data or 120% of upstream control station's SS at the same tide of the same day	99%-ile of baseline or 130% of upstream control station's SS at the same tide of the same day and specific sensitive receiver water quality requirements (e.g. required suspended solids levels for concerned sea water intakes)
Turbidity (Tby) in NTU (depth-averaged)	95%-ile of baseline data or 120% of upstream control station's Tby at the same tide of the same day	99%-ile of baseline or 130% of upstream control station's Tby at the same tide of the same day

Notes:

- For DO, non-compliance of the water quality limits occurs when monitoring result is lower than the limit.
- For SS and Tby, non-compliance of the water quality limits occurs when monitoring result is higher than the limits.
- All the figures given in the table are used for reference only and the EPD may amend the figures whenever it is considered necessary.

**Table 3-11 Action/Limit Levels for Water Quality**

Event	ET Leader	IEC	SOR	Contractor
Action Level being exceeded by one sampling day	<ul style="list-style-type: none"> <li>Repeat in-situ measurement to confirm findings;</li> <li>Identify source(s) of impact;</li> <li>Inform IEC and Contractor;</li> <li>Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>Discuss mitigation measures with IEC and Contractor; and</li> <li>Repeat measurement on next day of exceedance.</li> </ul>	<ul style="list-style-type: none"> <li>Discuss with ET and Contractor on the mitigation measures;</li> <li>Review proposals on mitigation measures submitted by Contractor and advise the SOR accordingly; and</li> <li>Assess the effectiveness of the implemented mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>Discuss with IEC on the proposed mitigation measures; and</li> <li>Make agreement on the mitigation measures to be implemented.</li> </ul>	<ul style="list-style-type: none"> <li>Inform the SOR and confirm notification of the non-compliance in writing;</li> <li>Rectify unacceptable practice;</li> <li>Check all plant and equipment;</li> <li>Consider changes of working methods;</li> <li>Discuss with ET and IEC and propose mitigation measures to IEC and SOR; and</li> <li>Implement the agreed mitigation measures.</li> </ul>
Action Level being exceeded by more than one consecutive sampling day	<ul style="list-style-type: none"> <li>Repeat in-situ measurement to confirm findings;</li> <li>Identify source(s) of impact;</li> <li>Inform IEC and Contractor;</li> <li>Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>Discuss mitigation measures with IEC and Contractor;</li> <li>Ensure mitigation measures are implemented;</li> <li>Prepare to increase the monitoring frequency to daily; and</li> <li>Repeat</li> </ul>	<ul style="list-style-type: none"> <li>Discuss with ET and Contractor on the mitigation measures;</li> <li>Review proposals on mitigation measures submitted by Contractor and advise the SOR accordingly; and</li> <li>Assess the effectiveness of the implemented mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>Discuss with IEC on the proposed mitigation measures;</li> <li>Make agreement on the mitigation measures to be implemented; and</li> <li>Assess the effectiveness of the implemented mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>Inform the Engineer and confirm notification of the non-compliance in writing;</li> <li>Rectify unacceptable practice;</li> <li>Check all plant and equipment;</li> <li>Consider changes of working methods;</li> <li>Discuss with ET and IEC and propose mitigation measures to IEC and SOR within 3 working days; and</li> <li>Implement the agreed mitigation measures.</li> </ul>

Event	ET Leader	IEC	SOR	Contractor
	measurement on next day of exceedance.			
Limit Level being exceeded by one sampling day	<ul style="list-style-type: none"> <li>Repeat in-situ measurement to confirm findings;</li> <li>Identify source(s) of impact;</li> <li>Inform IEC, Contractor and EPD;</li> <li>Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>Discuss mitigation measures with IEC, SOR and Contractor;</li> <li>Ensure mitigation measures are implemented; and</li> <li>Increase the monitoring frequency to daily until no exceedance of Limit level.</li> </ul>	<ul style="list-style-type: none"> <li>Discuss with ET and Contractor on the mitigation measures;</li> <li>Review proposals on mitigation measures submitted by Contractor and advise the SOR accordingly; and</li> <li>Assess the effectiveness of the implemented mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>Discuss with IEC, ET and Contractor on the proposed mitigation measures;</li> <li>Request Contractor to critically review the working methods;</li> <li>Make agreement on the mitigation measures to be implemented; and</li> <li>Assess the effectiveness of the implemented mitigation measures.</li> </ul>	<ul style="list-style-type: none"> <li>Inform the SOR and confirm notification of the non-compliance in writing;</li> <li>Rectify unacceptable practice;</li> <li>Check all plant and equipment;</li> <li>Consider changes of working methods;</li> <li>Discuss with ET, IEC and SOR and propose mitigation measures to IEC and SOR within 3 working days; and</li> <li>Implement the agreed mitigation measures.</li> </ul>
Limit Level being exceeded by more than one consecutive sampling day	<ul style="list-style-type: none"> <li>Repeat in-situ measurement to confirm findings;</li> <li>Identify source(s) of impact;</li> <li>Inform IEC, Contractor and EPD;</li> <li>Check monitoring data, all plant, equipment and Contractor's working methods;</li> <li>Discuss mitigation measures with</li> </ul>	<ul style="list-style-type: none"> <li>Discuss with ET and Contractor on the mitigation measures;</li> <li>Review proposals on mitigation measures submitted by Contractor and advise the SOR accordingly; and</li> <li>Assess the effectiveness of the implemented mitigation</li> </ul>	<ul style="list-style-type: none"> <li>Discuss with IEC, ET and Contractor on the proposed mitigation measures;</li> <li>Request Contractor to critically review the working methods;</li> <li>Make agreement on the mitigation measures to be implemented;</li> <li>Assess the effectiveness of</li> </ul>	<ul style="list-style-type: none"> <li>Inform the SOR and confirm notification of the non-compliance in writing;</li> <li>Rectify unacceptable practice;</li> <li>Check all plant and equipment;</li> <li>Consider changes of working methods;</li> <li>Discuss with ET, IEC and SOR and</li> </ul>

Event	ET Leader	IEC	SOR	Contractor
	IEC, SOR and Contractor; <ul style="list-style-type: none"> <li>• Ensure mitigation measures are implemented; and</li> <li>• Increase the monitoring frequency to daily until no exceedance of Limit level for two consecutive days.</li> </ul>	measures.	the implemented mitigation measures; and <ul style="list-style-type: none"> <li>• Consider and instruct, if necessary, the Contractor to slow down or to stop all or part of the marine work until no exceedance of Limit Level.</li> </ul>	propose mitigation measures to IEC and SOR within 3 working days; <ul style="list-style-type: none"> <li>• Implement the agreed mitigation measures; and</li> <li>• As directed by the SOR, to slow down or to stop all or part of the marine work or construction activities.</li> </ul>

**Table 3-12 Event/Action Plan for Water Quality**



## 4 MONITORING RESULT

### 4.1 Air Quality

4.1.1 The air quality monitoring schedule of the reporting period is given in Appendix H.

#### 1-hour TSP Monitoring

4.1.2 Results of 1-hour TSP level are shown in Table 4-1. All measurements were recorded and presented to the nearest 0.1  $\mu\text{g}/\text{m}^3$  in this report. Detailed results including weather conditions and graphical presentations are presented in Appendix I.

Station	Monitoring Date	Monitoring Result ( $\mu\text{g}/\text{m}^3$ )	Action/Limit Levels ( $\mu\text{g}/\text{m}^3$ )
ASR 1	04-Jul-12	128.6	307/500
		114.4	
	10-Jul-12	59.8	
		45.5	
		44.2	
		75.4	
		27.3	
		83.2	
	20-Jul-12	79.3	
		106.6	
		120.8	
		91.0	
	26-Jul-12	142.0	
		50.7	
75.4			
71.1			
ASR 3	04-Jul-12	41.9	327/500
		55.9	
	10-Jul-12	26.7	
		40.6	
		167.6	
		54.6	
		64.7	
		59.7	
	20-Jul-12	81.3	
		101.6	
		109.2	
		111.7	
	26-Jul-12	25.4	
		54.6	

Station	Monitoring Date	Monitoring Result ( $\mu\text{g}/\text{m}^3$ )	Action/Limit Levels ( $\mu\text{g}/\text{m}^3$ )
ASR 8	04-Jul-12	116.0	337/500
		113.2	
		90.2	
	10-Jul-12	75.9	
		48.7	
		71.6	
	16-Jul-12	50.1	
		73.0	
		73.0	
	20-Jul-12	94.5	
		113.2	
		130.3	
	26-Jul-12	147.5	
		111.7	
136.1			
ASR 9	04-Jul-12	102.7	329/500
		23.9	
		46.4	
	10-Jul-12	88.6	
		61.9	
		112.5	
	16-Jul-12	50.6	
		99.9	
		63.3	
	20-Jul-12	67.5	
		111.1	
		99.9	
	26-Jul-12	156.1	
		116.7	
88.6			

Note: *Italic* indicates the occurrence of exceedance of *Action level*

**Bold** indicates the occurrence of exceedance of **Limit Level**

**Table 4-1 Air Quality Monitoring Results**

4.1.3 No project related air quality exceedance was recorded in the reporting month.

## 4.2 Noise

### Air Borne Noise Monitoring

4.2.1 The air borne noise monitoring schedule of the reporting period is given in Appendix H. Results of measured noise level, in terms of  $L_{eq(30min)}$ , during the construction are shown in Table 4-2. All measurements including  $L_{10}$  and  $L_{90}$  are recorded and presented to the nearest 0.1 dB(A) in this report. Detailed results including weather conditions and graphical presentation are presented in Appendix I.

Station	Monitoring Date	$L_{eq(30min)}$ dB(A)	Limit Levels dB(A)
NSR 1	04-Jul-12	63.7	70
	10-Jul-12	63.4	
	16-Jul-12	64.0	
	26-Jul-12	65.1	
NSR 3	04-Jul-12	66.1	75
	10-Jul-12	68.1	
	16-Jul-12	69.7	
	26-Jul-12	72.5	
NSR 6	04-Jul-12	62.3	75
	10-Jul-12	59.6	
	16-Jul-12	66.3	
	26-Jul-12	60.3	
NSR 8	04-Jul-12	63.3	75
	10-Jul-12	63.2	
	16-Jul-12	63.4	
	26-Jul-12	65.3	
NSR 9	04-Jul-12	66.5	75
	10-Jul-12	65.3	
	16-Jul-12	64.5	
	26-Jul-12	68.2	

**Table 4-2 Air Borne Noise Monitoring Results**

4.2.2 No project related noise exceedance was recorded in the reporting month.

## 4.3 Water Quality Monitoring

4.3.1 The water quality monitoring schedule of the reporting period is given in Appendix H. Summaries of exceedances for water quality monitoring are provided in Table 4-3 to Table 4-5.

Parameter	Action Level Exceedance	Limit Level Exceedance
DO	Nil	Nil
Turbidity	Nil	Two records on 23 July 2012 and 25 July 2012
SS	One record on 18 July 2012	Three records on 9 July 2012, 23 July 2012 and 25 July 2012
Total	1	5

**Table 4-3 Summary of Exceedances for I-1**

Parameter	Action Level Exceedance	Limit Level Exceedance
DO	Nil	Nil
Turbidity	Nil	Four records on 5 July 2012, 18 July 2012, 25 July 2012 and 27 July 2012
SS	Two records on 27 July 2012 and 30 July 2012	Three records on 5 July 2012, 7 July 2012 and 25 July 2012
Total	2	7

**Table 4-4 Summary of Exceedances for I-2**

Parameter	Action Level Exceedance	Limit Level Exceedance
DO	Nil	Nil
Turbidity	Nil	Five records on 5 July 2012, 18 July 2012, 23 July 2012, 25 July 2012 and 27 July 2012
SS	Nil	Four records on 18 July 2012, 23 July 2012, 25 July 2012 and 27 July 2012
Total	0	9

**Table 4-5 Summary of Exceedances for I-3**

4.3.2 Results of measured water quality parameters during the reporting month are shown in Table 4-6. Detailed results including weather conditions and graphical presentations are enclosed in Appendix I.

## River Water Quality Monitoring

- 4.3.3 Twenty-four exceedances were recorded for the river water quality monitoring within the reporting month.

### Exceedances of Turbidity Level

#### Limit Level at I-2 on 5 July 2012

- 4.3.4 One exceedance of turbidity limit level was recorded at I-2 on 5 July 2012. The measured turbidity level (12.70 NTU) was higher than the baseline limit level, but lower than the turbidity level (12.75 NTU) of the control station (I-2-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. The exceedance was considered to be contributed by high turbidity level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-3 on 5 July 2012

- 4.3.5 One exceedance of turbidity limit level was recorded at I-3 on 5 July 2012. The measured turbidity level (4.72 NTU) was higher than the baseline limit level, but lower than the turbidity level (4.74 NTU) of the control station (I-3-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 22.0 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day, the exceedance was considered to be contributed by heavy rainfall and high turbidity level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-2 on 18 July 2012

- 4.3.6 One exceedance of turbidity limit level was recorded at I-2 on 18 July 2012. The measured turbidity level (7.29 NTU) was higher than the baseline limit level, but lower than the turbidity level (7.50 NTU) of the control station (I-2-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 34.3 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day, the exceedance was considered to be contributed by heavy rainfall and high turbidity level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-3 on 18 July 2012

- 4.3.7 One exceedance of turbidity limit level was recorded at I-3 on 18 July 2012. The measured turbidity level (48.05 NTU) was higher than the baseline limit level, but lower than the turbidity level (48.35 NTU) of the control station (I-3-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 34.3 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day, the exceedance was considered to be

contributed by heavy rainfall and high turbidity level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-1 on 23 July 2012

- 4.3.8 One exceedance of turbidity limit level was recorded at I-1 on 23 July 2012. The measured turbidity level (45.05 NTU) was higher than the baseline limit level, but lower than the turbidity level (45.15 NTU) of the control station (I-1-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 112.0 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day, the exceedance was considered to be contributed by heavy rainfall and high turbidity level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-3 on 23 July 2012

- 4.3.9 One exceedance of turbidity limit level was recorded at I-3 on 23 July 2012. The measured turbidity level (14.31 NTU) was higher than the baseline limit level, but lower than the turbidity level (14.47 NTU) of the control station (I-3-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 112.0 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day, the exceedance was considered to be contributed by heavy rainfall and high turbidity level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-1 on 25 July 2012

- 4.3.10 One exceedance of turbidity limit level was recorded at I-1 on 25 July 2012. The measured turbidity level (24.55 NTU) was higher than the baseline limit level, but lower than the turbidity level (24.75 NTU) of the control station (I-1-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 82.3 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day, the exceedance was considered to be contributed by heavy rainfall and high turbidity level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-2 on 25 July 2012

- 4.3.11 One exceedance of turbidity limit level was recorded at I-2 on 25 July 2012. The measured turbidity level (23.25 NTU) was higher than the baseline limit level, but lower than the turbidity level (23.35 NTU) of the control station (I-2-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 82.3 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day, the exceedance was considered to be contributed by heavy rainfall and high turbidity level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-3 on 25 July 2012

- 4.3.12 One exceedance of turbidity limit level was recorded at I-3 on 25 July 2012. The measured turbidity level (31.15 NTU) was higher than the baseline limit level, but lower than the turbidity level (31.25 NTU) of the control station (I-3-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 82.3 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day, the exceedance was considered to be contributed by heavy rainfall and high turbidity level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-2 on 27 July 2012

- 4.3.13 One exceedance of turbidity limit level was recorded at I-2 on 27 July 2012. The measured turbidity level (8.08 NTU) was higher than the baseline limit level, but lower than the turbidity level (8.19 NTU) of the control station (I-2-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 25.7 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day, the exceedance was considered to be contributed by heavy rainfall and high turbidity level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-3 on 27 July 2012

- 4.3.14 One exceedance of turbidity limit level was recorded at I-3 on 27 July 2012. The measured turbidity level (24.05 NTU) was higher than the baseline limit level, but lower than the turbidity level (24.25 NTU) of the control station (I-3-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 25.7 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day, the exceedance was considered to be contributed by heavy rainfall and high turbidity level at upstream location. Since the exceedance was non-project related, no further action was required.

### Exceedances of Suspended Solids Level

#### Action Level at I-1 on 18 July 2012

- 4.3.15 One exceedance of SS action level was recorded at I-1 on 18 July 2012. The measured SS level (3.45 mg/L) was well below the baseline action/limit level, but higher than 120% of the SS level (2.75 mg/L) of the control station (I-1-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. The exceedance was considered to be contributed by natural variation. Since the exceedance was non-project related, no further action was required.

#### Action Level at I-2 on 27 July 2012

- 4.3.16 One exceedance of SS action level was recorded at I-2 on 27 July 2012. The measured SS level (5.25 mg/L) was lower than the baseline action / limit level, but higher than 120% of the SS level (4.15 mg/L) of the control station (I-2-C). Details of the construction

activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 25.7 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day. Therefore, the exceedance was considered to be contributed by heavy rainfall and high SS level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Action Level at I-2 on 30 July 2012

- 4.3.17 One exceedance of SS action level was recorded at I-2 on 30 July 2012. The measured SS level (7.10 mg/L) was lower than the baseline action / limit level, but higher than 120% of the SS level (5.65 mg/L) of the control station (I-2-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. Therefore, the exceedance was considered to be contributed by natural variation. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-2 on 5 July 2012

- 4.3.18 One exceedance of SS limit level was recorded at I-2 on 5 July 2012. The measured SS level (12.05 mg/L) was higher than the baseline limit level, but lower than the SS level (13.40 mg/L) of the control station (I-2-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 22.0 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day, the exceedance was considered to be contributed by high SS level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-2 on 7 July 2012

- 4.3.19 One exceedance of SS limit level was recorded at I-2 on 7 July 2012. The measured SS level (4.70 mg/L) was lower than the baseline action / limit level, but higher than 130% of the SS level (<2.00 mg/L) of the control station (I-2-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No wastewater directly discharged from the site was observed. Although the SS level at I-2 was more than 135% higher than that at I-2-C, no direct sources of impact from the site were identified. As such, no further mitigation measures or actions were recommended.

#### Limit Level at I-1 on 9 July 2012

- 4.3.20 One exceedance of SS limit level was recorded at I-1 on 9 July 2012. The measured SS level (2.80 mg/L) was well below the baseline action/limit level, but higher than 130% of the SS level (<2.00 mg/L) of the control station (I-1-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. Therefore, the exceedance was considered to be contributed by natural variation. Since the exceedance was non-project related, no further action was required.



#### Limit Level at I-3 on 18 July 2012

- 4.3.21 One exceedance of SS limit level was recorded at I-3 on 18 July 2012. The measured SS level (37.25 mg/L) was higher than the baseline limit level, but lower than 120% of the SS level (36.75 mg/L) of the control station (I-3-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. Raining was observed on the monitoring day and about 34.3 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day. Therefore, the exceedance was considered to be contributed by heavy rainfall and high SS level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-1 on 23 July 2012

- 4.3.22 One exceedance of SS limit level was recorded at I-1 on 23 July 2012. The measured SS level (62.10 mg/L) was higher than the baseline limit level, but lower than 120% of the SS level (59.70 mg/L) of the control station (I-1-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 112.0 mm heavy rainfall was recorded by the Hong Kong Observatory on the monitoring day. Therefore, the exceedance was considered to be contributed by heavy rainfall and high SS level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-3 on 23 July 2012

- 4.3.23 One exceedance of SS limit level was recorded at I-3 on 23 July 2012. The measured SS level (16.35 mg/L) was higher than the baseline limit level, but lower than the SS level (16.40 mg/L) of the control station (I-3-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. Raining was observed on the monitoring day and about 112.0 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day. Therefore, the exceedance was considered to be contributed by heavy rainfall and high SS level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-1 on 25 July 2012

- 4.3.24 One exceedance of SS limit level was recorded at I-1 on 25 July 2012. The measured SS level (17.20 mg/L) was higher than the baseline limit level, but lower than the SS level (18.45 mg/L) of the control station (I-1-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. Raining was observed on the monitoring day and about 82.3 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day. Therefore, the exceedance was considered to be contributed by heavy rainfall and high SS level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-2 on 25 July 2012

- 4.3.25 One exceedance of SS limit level was recorded at I-2 on 25 July 2012. The measured SS level (11.90 mg/L) was higher than the baseline limit level, but lower than the SS level (13.05 mg/L) of the control station (I-2-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. Raining was observed on the monitoring day and about 82.3 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day. Therefore, the exceedance was considered to be contributed by heavy rainfall and high SS level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-3 on 25 July 2012

- 4.3.26 One exceedance of SS limit level was recorded at I-3 on 25 July 2012. The measured SS level (15.05 mg/L) was higher than the baseline limit level, but lower than the SS level (17.90 mg/L) of the control station (I-3-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 82.3 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day. Therefore, the exceedance was considered to be contributed by heavy rainfall and high SS level at upstream location. Since the exceedance was non-project related, no further action was required.

#### Limit Level at I-3 on 27 July 2012

- 4.3.27 One exceedance of SS limit level was recorded at I-3 on 27 July 2012. The measured SS level (16.70 mg/L) was higher than the baseline limit level, but lower than the SS level (18.10 mg/L) of the control station (I-3-C). Details of the construction activities conducted on the monitoring day are given in Appendix J. No direct disturbance was observed from the site. About 25.7 mm rainfall was recorded by the Hong Kong Observatory on the monitoring day. Therefore, the exceedance was considered to be contributed by heavy rainfall and high SS level at upstream location. Since the exceedance was non-project related, no further action was required.

Station	Date	Temperature (°C)	DO (mg/L)	Action/Limit Level for DO (mg/L)	pH	Turbidity (NTU)	Action/Limit Level for Turbidity (NTU)	SS (mg/L)	Action/Limit Level for SS (mg/L)
I-1	03-Jul-12	32.80	6.87	3.42 / 3.34	7.93	3.32	9.75 / 12.47	<2.00	8.85 / 10.17
	05-Jul-12	26.10	7.77		7.90	3.07		<2.00	
	07-Jul-12	26.90	7.83		7.77	5.15		4.95	
	09-Jul-12	32.20	6.85		7.99	2.54		<b>2.80</b>	
	11-Jul-12	32.20	6.89		7.96	2.77		2.36	
	13-Jul-12	32.00	7.38		7.98	3.35		<2.00	
	16-Jul-12	29.65	7.37		7.96	3.75		3.55	
	18-Jul-12	27.00	6.78		7.90	4.64		<b>3.45</b>	
	20-Jul-12	29.70	7.23		7.90	3.25		2.10	
	23-Jul-12	26.60	7.56		7.93	<b>45.05</b>		<b>62.10</b>	
	25-Jul-12	24.10	7.94		7.97	<b>24.55</b>		<b>17.20</b>	
	27-Jul-12	24.40	8.04		8.02	7.84		5.10	
	30-Jul-12	33.00	6.90		7.88	3.22		3.25	

Note: *Italic* indicates the occurrence of exceedance of *Action level*.  
**Bold** indicates the occurrence of exceedance of **Limit level**.

Station	Date	Temperature (°C)	DO (mg/L)	Action/Limit Level for DO (mg/L)	pH	Turbidity (NTU)	Action/Limit Level for Turbidity (NTU)	SS (mg/L)	Action/Limit Level for SS (mg/L)
I-1-C	03-Jul-12	32.80	6.80	- / -	7.93	3.42	- / -	<2.00	- / -
	05-Jul-12	26.10	7.73		7.90	3.08		<2.00	
	07-Jul-12	26.90	7.74		7.77	5.23		5.70	
	09-Jul-12	32.20	6.79		7.99	2.63		<2.00	
	11-Jul-12	32.20	6.83		7.96	2.82		2.75	
	13-Jul-12	31.90	7.34		7.99	3.36		2.55	
	16-Jul-12	29.70	7.30		7.96	3.87		3.75	
	18-Jul-12	26.95	6.71		7.90	4.74		2.75	
	20-Jul-12	29.70	7.16		7.90	3.39		2.40	
	23-Jul-12	26.60	7.62		7.94	45.15		59.70	
	25-Jul-12	24.10	7.87		7.96	24.75		18.45	
	27-Jul-12	24.40	8.00		8.03	7.81		5.05	
	30-Jul-12	32.90	6.85		7.88	3.39		2.75	

Note: *Italic* indicates the occurrence of exceedance of *Action level*.  
**Bold** indicates the occurrence of exceedance of **Limit level**.

Station	Date	Temperature (°C)	DO (mg/L)	Action/Limit Level for DO (mg/L)	pH	Turbidity (NTU)	Action/Limit Level for Turbidity (NTU)	SS (mg/L)	Action/Limit Level for SS (mg/L)
I-2	03-Jul-12	32.20	6.89	3.66 / 3.63	7.90	2.35	6.63 / 6.99	<2.00	7.68 / 8.34
	05-Jul-12	26.60	7.85		7.93	<b>12.70</b>		<b>12.05</b>	
	07-Jul-12	26.60	7.64		7.86	1.90		<b>4.70</b>	
	09-Jul-12	32.20	6.93		7.95	1.82		<2.00	
	11-Jul-12	32.00	6.98		7.98	1.80		<2.00	
	13-Jul-12	32.20	7.39		7.96	2.33		2.22	
	16-Jul-12	29.40	7.30		7.94	2.08		2.30	
	18-Jul-12	27.30	6.62		7.93	<b>7.29</b>		5.70	
	20-Jul-12	29.50	7.33		7.92	1.92		<2.00	
	23-Jul-12	25.70	7.88		7.86	2.52		<2.00	
	25-Jul-12	24.20	7.94		7.97	<b>23.25</b>		<b>11.90</b>	
	27-Jul-12	24.60	7.92		8.00	<b>8.08</b>		<i>5.25</i>	
	30-Jul-12	32.60	6.84		7.91	4.40		<i>7.10</i>	

Note: *Italic* indicates the occurrence of exceedance of *Action level*.  
**Bold** indicates the occurrence of exceedance of **Limit level**.

Station	Date	Temperature (°C)	DO (mg/L)	Action/Limit Level for DO (mg/L)	pH	Turbidity (NTU)	Action/Limit Level for Turbidity (NTU)	SS (mg/L)	Action/Limit Level for SS (mg/L)
I-2-C	03-Jul-12	32.20	6.98	- / -	7.90	2.30	- / -	<2.00	- / -
	05-Jul-12	26.60	7.79		7.93	12.75		13.40	
	07-Jul-12	26.60	7.56		7.86	1.83		<2.00	
	09-Jul-12	32.20	6.92		7.95	1.76		<2.00	
	11-Jul-12	32.00	7.06		7.97	1.86		<2.00	
	13-Jul-12	32.20	7.32		7.96	2.41		<2.00	
	16-Jul-12	29.40	7.40		7.94	2.08		2.05	
	18-Jul-12	27.20	6.55		7.93	7.50		5.75	
	20-Jul-12	29.50	7.24		7.92	2.00		<2.00	
	23-Jul-12	25.70	7.79		7.86	2.46		<2.00	
	25-Jul-12	24.20	8.02		7.99	23.35		13.05	
	27-Jul-12	24.60	8.01		8.00	8.19		4.15	
	30-Jul-12	32.70	6.77		7.91	4.36		5.65	

Note: *Italic* indicates the occurrence of exceedance of *Action level*.  
**Bold** indicates the occurrence of exceedance of **Limit level**.

Station	Date	Temperature (°C)	DO (mg/L)	Action/Limit Level for DO (mg/L)	pH	Turbidity (NTU)	Action/Limit Level for Turbidity (NTU)	SS (mg/L)	Action/Limit Level for SS (mg/L)
I-3	03-Jul-12	32.40	6.86	3.65 / 3.51	7.88	3.65	3.99 / 4.18	3.45	6.13 / 7.23
	05-Jul-12	26.20	7.77		7.89	<b>4.72</b>		2.30	
	07-Jul-12	26.40	7.65		7.89	2.54		<2.00	
	09-Jul-12	32.00	6.85		7.96	2.63		<2.00	
	11-Jul-12	31.95	7.11		7.94	2.29		<2.00	
	13-Jul-12	31.80	7.23		7.95	2.04		<2.00	
	16-Jul-12	29.30	7.28		7.88	2.24		<2.00	
	18-Jul-12	27.50	6.75		7.95	<b>48.05</b>		<b>37.25</b>	
	20-Jul-12	29.20	7.23		7.90	2.42		<2.00	
	23-Jul-12	26.00	7.70		7.90	<b>14.31</b>		<b>16.35</b>	
	25-Jul-12	24.00	7.82		7.92	<b>31.15</b>		<b>15.05</b>	
	27-Jul-12	24.60	8.01		7.98	<b>24.05</b>		<b>16.70</b>	
	30-Jul-12	33.10	6.86		7.93	3.79		2.70	

Note: *Italic* indicates the occurrence of exceedance of *Action level*.  
**Bold** indicates the occurrence of exceedance of **Limit level**.

Station	Date	Temperature (°C)	DO (mg/L)	Action/Limit Level for DO (mg/L)	pH	Turbidity (NTU)	Action/Limit Level for Turbidity (NTU)	SS (mg/L)	Action/Limit Level for SS (mg/L)
I-3-C	03-Jul-12	32.40	6.80	- / -	7.88	3.60	- / -	3.50	- / -
	05-Jul-12	26.20	7.71		7.88	4.74		2.55	
	07-Jul-12	26.40	7.61		7.88	2.49		<2.00	
	09-Jul-12	32.00	6.84		7.96	2.75		<2.00	
	11-Jul-12	31.90	7.07		7.94	2.25		<2.00	
	13-Jul-12	31.80	7.26		7.95	2.11		<2.00	
	16-Jul-12	29.30	7.36		7.88	2.28		2.25	
	18-Jul-12	27.50	6.67		7.95	48.35		36.75	
	20-Jul-12	29.20	7.21		7.90	2.60		<2.00	
	23-Jul-12	25.90	7.66		7.90	14.47		16.40	
	25-Jul-12	24.00	7.89		7.92	31.25		17.90	
	27-Jul-12	24.60	7.94		7.98	24.25		18.10	
	30-Jul-12	33.10	6.82		7.93	3.78		2.95	

Note: *Italic* indicates the occurrence of exceedance of *Action level*.  
**Bold** indicates the occurrence of exceedance of **Limit level**.

**Table 4-6 Water Quality Monitoring Results**



## 4.4 Summary of Project-Related Exceedances

4.4.1 Table 4-7 summarises the project-related exceedance results recorded in July 2012. Note that exceedances that are considered not related to the construction activities are not included in this table.

<b>Environmental Monitoring</b>	<b>Total No. of Measurement</b>	<b>Action Level Exceedance</b>	<b>% of Action Level Exceedance</b>	<b>Limit Level Exceedance</b>	<b>% of Limit Level Exceedance</b>
Air Quality	60	0	0	0	0
Air Borne Noise	20	0	0	0	0
Water	78	0	0	0	0

Note: Exceedances that are considered not related to the construction activities are not included in this table.

**Table 4-7 Summary of Project-Related Exceedances**

# WASTE MANAGEMENT

5.1.1 The status of waste management is summarised in Table 5-1.

Status of waste management	Quantity
Inert C&D Material Disposed of to Public Fill at Tuen Mun (m <sup>3</sup> )	1,930.6
Inert C&D Material Reused in this Contract (m <sup>3</sup> )	0
Inert C&D Material Reused in other Contracts* (m <sup>3</sup> )	480.0
Metals Generated (kg)	0
Paper / Cardboard Packaging (kg)	0
Plastics (kg)	0
Chemical Waste (kg)	13,400.0
General Waste Disposed of to NENT Landfill (m <sup>3</sup> )	20.8

\* Other Contracts include XRL823AB and Tailor Recycle Aggregate.

**Table 5-1 Waste Generated in July 2012**

# 5 NON-COMPLIANCE AND DEFICIENCY

## 5.1 Site Audit by ET

6.1.1 ET has carried out two site inspections in the reporting month. All observations together with the appropriate recommended mitigation measures where necessary were recorded in the audit checklists that were passed to the Contractor. Major environmental deficiencies observed during site inspections / audits and recommendation, which were made by the ET, are summarised in Table 6-1 below. No non-compliance was observed.

Inspection Date	Observation	Recommendation	Status
12 July 2012	Stagnant water was found in the U-channel at I-3	The Contractor was reminded to clean the U-channel to prevent mosquito breeding at I-3	Stagnant water was cleaned in the U-channel at I-3 on 13 July 2012. (Closed)
26 July 2012	Wastewater treatment plant discharge was not in good condition at I-3	The Contractor was reminded to keep the wastewater treatment plant discharge in good condition at I-3	Wastewater treatment plant was fixed and the discharge was in good condition at I-3 on 26 July 2012 (Closed)

**Table 6-1 Site Inspections by ET**

## 6 COMPLAINT

- 7.1.1 A complaint hotline at **9850 3241** of the Contractor has been established for the Project.
- 7.1.2 No environmental complaint was received during the reporting month. Details of the complaint investigation and observations can be referred to Appendix K.
- 7.1.3 Cumulative statistics of environmental complaints are shown in Table 7-1.

<b>Complaints Received in the Reporting Month</b>	<b>Cumulative Number of Complaints</b>
0	24

**Table 7-1 Cumulative Statistics of Environmental Complaints**

## 7 SUMMARY OF NOTIFICATION OF SUMMONS, SUCCESSFUL PROSECUTIONS AND CORRECTIVE ACTIONS

8.1.1 No summons and successful prosecution was received during the reporting month.

8.1.2 Cumulative statistics of notification of summons, successful prosecutions and convictions are shown in Table 8-1.

Notification of Summons		Successful Prosecution and Conviction	
July 2012	Cumulative	July 2012	Cumulative
0	0	0	0

**Table 8-1 Cumulative Statistics of Notification of Summons and Successful Prosecutions and Convictions**

## 8 FUTURE KEY ISSUE

9.1.1 The forecast of construction works for the upcoming three months are:

- Site cleaning and tidying at Outfall, I-1, I-2 and I-3;
- Excavation and construction of cascade and open tapered channel at outfall;
- Excavation and construction of box culvert at outfall;
- Construction of buttress wall at outfall;
- Slope reinstatement works at outfall;
- Finishing works for spiral ramp at outfall;
- Construction of vehicular access from spiral ramp to box culvert at outfall;
- Construction and excavation of permanent access road at I-3;
- Construction of road drainage works at I-3;
- Construction and excavation of main adit tunnel at I-3;
- Construction of vortex drop shaft RC structure at I-3;
- Construction of man access shaft RC structures at I-3;
- Construction of de-aeration chamber RC structure at I-3;
- Construction of 85 degree cut slope above access road at I-3;
- Tree planting at I-3;
- Construction and excavation of main adit tunnel at I-2;
- Construction of vortex drop shaft RC structure at I-2;
- Construction of man access shaft and man access adit RC structure at I-2;
- Construction of de-aeration chamber RC structure at I-2;
- Drainage works and outstanding landscaping works at portion G at I-2;
- Construction of remaining box culvert RC structure at I-1;
- Construction of skin wall and ramp at I-1;
- Finishing works for spiral ramp at I-1; and
- Grouting and segment repair works at Tunnel

Appendix A

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Site Map and Works Area

Appendix B

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Organization Chart



Appendix C

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Construction Programme

Appendix D

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## Implementation Status of Environmental Mitigation Measures

## Appendix E

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### Status of License and Permit

Appendix F

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## Calibration Certificates

## Appendix G

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### Monitoring Locations

Appendix H

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EM&A Schedule

Appendix I

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Monitoring Results

Appendix J

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## Interim Notifications of Environmental Quality Limits Exceedances



Appendix K

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Complaint Log