



PROJECT NO.: TCS/00394/12

**CONTRACT NO. DC/2007/06 –  
RIVER IMPROVEMENT WORKS IN UPPER LAM  
TSUEN RIVER, SHE SHAN RIVER AND UPPER TAI PO  
RIVER**

**48<sup>TH</sup> MONTHLY ENVIRONMENTAL MONITORING AND  
AUDIT REPORT FOR UPPER TAI PO RIVER –  
AUGUST 2012**

PREPARED FOR  
**CHIU HING CONSTRUCTION AND TRANSPORTATION  
COMPANY LIMITED**

Quality Index

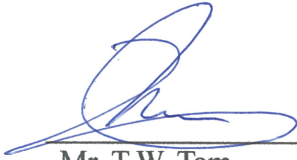
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Ver.	Date	Description
1	13 September 2012	First submission
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## EXECUTIVE SUMMARY

ES.01. This is the **forty-eighth (48<sup>th</sup>)** monthly Environmental Monitoring and Audit (EM&A) Report for the river improvement works at Upper Tai Po River under Drainage Services Department (DSD) Contract No. DC/2007/06 entitled “River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River” (hereinafter “the Project”). This report concludes the impact monitoring results and findings for the activities undertaken during the period from **1<sup>st</sup> to 31<sup>st</sup> August 2012** (hereinafter “the Reporting Period”). Major construction activities being carried out by the Contractor during this reporting period include:

- Construction of Stilling Basin
- Construction of Inclined Gabion Wall/No-fines Mass Concrete Wall
- Installation of Baffle Blocks
- Formation of Riverbed
- Construction of Dwarf Walls
- Ground Investigation Works
- Construction of Surface Drainage

ES.02. The Environmental Team (ET) is responsible for the EM&A works required in the EM&A manual. Site inspections were carried out on weekly basis to investigate and audit the equipment and work methodologies with respect to pollution control and environmental mitigation. The weekly inspection records and photos taken were kept.

### ENVIRONMENTAL MONITORING AND AUDIT ACTIVITIES

ES.03. Environmental Team had carried out construction noise monitoring on weekly basis and no exceedance was found in this Reporting Period. The noise monitoring results collected in the Reporting Period are presented in **Section 4**.

ES.04. In this Reporting Period, weekly ecological inspections were carried out on **6<sup>th</sup>, 13<sup>th</sup>, 20<sup>th</sup> and 27<sup>th</sup> August 2012**.

ES.05. Joint weekly site inspection by the ET, the Contractor, Independent Environmental Checker (IEC) and Engineer’s Representative (ER) were undertaken on **8<sup>th</sup>, 15<sup>th</sup>, 22<sup>nd</sup> and 28<sup>th</sup> August 2012**.

ES.06. As no piling work conducted, no vibration monitoring was performed in this Reporting Period.

ES.07. Environmental monitoring activities under the EM&A programme in this Reporting Period are summarized in the following table.

Issues	Environmental Monitoring Parameters / Inspection	Occurrences
Construction Noise	$L_{eq30min}$ Daytime	44
Inspection / Audit	Weekly Environmental inspection by the Contractor, ET, ER and IEC	4
Ecological	Ecological Impact Monitoring	0
	Weekly inspection by the Ecologist	4

### BREACH OF ACTION AND LIMIT (A/L) LEVELS

ES.08. No noise complaint (which is an Action Level exceedance) was received in the Reporting Period. Also, no Limit Level exceedance of noise monitoring was recorded.

### ENVIRONMENTAL COMPLAINT

ES.09. No written or verbal complaint in relation to environmental matters was recorded in the Reporting Period.

**NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTIONS**

ES.10. No environmental summons or successful prosecutions were recorded in the Reporting Period.

**REPORTING CHANGE**

ES.11. No reporting changes were made in the Reporting Period.

**FUTURE KEY ISSUES**

ES.12. The construction activities for the upcoming month include construction of dwarf wall, surface drains, wing wall for box culvert and stilling basin.

ES.13. During wet season, muddy water and other water quality pollutants via site surface water runoff into the local stream of Tai Po River will be the key issue in the upcoming month. Mitigation measures for water quality should be fully implemented.

ES.14. On the other hand, construction noise will be another key environmental issue. Noise mitigation measures should be implemented in accordance with the EM&A Manual.

ES.15. The Contractor is reminded to provide environmental pollution control measures wherever necessary and keep a good environmental management for site practice.

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## 1.0 INTRODUCTION

### PROJECT BACKGROUND

- 1.01 This is the **forty-eighth (48<sup>th</sup>)** monthly Environmental Monitoring and Audit (EM&A) Report for the river improvement works at Upper Tai Po River under Drainage Services Department Contract No. DC/2007/06 entitled “River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River”.
- 1.02 Site layout plan of Upper Tai Po River is shown in **Appendix A**. Approximately 0.6km of Upper Tai Po River will be improved to enhance the hydraulic performance of the river. The location of the project site at Upper Tai Po River starts from Ta Tit Yan of Tai Mo Shan, flows from southeast to northeast alongside Wilson Trail, turning northward before joining the Lam Tsuen River and then runs towards Tai Po Market. To the east of the river, there are active and abandoned cultivated lands. Village settlements are mainly located on the west and northeast side of the river bank, where the San Uk Ka and Lai Chi Shan establishment also lie. The construction of the proposed improvement works for Upper Tai Po River has commenced on 15<sup>th</sup> September 2008 and anticipated to be completed in December 2012. The improvement works comprise the following:
- Re-profiling and realignment of the channel;
  - Inclusion of gabions and retaining wall for bank protection whilst providing a natural channel bed; and
  - Re-provisioning of footbridges and footpaths along the channel.
- 1.03 Since 12<sup>th</sup> July 2012, Action United Environmental Services & Consulting (AUES) has been appointed by Chiu Hing Construction and Transportation Company Limited (hereinafter “the Contractor”) as the Environmental Team replacing Environmental Pioneers & Solutions Limited to implement the EM&A programme and prepare report. This is the second month as performed by AUES.
- 1.04 This report presents the results of the environmental monitoring conducted at Upper Tai Po River in **August 2012**. It includes weekly site inspections to verify the implementation of the mitigation measures as recommended in the Environmental Permit EP-223/2005/A, EM&A Manual, the Particular Specifications of the Contract and the Contractor’s Environmental Management Plan (EMP).

### REPORT STRUCTURE

- 1.05 The Monthly Environmental Monitoring and Audit (EM&A) Report is structured into the following sections:-

<b>Section 1</b>	<b>Introduction</b>
<b>Section 2</b>	<b>Construction Progress and Submission</b>
<b>Section 3</b>	<b>EM&amp;A Program Requirement for Upper Tai Po River</b>
<b>Section 4</b>	<b>Noise Monitoring Results</b>
<b>Section 5</b>	<b>Vibration Monitoring Results</b>
<b>Section 6</b>	<b>Ecology Monitoring Results</b>
<b>Section 7</b>	<b>Site Inspections</b>
<b>Section 8</b>	<b>Waste Management</b>
<b>Section 9</b>	<b>Environmental Complaint and Non-Compliance</b>
<b>Section 10</b>	<b>Implementation Status of Mitigation Measures</b>
<b>Section 11</b>	<b>Impact Forecast</b>
<b>Section 12</b>	<b>Conclusions and Recommendations</b>

## 2.0 CONSTRUCTION PROGRESS AND SUBMISSION

### CONSTRUCTION PROGRESS

- 2.01 The proposed construction sequences are shown in the following:
- Site clearance and preparation works
  - Construction of maintenance access which involves construction of retaining walls
  - River channel construction and excavation, involving excavation works, construction of retaining walls and gabion walls
  - Construction of additional boulder trap and additional stilling basins with baffle blocks
  - Provision of riverbed treatment
  - Re-provisioning of footbridges
  - Construction of footpaths
  - Landscaping works
- 2.02 The major construction activities undertaken at Upper Tai Po River in the Report Period are listed below:-
- Construction of Stilling Basin;
  - Construction of Inclined Gabion Wall/No-fines Mass Concrete Wall
  - Installation of Baffle Blocks
  - Formation of Riverbed
  - Construction of Dwarf Walls
  - Ground Investigation Works
  - Construction of Surface Drainage
- 2.03 The master and three month rolling construction programs are enclosed in *Appendix B*.

### SUMMARY OF ENVIRONMENTAL SUBMISSIONS

- 2.04 Summary of the relevant permits, licences, and/or notifications on environmental protection for this Contract in the Reporting Period is presented in *Table 2-1*.

**Table 2-1 Status of Environmental Licenses and Permits**

Description	License / Permit No.	Date of Issue	Date of Expiry	Remarks
Environmental Permit	EP-223/2005	31 Aug 2005	N/A	Superseded by EP-223/2005/A
Amended Environmental Permit	EP-223/2005/A	18 Nov 2008	N/A	Issued
Construction Noise Permit	NA	N/A	N/A	N/A
Effluent Discharge License	3678	14 Mar 2008	31 Mar 2013	Issued
Registration as a Chemical Waste Producer	5213-724-C3251-03	19 Dec 2007	N/A	Issued
Billing Account for Disposal of Construction Waste	7006101	N/A	N/A	N/A



### 3.0 EM&A PROGRAM REQUIREMENT FOR UPPER TAI PO RIVER

3.01 The EM&A requirements set out in the Environmental Permit EP-223/2005/A (hereinafter ‘the EP’), and the associated EM&A Manual, are presented in the following sub-sections.

#### MONITORING PARAMETERS

3.02 According to the EM&A Manual, the monitoring requirements under this Contract are listed in **Table 3-1**.

**Table 3-1 Summary of Monitoring Parameters**

Environmental Aspect	Parameters
Construction Noise	<ul style="list-style-type: none"> <li>A-weighted equivalent continuous sound pressure level (30min) (hereinafter ‘<math>L_{eq(30min)}</math>’) during the normal working hours; and</li> <li>A-weighted equivalent continuous sound pressure level (15min) (hereinafter ‘<math>L_{eq(15min)}</math>’) for construction work during the restricted hours.</li> </ul>
*Ecology	Inspection and auditing the proper implementation of mitigation measures stipulated in EIA report and EM&A Manual

Remarks: \*Monitoring as carried out by the Ecologist appointed by the Contractor

#### MONITORING LOCATIONS

3.03 Monitoring locations have been proposed in EM&A Manual. Graphic plot is shown in **Appendix C** and summarized in **Table 3-2**.

**Table 3-2 Designated Monitoring Locations of the EM&A Programme**

Aspect	Location ID	Address
Construction Noise	UTP1	54B, Sheung Wun Yiu
	UTP2	Village House in Lai Chi Shan
	UTP3	Village House near Upper Tai Po River
	UTP4	Village House near Upper Tai Po River
	UTP5	Village House near Upper Tai Po River
	UTP6	Village House near Upper Tai Po River
	UTP7	Village House near Upper Tai Po River
	UTP8	Village House near Upper Tai Po River
	UTP9	49A, Pun Shan Chau
	UTP10	Village House near the proposed access road
	UTP11	49G, San Uk Ka
Ecology	As within and adjacent to Upper Tai Po River of construction works areas	

#### MONITORING FREQUENCY

3.04 The monitoring frequency and duration as specified in EM&A Manual are summarized below.

##### Construction Noise

Frequency: Once a week during 0700-1900 on normal weekdays for  $L_{eq(30min)}$

If construction work is undertaken at restricted hour, the frequency of construction noise monitoring will comply with the requirements stipulated in the related Construction Noise Permit issued by EPD

Duration: Throughout the construction period when major construction activities are undertaken

##### Ecology

Frequency: Weekly site inspection and bi-annual monitoring

Duration: Throughout the construction period when the major construction activities are undertaken

**MONITORING EQUIPMENT**

**Noise Monitoring**

- 3.05 Sound level meter in compliance with the *International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1)* specifications shall be used for noise monitoring. The sound level meter shall be checked with an acoustic calibrator. The wind speed shall be checked with a portable wind speed meter, which capable to measure wind speed in m/s.

**Table 3-3 Monitoring Equipment Used in EM&A Program**

Equipment	Model
<i>Construction Noise</i>	
Integrating Sound Level Meter	Bruel & Kjaer Type 2238 or Rion NL-31
Calibrator	Bruel & Kjaer Type 4231
Portable Wind Speed Indicator	Testo Anemometer

**MONITORING METHODOLOGY**

**Noise Monitoring**

- 3.06 Noise measurements are taken in terms of the A-weighted equivalent sound pressure level ( $L_{eq}$ ) measured in decibels (dB). Supplementary statistical results ( $L_{10}$  and  $L_{90}$ ) are also obtained for reference.
- 3.07 Sound level meter as listed in **Table 3-3** complies with the *International Electrotechnical Commission Publications 651: 1979 (Type 1) and 804: 1985 (Type 1)* specifications, as recommended in Technical Memorandum (TM) issued under the *Noise Control Ordinance (NCO)*.
- 3.08 During the monitoring, all noise measurements are performed with the meter set to FAST response and on the A-weighted equivalent continuous sound pressure level ( $L_{eq}$ ).  $L_{eq(30min)}$  in six consecutive  $Leq_{(5min)}$  measurements is used as the monitoring parameter for the time period between 0700-1900 hours on weekdays; and also  $Leq_{(15min)}$  in three consecutive  $Leq_{(5min)}$  measurements is used as monitoring parameter for other time periods (e.g. during restricted hours), if necessary.
- 3.09 During the course of measurement, the sound level meter is mounted on a tripod with a height of 1.2m above ground and placed at the assessment point and oriented such that the microphone is pointed to the site with the microphone facing perpendicular to the line of sight. The windshield is fitted for all measurements. The assessment point is normally set as free-field situation for the measurement.
- 3.10 Prior to noise measurement, the accuracy of the sound level meter is checked by an acoustic calibrator which generated a known sound pressure level at a known frequency. The checking is performed before and after the noise measurement.

**DATA MANAGEMENT AND DATA QA/QC CONTROL**

- 3.11 The impact monitoring data are handled by the ET's systematic data recording and management, which complies with in-house Quality Management System. Standard Field Data Sheets (FDS) are used in the impact monitoring program.
- 3.12 The monitoring data recorded in the noise meter are downloaded directly from the equipment at the end of each monitoring day. The downloaded monitoring data are input into a computerized database properly maintained by the ET.

**OTHERS MONITORING IMPLEMENTATION FOR THE CONTRACT**

**Vibration**

- 3.13 Vibration monitoring will be carried out when piling works take place in Upper Tai Po River.

**DETERMINATION OF ACTION/LIMIT (A/L) LEVELS**

3.14 The established performance criteria for construction noise, namely Action and Limit levels are used for the Project is listed in *Table 3-4*.

**Table 3-4 Action and Limit Levels for Construction Noise**

Location	Time Period	Action Level	Limit Level
UTP1, UTP2, UTP3, UTP4, UTP5, UTP6, UTP7, UTP8, UTP9, UTP10, UTP11	Daytime 0700 – 1900 hrs on normal weekdays	When one documented complaint is received	75* dB(A)
	1900 – 2300 on all days and 0700 – 2300 on general holidays (including Sundays)		60/65/70 dB(A)**
	2300 – 0700 on all days		45/50/55 dB(A)**

Note: \* Reduces to 70dB(A) for schools and 65dB(A) during the school examination periods.

\*\* To be selected based on the Area Sensitivity Rating of A/B/C, and the conditions of the applicable CNP(s) must be followed

**EQUIPMENT CALIBRATION**

3.15 The sound level meter and calibrator are calibrated and certified by a laboratory accredited under HOKLAS or any other international accreditation scheme in yearly basis. Valid calibration certificates of the monitoring equipment used for the impact monitoring program in this Reporting Period are attached in *Appendix D*.

**METEOROLOGICAL INFORMATION**

3.16 The meteorological information during the construction phase is obtained from Tai Po and Shatin Stations of the Hong Kong Observatory (HKO). The meteorological data during the impact monitoring days are summarized in *Appendix G*.

#### 4.0 NOISE MONITORING RESULTS

4.01 The monitoring schedule had been issued to relevant parties before each Reporting Period and presented in *Appendix F*. The works undertaken during the Reporting Period is illustrated in *Appendix B*. The monitoring results are presented in the following sub-sections.

##### RESULT SUMMARY

4.02 In the Reporting Period, the noise monitoring results at the designated locations are presented in *Tables 4-1 to 4-11* and the graphical plot is shown in *Appendix H*.

**Table 4-1 Construction Noise Monitoring Results at UTP1**

Date	Start Time	1 <sup>st</sup> L <sub>eq5min</sub>	2 <sup>nd</sup> L <sub>eq5min</sub>	3 <sup>rd</sup> L <sub>eq5min</sub>	4 <sup>th</sup> L <sub>eq5min</sub>	5 <sup>th</sup> L <sub>eq5min</sub>	6 <sup>th</sup> L <sub>eq5min</sub>	L <sub>eq30min</sub>	Sound Level Meter ID
6-Aug-12	15:18	67.5	67.3	65.9	65.3	65.9	65.5	66	EQ006
17-Aug-12	15:57	64.1	64.5	65.3	65.7	67.9	66.1	66	EQ006
25-Aug-12	10:01	56.6	56.1	57.8	54.6	55.6	60.0	57	EQ010
29-Aug-12	11:30	67.2	63.4	65.4	70.1	69.5	65.6	67	EQ006
<b>Limit Level in dB(A)</b>								<b>75</b>	

**Remarks:** *The monitoring is undertaken under façade situation. No façade correction is made according to acoustical principles and EPD guidelines.*

**Table 4-2 Construction Noise Monitoring Results at UTP2**

Date	Start Time	1 <sup>st</sup> L <sub>eq5min</sub>	2 <sup>nd</sup> L <sub>eq5min</sub>	3 <sup>rd</sup> L <sub>eq5min</sub>	4 <sup>th</sup> L <sub>eq5min</sub>	5 <sup>th</sup> L <sub>eq5min</sub>	6 <sup>th</sup> L <sub>eq5min</sub>	L <sub>eq30min</sub>	Sound Level Meter ID
6-Aug-12	15:20	58.5	57.8	59.2	65.2	65.9	61.9	63	EQ067
17-Aug-12	16:28	63.7	66.0	66.5	66.6	67.8	64.7	66	EQ009
25-Aug-12	09:50	59.5	57.9	58.2	60.7	60.1	63.4	60	EQ065
29-Aug-12	11:34	66.0	64.4	65.0	70.7	70.1	64.1	68	EQ065
<b>Limit Level in dB(A)</b>								<b>75</b>	

**Remarks:** *The monitoring is undertaken under façade situation. No façade correction is made according to acoustical principles and EPD guidelines.*

**Table 4-3 Construction Noise Monitoring Results at UTP3**

Date	Start Time	1 <sup>st</sup> L <sub>eq5min</sub>	2 <sup>nd</sup> L <sub>eq5min</sub>	3 <sup>rd</sup> L <sub>eq5min</sub>	4 <sup>th</sup> L <sub>eq5min</sub>	5 <sup>th</sup> L <sub>eq5min</sub>	6 <sup>th</sup> L <sub>eq5min</sub>	L <sub>eq30min</sub>	Sound Level Meter ID
6-Aug-12	14:56	59.5	59.2	64.7	61.9	60.0	60.0	61	EQ010
17-Aug-12	15:20	68.2	68.0	68.4	68.2	68.3	68.4	68	EQ067
25-Aug-12	09:53	68.6	72.6	68.3	71.9	74.7	66.6	71	EQ009
29-Aug-12	11:43	63.4	63.6	63.7	60.3	67.1	64.5	64	EQ010
<b>Limit Level in dB(A)</b>								<b>75</b>	

**Remarks:** *The monitoring is undertaken under façade situation. No façade correction is made according to acoustical principles and EPD guidelines.*

**Table 4-4 Construction Noise Monitoring Results at UTP4**

Date	Start Time	1 <sup>st</sup> L <sub>eq5min</sub>	2 <sup>nd</sup> L <sub>eq5min</sub>	3 <sup>rd</sup> L <sub>eq5min</sub>	4 <sup>th</sup> L <sub>eq5min</sub>	5 <sup>th</sup> L <sub>eq5min</sub>	6 <sup>th</sup> L <sub>eq5min</sub>	L <sub>eq30min</sub>	Sound Level Meter ID
6-Aug-12	14:45	60.9	54.4	52.5	53.4	60.7	58.8	58	EQ067
17-Aug-12	15:38	67.6	67.3	64.4	64.9	67.7	64.7	66	EQ009
25-Aug-12	10:36	53.0	50.9	50.7	53.0	53.2	53.9	52	EQ010
29-Aug-12	11:07	60.5	61.3	59.7	61.5	56.2	51.0	59	EQ010
<b>Limit Level in dB(A)</b>								<b>75</b>	

**Remarks:** *The monitoring is undertaken under façade situation. No façade correction is made according to acoustical principles and EPD guidelines.*

**Table 4-5 Construction Noise Monitoring Results at UTP5**

Date	Start Time	1 <sup>st</sup> L <sub>eq5min</sub>	2 <sup>nd</sup> L <sub>eq5min</sub>	3 <sup>rd</sup> L <sub>eq5min</sub>	4 <sup>th</sup> L <sub>eq5min</sub>	5 <sup>th</sup> L <sub>eq5min</sub>	6 <sup>th</sup> L <sub>eq5min</sub>	L <sub>eq30min</sub>	Sound Level Meter ID
6-Aug-12	14:42	56.5	53.5	60.8	50.8	55.0	56.6	57	EQ006
17-Aug-12	15:23	60.6	60.7	58.9	59.4	60.4	59.5	60	EQ006
25-Aug-12	10:34	61.3	55.3	57.8	60.3	58.4	61.1	59	EQ009
29-Aug-12	10:59	61.1	62.7	62.4	63.5	62.9	63.8	63	EQ006
<b>Limit Level in dB(A)</b>								<b>75</b>	

**Remarks:** The monitoring is undertaken under façade situation. No façade correction is made according to acoustical principles and EPD guidelines.

**Table 4-6 Construction Noise Monitoring Results at UTP6**

Date	Start Time	1 <sup>st</sup> L <sub>eq5min</sub>	2 <sup>nd</sup> L <sub>eq5min</sub>	3 <sup>rd</sup> L <sub>eq5min</sub>	4 <sup>th</sup> L <sub>eq5min</sub>	5 <sup>th</sup> L <sub>eq5min</sub>	6 <sup>th</sup> L <sub>eq5min</sub>	L <sub>eq30min</sub>	Sound Level Meter ID
6-Aug-12	14:16	56.7	54.4	55.1	54.5	56.3	54.9	55	EQ010
17-Aug-12	14:38	71.5	71.3	71.9	71.3	73.4	72.9	72	EQ067
25-Aug-12	11:12	64.4	64.6	61.4	66.5	63.3	62.1	64	EQ010
29-Aug-12	10:34	55.0	54.9	54.4	55.4	57.8	55.9	56	EQ065
<b>Limit Level in dB(A)</b>								<b>75</b>	

**Remarks:** The monitoring is undertaken under façade situation. No façade correction is made according to acoustical principles and EPD guidelines.

**Table 4-7 Construction Noise Monitoring Results at UTP7**

Date	Start Time	1 <sup>st</sup> L <sub>eq5min</sub>	2 <sup>nd</sup> L <sub>eq5min</sub>	3 <sup>rd</sup> L <sub>eq5min</sub>	4 <sup>th</sup> L <sub>eq5min</sub>	5 <sup>th</sup> L <sub>eq5min</sub>	6 <sup>th</sup> L <sub>eq5min</sub>	L <sub>eq30min</sub>	Sound Level Meter ID
6-Aug-12	14:10	60.3	59.2	56.3	61.1	57.8	56.2	59	EQ067
17-Aug-12	14:56	71.3	72.1	70.4	72.3	73.4	67.0	71	EQ009
25-Aug-12	11:12	70.6	68.9	67.1	71.9	67.7	67.8	69	EQ009
29-Aug-12	10:35	58.5	63.5	58.3	59.3	64.4	60.9	61	EQ010
<b>Limit Level in dB(A)</b>								<b>75</b>	

**Remarks:** The monitoring is undertaken under façade situation. No façade correction is made according to acoustical principles and EPD guidelines.

**Table 4-8 Construction Noise Monitoring Results at UTP8**

Date	Start Time	1 <sup>st</sup> L <sub>eq5min</sub>	2 <sup>nd</sup> L <sub>eq5min</sub>	3 <sup>rd</sup> L <sub>eq5min</sub>	4 <sup>th</sup> L <sub>eq5min</sub>	5 <sup>th</sup> L <sub>eq5min</sub>	6 <sup>th</sup> L <sub>eq5min</sub>	L <sub>eq30min</sub>	Sound Level Meter ID
6-Aug-12	14:08	55.4	57.9	55.7	56.4	58.4	58.3	57	EQ006
17-Aug-12	14:48	62.8	62.1	61.3	62.3	61.6	61.7	62	EQ006
25-Aug-12	13:06	66.4	62.8	62.8	63.0	60.7	64.2	64	EQ009
29-Aug-12	09:57	62.7	65.1	67.0	65.1	66.1	64.4	65	EQ065
<b>Limit Level in dB(A)</b>								<b>75</b>	

**Remarks:** The monitoring is undertaken under façade situation. No façade correction is made according to acoustical principles and EPD guidelines.

**Table 4-9 Construction Noise Monitoring Results at UTP9**

Date	Start Time	1 <sup>st</sup> L <sub>eq5min</sub>	2 <sup>nd</sup> L <sub>eq5min</sub>	3 <sup>rd</sup> L <sub>eq5min</sub>	4 <sup>th</sup> L <sub>eq5min</sub>	5 <sup>th</sup> L <sub>eq5min</sub>	6 <sup>th</sup> L <sub>eq5min</sub>	L <sub>eq30min</sub>	Sound Level Meter ID
6-Aug-12	13:42	60.8	59.2	60.2	60.6	56.8	56.9	59	EQ010
17-Aug-12	14:05	58.4	58.7	58.1	58.0	58.2	58.1	58	EQ067
25-Aug-12	13:00	57.4	53.6	53.3	53.2	54.3	55.7	55	EQ010
29-Aug-12	10:01	62.4	63.7	63.0	62.9	62.4	65.4	63	EQ010
<b>Limit Level in dB(A)</b>								<b>75</b>	

**Remarks:** The monitoring is undertaken under façade situation. No façade correction is made according to acoustical principles and EPD guidelines.

**Table 4-10 Construction Noise Monitoring Results at UTP10**

Date	Start Time	1 <sup>st</sup> L <sub>eq5min</sub>	2 <sup>nd</sup> L <sub>eq5min</sub>	3 <sup>rd</sup> L <sub>eq5min</sub>	4 <sup>th</sup> L <sub>eq5min</sub>	5 <sup>th</sup> L <sub>eq5min</sub>	6 <sup>th</sup> L <sub>eq5min</sub>	L <sub>eq30min</sub>	Sound Level Meter ID
6-Aug-12	13:33	52.3	52.8	62.2	46.1	67.6	51.7	61	EQ006
17-Aug-12	14:07	57.3	45.5	45.8	46.6	45.2	46.2	51	EQ006
25-Aug-12	13:47	60.9	55.3	55.0	44.7	44.4	55.7	56	EQ009
29-Aug-12	09:50	53.1	47.4	50.2	51.4	48.8	49.2	50	EQ006
<b>Limit Level in dB(A)</b>								<b>75</b>	

**Remarks:** *The monitoring is undertaken under façade situation. No façade correction is made according to acoustical principles and EPD guidelines.*

**Table 4-11 Construction Noise Monitoring Results at UTP11**

Date	Start Time	1 <sup>st</sup> L <sub>eq5min</sub>	2 <sup>nd</sup> L <sub>eq5min</sub>	3 <sup>rd</sup> L <sub>eq5min</sub>	4 <sup>th</sup> L <sub>eq5min</sub>	5 <sup>th</sup> L <sub>eq5min</sub>	6 <sup>th</sup> L <sub>eq5min</sub>	L <sub>eq30min</sub>	Sound Level Meter ID
6-Aug-12	13:35	56.4	47.5	50.1	45.0	58.1	49.9	54	EQ067
17-Aug-12	14:18	47.5	48.1	50.7	47.1	56.8	45.9	51	EQ009
25-Aug-12	13:45	55.0	49.4	50.9	49.1	49.0	49.7	51	EQ010
29-Aug-12	10:20	59.1	49.3	47.2	49.4	47.3	52.7	53	EQ006
<b>Limit Level in dB(A)</b>								<b>75</b>	

**Remarks:** *The monitoring is undertaken under free field situation. A façade correction of +3 dB(A) has been added according to acoustical principles and EPD guidelines*

- 4.03 A free field noise monitoring is performed only at UTP11, therefore, a façade correction +3 dB(A) is added in accordance with the acoustical principles and EPD guidelines.
- 4.04 No noise complaint (which is an Action Level exceedance) was received in the Reporting Period. Furthermore, no noise monitoring exceedance was recorded. No Notice of Exceedance (NOE) was issued to notify EPD, IEC, the Contractor and the ER.
- 4.05 Although all noise measurement results were below 75dB(A), the Contractor is reminded to strictly implement noise mitigation measures as recommended in the EM&A Manual to avoid noise Limit Level exceedance.

## 5.0 VIBRATION MONITORING RESULTS

- 5.01 There was no vibration monitoring carried out in this Reporting Period. Vibration monitoring will be carried out when piling works take place in Upper Tai Po River.

## 6.0 ECOLOGY MONITORING RESULTS

6.01 Weekly ecological inspections by the Ecologist Dr. Mark Shea were carried out on 6<sup>th</sup>, 13<sup>th</sup>, 20<sup>th</sup> and 27<sup>th</sup> August 2012. Details of findings are summarized in *Table 6-1*.

**Table 6-1 Summary Results of Ecological Site Inspection Findings**

Date	Observations	Advice from Ecologist	Action Taken	Closing Date
06 <sup>th</sup> August 2012	No Major findings for this inspection	No Advice is required	No Action is required to be taken	N/A
13 <sup>th</sup> August 2012	No Major findings for this inspection	No Advice is required	No Action is required to be taken	N/A
20 <sup>th</sup> August 2012	No Major findings for this inspection	No Advice is required	No Action is required to be taken	N/A
27 <sup>th</sup> August 2012	No Major findings for this inspection	No Advice is required	No Action is required to be taken	N/A

6.02 Furthermore, the eighth (8<sup>th</sup>) bi-annual ecological impact monitoring report was undertaken on 5 July 2012. The report prepared by Ecologist Dr. Mark Shea has been accepted by the IEC and ER and the verified report is attached in *Appendix J*. The next bi-annual ecological impact monitoring has been arranged to be carried out in January 2013.



7.0 SITE INSPECTION

REGULAR SITE INSPECTION AND AUDITING

- 7.01 Joint weekly environmental site inspection was carried out by the Contractor, ET, IEC and RE on **8<sup>th</sup>, 15<sup>th</sup>, 22<sup>nd</sup> and 28<sup>th</sup> August 2012**. Also, DSD’s representatives attended the site inspection on **28<sup>th</sup> August 2012**. In this Reporting Period, **9** observations were recorded but no non-compliance was identified.
- 7.02 Observations for the site inspection and monthly audit within this Reporting Period are summarized in **Table 7-1**.

**Table 7-1 Site Inspection of Observations – Findings and Deficiencies**

Date	Findings / Deficiencies	Follow-Up Status
8 <sup>th</sup> August 2012	<ul style="list-style-type: none"> <li>• Rubbish bin was observed full at Upper Tai Po River, the Contractor was reminded to clean.</li> <li>• Free standing chemical container without drip tray was observed at Upper Tai Po River, the contractor was requested to provide drip tray for all chemical containers on-site to prevent leakage.</li> <li>• General waste scattered at Upper Tai Po River was observed, the contractor was reminded to clean.</li> </ul>	<ul style="list-style-type: none"> <li>• General waste inside the rubbish bin at Upper Tai Po River was removed before the site inspection on 15 August 2012.</li> <li>• Drip tray has been provided for each chemical container before the site inspection on 15 August 2012.</li> <li>• General waste scattered at Upper Tai Po River was cleared and plastic waste bags were provided for daily general refuse collection.</li> </ul>
15 <sup>th</sup> August 2012	<ul style="list-style-type: none"> <li>• Free standing chemical container without drip tray was observed at Upper Tai Po River nearly ch.10, the contractor was requested to provide drip tray for all chemical containers on-site to prevent leakage.</li> <li>• Stagnant water cumulated at Upper Tai Po River was observed, the contractor was requested to remove the stagnant water to prevent mosquito breeding.</li> <li>• C&amp;D waste cumulated along the site area at Upper Tai Po River was observed, the contractor was reminded to clean more frequently.</li> </ul>	<ul style="list-style-type: none"> <li>• Free standing chemical containers at Upper Tai Po River were removed.</li> <li>• Stagnant water and general waste observed at Upper Tai Po River were removed.</li> <li>• C&amp;D waste cumulated along the site area at Upper Tai Po River were removed.</li> </ul>
22 <sup>nd</sup> August 2012	<ul style="list-style-type: none"> <li>• Protection zone should be fenced off to prevent any damage of retained tree by construction activity.</li> <li>• Oil leakage from the backhoe was observed at the upper Tai Po River, the contractor was request to provide proper maintenance for all the construction plant to prevent contamination.</li> </ul>	<ul style="list-style-type: none"> <li>• Protection zone to prevent any construction activities damage the retained tree was fenced off at Upper Tai Po River.</li> <li>• The oil stain has been removed and no oil leakage was observed from the backhoe after repair work.</li> </ul>
28 <sup>th</sup> August 2012	<ul style="list-style-type: none"> <li>• General material and waste scattered at Upper Tai Po River was observed. The Contractor was reminded to improve housekeeping.</li> </ul>	General material and waste scattered at upper Tai Po River was removed. The Contractor has improved the housekeeping in working area.

7.03 Some deficiencies observed during previous site inspections are still outstanding. The status of rectification is presented in *Table 7-2*.

**Table 7-2 Rectification Status of Previous Site Inspection Deficiencies**

<b>Inspection Date</b>	<b>Findings / Deficiencies</b>	<b>Status</b>
6 <sup>th</sup> Oct 2011	Noise barriers have not yet been erected by the Contractor along Upper Tai Po River. The Contractor was urged to install noise barriers to minimize the noise impact arisen from construction activities.	Ongoing

7.04 Implementation status of environmental protection and mitigation measures are shown in *Table 10-1* of this report.

**8.0 WASTE MANAGEMENT**

8.01 Waste management is carried out by an on-site Environmental Officer (EO) or an Environmental Supervisor (ES) from time to time.

**RECORDS OF WASTE QUANTITIES**

8.02 All types of waste arising from the construction work are classified into the following:

- Construction & Demolition (C&D) Material;
- Chemical Waste; and
- General Refuse

8.03 The quantities of waste for disposal in the Reporting Period are summarized in *Table 8-1* and *8-2* and the Monthly Summary Waste Flow Table is shown in *Appendix K*. Whenever possible, materials are reused on-site as far as practicable.

**Table 8-1 Summary of Quantities of Inert C&D Materials**

Type of Waste	Quantity
C&D Materials (Inert) (in '000m <sup>3</sup> )	0.128
Reused in the Contract (Inert) (in '000m <sup>3</sup> )	0.128
Reused in other Projects (Inert) (in '000m <sup>3</sup> )	0.000
Disposal as Public Fill (Inert) (in '000m <sup>3</sup> )	0.000

**Table 8-2 Summary of Quantities of C&D Wastes**

Type of Waste	Quantity	Disposal Method
Metal (in '000kg)	0.050	Licensed Collector
Paper / Cardboard Packing (in '000kg)	0.050	Licensed Collector
Plastic (in '000kg)	0.030	Licensed Collector
Chemical Wastes (in '000kg)	0.001	Licensed Collector
General Refuses (in '000m <sup>3</sup> )	0.060	Refuse Collector

8.04 To control over the site performance on waste management, the Contractor shall ensure that all solid and liquid waste management works are in full compliance with the relevant license/permit requirements, such as the effluent discharge license and the chemical waste producer registration. The Contractor is also reminded to implement the recommended environmental mitigation measures according to the EM&A Manual based on actual site conditions.

## 9.0 ENVIRONMENTAL COMPLAINT AND NON-COMPLIANCE

### ENVIRONMENTAL COMPLAINT, SUMMONS AND PROSECUTION

9.01 No environmental complaint, summon and prosecution was received in the Reporting Period. The statistical summary of environmental complaint, summon and prosecution, is presented in *Tables 9-1, 9-2 and 9-3*.

**Table 9-1 Statistical Summary of Environmental Complaints**

Complaint Nature	Environmental Complaint Statistics		
	Cumulative (Sep 2008 –Jul 2012)	Frequency (Aug 2012)	Total
Air/Dust	7	0	7
Noise	5	0	5
Water	11	0	11
Housekeeping Hygiene	1	0	1
Chemical Waste	0	0	0
<b>Overall</b>	<b>24</b>	<b>0</b>	<b>24</b>

**Table 9-2 Statistical Summary of Environmental Summons**

Complaint Nature	Environmental Summons Statistics		
	Cumulative (Sep 2008 –Jul 2012)	Frequency (Aug 2012)	Total
Air/Dust	0	0	0
Noise	0	0	0
Water	0	0	0
Housekeeping Hygiene	0	0	0
Chemical Waste	0	0	0
<b>Overall</b>	<b>0</b>	<b>0</b>	<b>0</b>

**Table 9-3 Statistical Summary of Environmental Prosecution**

Complaint Nature	Environmental Prosecution Statistics		
	Cumulative (Sep 2008 –Jul 2012)	Frequency (Aug 2012)	Total
Air/Dust	0	0	0
Noise	0	0	0
Water	0	0	0
Housekeeping Hygiene	0	0	0
Chemical Waste	0	0	0
<b>Overall</b>	<b>0</b>	<b>0</b>	<b>0</b>

## 10.0 IMPLEMENTATION STATUS OF MITIGATION MEASURES

10.01 The environmental mitigation measures recommended in EM&A Manual cover the issues of dust, noise and waste and they are summarized as follows:

### Noise Mitigation Measures

- (a) No percussive piling shall be carried out;
- (b) Only well-maintained plant should be operated on-site; and plant shall be serviced regularly during the construction program;
- (c) Silencers or mufflers on construction equipment should be utilized and shall be properly maintained during the construction program;
- (d) Mobile plant, if any, should be sited as far from Noise Sensitive Receivers (NSRs) as possible;
- (e) Machines and plant (such as trucks) that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum;
- (f) Plant known to emit noise strongly in one direction should, wherever possible, be orientated so that the noise is directed away from the nearby NSRs;
- (g) Material stockpiles and other structures should be effectively utilized, wherever practicable, in screening noise from on-site construction activities;
- (h) Use of quieter plants to carry out the construction tasks proposed for the Project;
- (i) Use 2.0m high temporary noise barriers as screened the noisy PME to carry out the river implementation work;
- (j) Low Impact Method, such as using PMEs smaller in size.

### Dust Mitigation Measures

10.02 Implementation of mitigation measures stipulated in the Air Pollution Control (Construction Dust) Regulation and good site practices include but not limited to the following:

- (a) Use of regular watering to reduce dust emissions from exposed site surfaces and unpaved road, with complete coverage, particularly during dry weather;
- (b) Use of frequent watering for particularly dusty static construction areas and areas close to ASRs;
- (c) Tarpaulin covering of all dusty vehicle loads transported to, from and between site location;
- (d) Establishment and use of vehicle wheel and body washing facilities at the exit points of the site;
- (e) Routing of vehicles and positioning of construction plant should be at the maximum possible distance from ASRs;
- (f) Stockpiled excavated materials should be covered with tarpaulin.

### Local Stream Water Quality Mitigation Measures

- (a) Excavation works within the Tai Po River within the Project shall be carried out in stages and excavation area for each stage shall be limited to section of half width of the channel and less than 100m long at any one time in order to maintain water flow within the river during construction stage;
- (b) Land-based plant shall be employed and site run-off shall be directed towards regularly cleaned and maintained silt traps and oil / grease separators to minimize leakage and loss of sediments during excavation;
- (c) Large boulders removed from the Tai Po River within the Project during excavation shall be re-instated upon completion of works A section of 150m long natural riverbank on the western side of the river channel (Ch0 –Ch150) shall be retained;
- (d) The excavation area shall be enclosed with bunds or barriers and dewatered prior to excavation to minimize the impacts upon the downstream of the Tai Po River;
- (e) Provide silt trap and oil interceptor to remove the oil, lubricants, grease, silt, grit and debris from the wastewater before pumped to the public storm water drainage system;
- (f) Provide site toilet facilities;

- (g) During rainstorms, exposed slope/soil surfaces shall be covered by a tarpaulin or other means. Other measures that need to be implemented before, during, and after rainstorms as summarized in ProPECC PN 1/94 shall be followed.

### **Waste Mitigation Measures**

- (a) The Contractor shall observe and comply with the Waste Disposal Ordinance (WDO) and its subsidiary regulations;
- (b) The Contractor shall submit to the Engineer for approval a Waste Management Plan with appropriate mitigation measures including the allocation of an area for waste segregation and shall ensure that the day-to-day site operations comply with the approved waste management plan;
- (c) The Contractor shall minimize the generation of waste from his work. Avoidance and minimization of waste generation can be achieved through changing or improving design and practices, careful planning and good site management;
- (d) The reuse and recycling of waste shall be practised as far as possible. The recycling materials shall include paper/cardboard, timber and metal etc;
- (e) The Contractor shall ensure that Construction and Demolition (C&D) materials are sorted into public fill (inert portion) and C&D waste (non-inert portion). The public fill which comprises soil, rock, concrete, brick, cement plaster/mortar, inert building debris, aggregates and asphalt shall be reused in earth filling, reclamation or site formation works. The C&D waste which comprises metal, timber, paper, glass, junk and general garbage shall be reused or recycled where possible and, as the last resort, disposal of at landfills;
- (f) The Contractor shall record the amount of wastes generated, recycled and disposed of (including the disposal sites). The Contractor shall use a trip ticket system for the disposal of C&D materials to any designated public filling facility and/or landfill;
- (g) In order to avoid dust or odour impacts, any vehicles leaving a works area carrying construction waste or public fill shall have their load covered;
- (h) To avoid the excessive use of wood, reusable steel shutters shall be used as a preferred alternative to formwork and falsework where possible;
- (i) The Contractor shall observe and comply with the Waste Disposal (Chemical Waste) (General) Regulation. The Contractor shall apply for registration as chemical waste producer under the Waste Disposal (Chemical Waste) (General) Regulation when chemical waste is produced. All chemical waste shall be properly stored, labeled, packaged and collected in accordance with the Regulation.

### **Vibration**

- (a) Percussive piling is to be replaced by bore-hole piling to minimize vibration impacts to the two identified declared monuments;
- (b) Carrying out of vibration monitoring to ensure that vibration associated with the construction phase do not exceed the threshold limit otherwise contractor have to review the work method and construction activities have to be slow down or rescheduled to reduce the impacts;
- (c) Close monitoring and measurement on the cracks of the external wall of Fan Sin Temple during construction works will be carried out. Any changes on the cracks will be recorded for the contractor to slow down the construction activities accordingly; and to review the work methods and equipment immediately.

### **Ecology**

- (a) Large boulders will be returned to the riverbed following the excavation works;
- (b) Construction works from Ch. 0.0m – Ch. 150m would be along one side of the river only;
- (c) Approximately 150m of the existing natural riverbank on the western side of the river would be retained;
- (d) Excavation works within the river channel should be restricted to an enclosed dewater section of the river, and would be limited to sections 50-100m long at any one time;

- (e) Flows to the area downstream shall be maintained at all times during the construction phase;
- (f) Capture survey shall be conducted within the Tai Po River before commencement of works. The captured target species shall be relocated to areas of the watercourse upstream of the watercourse upstream of the Tai Po River;
- (g) Temporary noise barriers should be constructed to control noise impacts to habitats and associated wildlife within and adjacent to the proposed works area;
- (h) Excavation works shall be carried out by land based plant within enclosed dry section of river channel;
- (i) Compensatory planting of trees and other vegetation along the banks of the newly improved drainage channel should be provided to compensate for the loss of riparian vegetation;
- (j) Operation phase activities in the improved drainage channel would be limited to periodic channel maintenance such as de-silting.

10.03 Based on the site environmental situation, the Contractor has implemented the required environmental mitigation measures according to the Updated Environmental Monitoring and Audit Manual. In the Reporting Period, environmental mitigation measures had been implemented by the Contractor are summarized in **Table 10-1**.

**Table 10-1 Environmental Mitigation Measures**

Issues	Environmental Mitigation Measures
Water Quality	<ul style="list-style-type: none"> <li>• Wastewater should be appropriately treated by treatment facilities;</li> <li>• Drainage channels should be provided to convey run-off into the treatment facilities; and</li> <li>• Drainage systems should be regularly and adequately maintained.</li> </ul>
Air Quality	<ul style="list-style-type: none"> <li>• Increase watering frequency to reduce dust emissions from all exposed site surface, particularly during dry weather;</li> <li>• Frequent watering for particularly dusty construction areas and areas close to air sensitive receivers;</li> <li>• Cover all excavated or stockpile of dusty material by impervious sheeting or sprayed with water to maintain the entire surface wet;</li> <li>• Public roads around the site entrance/exit should be kept clean and free from dust; and</li> <li>• Tarpaulin covering of any dusty materials on a vehicle leaving the site.</li> </ul>
Noise	<ul style="list-style-type: none"> <li>• Reduce construction machines as used within the site;</li> <li>• Use of quiet plant and working methods;</li> <li>• Scheduling of construction works nearby the NSR; and</li> <li>• Alternative use of plant items within one worksite, where practicable.</li> </ul>
Waste and Chemical Management	<ul style="list-style-type: none"> <li>• Excavated material should be reused on site as far as possible to minimize off-site disposal. Scrap metals or abandoned equipment should be recycled if possible;</li> <li>• Waste arising should be kept to a minimum and be handled, transported and disposed of in a suitable manner;</li> <li>• The Contractor should adopt a trip ticket system for the disposal of C&amp;D materials to any designed public filling facility and/or landfill; and</li> <li>• Chemical waste shall be handled in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes.</li> </ul>
General	<ul style="list-style-type: none"> <li>• The site should be generally kept tidy and clean.</li> </ul>

## 11.0 IMPACT FORECAST

### CONSTRUCTION ACTIVITIES FOR THE FORTH-COMING MONTH

11.01 Construction activities planned to be carried out next month at Upper Tai Po River is listed as below:-

- Construction of Dwarf Wall
- Formation of Riverbed
- Installation of Baffle Blocks
- Construction of Inclined Gabion /No-fines Mass Concrete Wall
- Construction of Stilling Basin
- Construction of Surface Drainage
- Construction of Wing Wall for Box Culvert

### KEY ISSUES FOR THE COMING MONTH

11.02 According to construction activities to be carried out in coming months, key issues to be considered include:

- Implementation of dust suppression measures should be conducted at all times;
- Ensure dust suppression measures should be implemented properly;
- Disposal of empty engine oil containers should be undertaken within site area;
- Sediment catch-pits and silt removal facilities should be regularly maintained;
- Management of chemical wastes should be followed;
- Discharge of site effluent to the nearby local stream or storm drainage, stockpiling or disposal of materials, and any dredging or construction area at this area should be prohibited;
- Follow-up of improvement on general waste management issues should be conducted; and
- Implementation of construction noise preventative control measures should be undertaken.



## 12.0 CONCLUSIONS AND RECOMMENTATIONS

### CONCLUSIONS

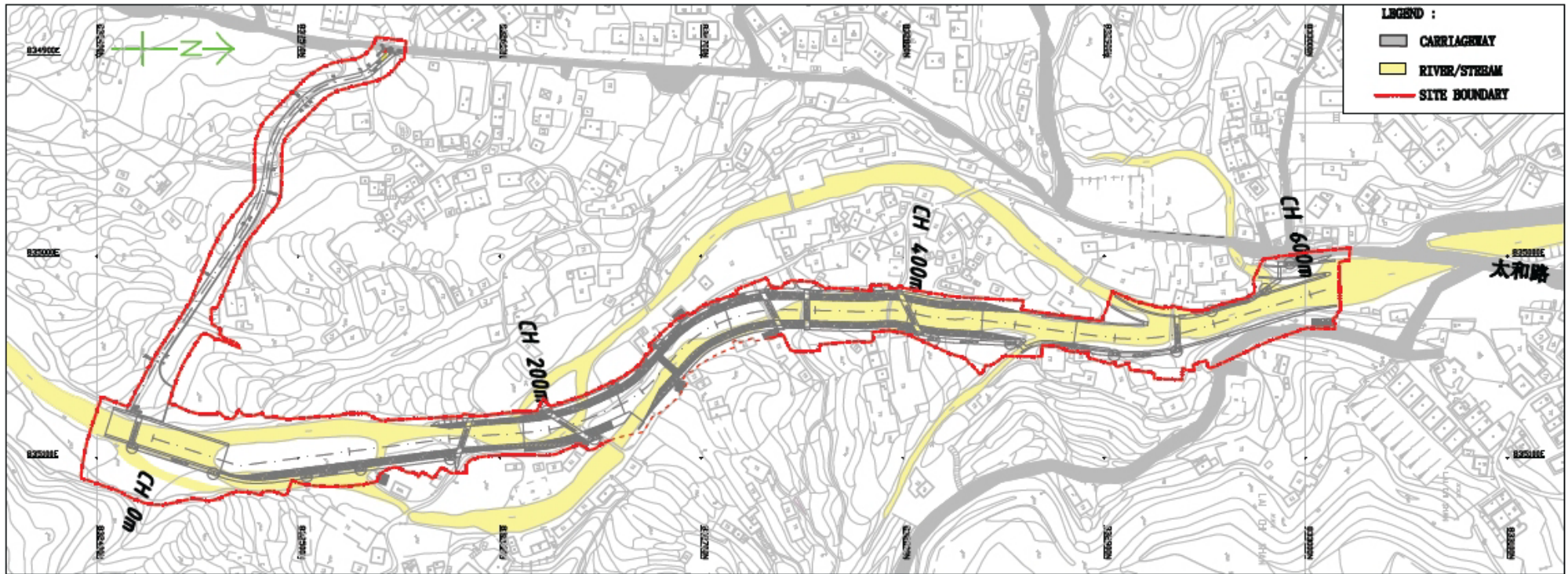
- 12.01 This is the **forty-eighth (48<sup>th</sup>)** monthly EM&A report for the Project presenting the monitoring results and inspection findings for the reporting month from **1<sup>st</sup> to 31<sup>st</sup> August 2012**.
- 12.02 No noise complaint (which is an Action Level exceedance) was received in this Reporting Period. In reporting month, a total 44 events of construction noise monitoring was undertaken and all measurement results were below 75dB(A). No NOE was therefore issued to notify EPD, IEC, the Contractor and RE.
- 12.03 As no piling work conducted, no vibration monitoring was performed in this Reporting Period.
- 12.04 Weekly ecological site inspections were performed on **6<sup>th</sup>, 13<sup>th</sup>, 20<sup>th</sup> and 27<sup>th</sup> August 2012**. According to inspection findings, no advice and action was recommended by the ecologist.
- 12.05 No documented environmental complaints, notification of summon or successful prosecution was received in the reporting month.
- 12.06 Joint weekly environmental site inspection by the Contractor, ET, IEC and Engineer's Representative was undertaken on **8<sup>th</sup>, 15<sup>th</sup>, 22<sup>nd</sup> and 28<sup>th</sup> August 2012**. In this Reporting Period, **9** observations were recorded but no non-compliance was identified during the site inspection. In this reporting month, DSD's representatives attended the site inspection on **28<sup>th</sup> August 2012**.

### RECOMMENDATIONS

- 12.07 During wet season, muddy water and other water quality pollutants via site surface water runoff into the local stream Tai Po River is a key issue in the upcoming month and water quality mitigation measures shall be fully implemented.
- 12.08 On the other hand, construction noise is another key environmental issue during construction phase. Noise mitigation measures are reminded to be implemented in accordance with EM&A Manual stipulation. Dust mitigation measures to avoid fugitive dust emissions from loose soil surface or haul road are also reminded.
- 12.09 To control the site performance on waste management, Chiu Hing Construction and Transportation Company Limited shall ensure that all solid and liquid waste management works are fully in compliance with the relevant license/permit requirements, such as the effluent discharge licence and the chemical waste producer registration. Chiu Hing Construction and Transportation Company Limited is also reminded to implement the recommended environmental mitigation measures according to EM&A Manual.

## **Appendix A**

### **Site Layout Plan of the Upper Tai Po River**



Upper Tai Po River

## **Appendix B**

### **Master and Three Months Rolling Construction Programs**

識別碼	任務名稱	工期	開始時間	完成時間	2010年		2011年		2012年		2013年	
					H2	H1	H2	H1	H2	H1	H2	H1
1	Programme of Upper Tai Po River	750 工作日	5/1/2010	19/11/2012								
2	Wet Season of 2010	214 工作日	5/1/2010	31/10/2010								
3	Wet Season of 2011	149 工作日	8/3/2011	30/9/2011								
4	Works Suspended Due to Villager's Rally	42 工作日	21/10/2010	18/12/2010								
5	Ch 230-350	446 工作日	28/1/2011	12/10/2012								
6	Gabion Wall (Ch 230-275 RHS) TGI/TGIA (Completed)	40 工作日	28/1/2011	24/3/2011								
10	Retaining Wall (Ch 275-330 RHS) TRI (replaced by AD1) (Completed)	154 工作日	17/3/2011	18/10/2011								
17	Drainage & Footpath (Ch 275-330 RHS)	21 工作日	6/8/2012	3/9/2012								
18	Construction of drainage & footpath	21 工作日	6/8/2012	3/9/2012								
19	Inclined Gabion Wall (Ch 290-327 LHS)	109 工作日	3/1/2012	1/6/2012								
20	Remove Concrete Blocks and shotcrete (Completed)	30 工作日	6/2/2012	13/2/2012								
21	Concreting (Completed)	60 工作日	5/3/2012	25/5/2012								
22	No-fine	5 工作日	28/5/2012	1/6/2012								
23	Gabion	4 工作日	22/5/2012	25/5/2012								
24	Maintenance Staircase (Ch 315 LHS) (Completed)	30 工作日	6/6/2011	15/7/2011								
26	Drainage & Footpath (Ch 270-330 LHS)	30 工作日	6/6/2011	15/7/2011								
27	Construction of drainage & footpath	30 工作日	6/6/2011	15/7/2011								
28												
29	Temp Utility and Pedestrian Diversion at Ch230 (Completed)	192 工作日	21/7/2011	13/4/2012								
32												
33	Demolition of Interim Footbridge at Ch230 (Completed)	17 工作日	3/10/2011	25/10/2011								
36												
37	Inclined Gabion Wall (Ch 218-240 LHS)	129 工作日	3/1/2012	29/6/2012								
38	Remove Shotcrete & concrete block (Completed)	30 工作日	3/1/2012	13/2/2012								
39	Concreting	25 工作日	14/5/2012	15/6/2012								
40	No-fine	3 工作日	22/6/2012	26/6/2012								
41	Gabion	3 工作日	27/6/2012	29/6/2012								
42	Maintenance Staircase (Ch 242 LHS)	4 工作日	18/6/2012	21/6/2012								
43	Formwork and concreting	4 工作日	18/6/2012	21/6/2012								
44	Inclined Gabion Wall (Ch 240-272 LHS)	129 工作日	3/1/2012	29/6/2012								
45	Remove Concrete Blocks and shotcrete (Completed)	30 工作日	3/1/2012	13/2/2012								
46	Concreting (Completed)	30 工作日	12/3/2012	20/4/2012								
47	No-fine	3 工作日	22/6/2012	26/6/2012								
48	Gabion	3 工作日	27/6/2012	29/6/2012								
49	Inclined RC Wall and Step 2A (Ch 272-290 LHS)	51 工作日	9/4/2012	18/6/2012								
50	Concreting (Base)	10 工作日	9/4/2012	20/4/2012								
51	Concreting (Ramp)	7 工作日	11/5/2012	21/5/2012								
52	Concreting (Slab)	5 工作日	22/5/2012	28/5/2012								
53	Concreting (Wall Stem and Step 2A with stilling basin)	15 工作日	29/5/2012	18/6/2012								
54	Drainage & Footpath (Ch 230-270 LHS)	20 工作日	16/7/2012	10/8/2012								
55	Construction of drainage & footpath	20 工作日	16/7/2012	10/8/2012								
56	Step 2(Ch 236)	10 工作日	19/6/2012	27/7/2012								
57	Stilling Basin	5 工作日	19/6/2012	25/6/2012								

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					H2	H1	H2	H1	H2	H1	H1
58	Ramp and Slab	5 工作日	26/6/2012	27/7/2012							
59	Cascade (Ch 275) (Completed)	21 工作日	28/6/2012	26/7/2012							
62	Lighting at CH 250-320	45 工作日	13/8/2012	12/10/2012							
63	Construction of Drawpits / Ductings	21 工作日	13/8/2012	10/9/2012							
64	Public lighting installation (CE2318)	12 工作日	11/9/2012	26/9/2012							
65	Public lighting installation (CE2317)	12 工作日	11/9/2012	26/9/2012							
66	T&C	6 工作日	27/9/2012	4/10/2012							
67	Removal of existing lighting (VA1311-Z1)	6 工作日	5/10/2012	12/10/2012							
68											
69	Footbridge TB04 (Ch 330)	181 工作日	12/10/2011	20/6/2012							
70	Construction of Abutment A (LHS) (Completed)	22 工作日	7/12/2011	5/1/2012							
78	Construction of Abutment B (RHS) (Completed)	24 工作日	12/10/2011	14/11/2011							
87	Construction of decking (steel deck) (Completed)	16 工作日	11/5/2012	1/6/2012							
91	Demolition of Bridge TB-A (Completed)	17 工作日	17/5/2012	8/6/2012							
94	Lighting at Footbridge TB04	11 工作日	6/6/2012	20/6/2012							
95	Construction of Drawpits / Ductings	7 工作日	6/6/2012	14/6/2012							
96	Public lighting installation (CE2315)	3 工作日	15/6/2012	19/6/2012							
97	Public lighting installation (CE2316)	3 工作日	15/6/2012	19/6/2012							
98	T&C	1 工作日	20/6/2012	20/6/2012							
99	Construction of Gabion Wall at TB-A (Completed)	5 工作日	11/6/2012	15/6/2012							
103											
104	Footbridge TB05 (ch 350)	353 工作日	10/3/2011	16/7/2012							
105	Construction of Abutment A (LHS) (Completed)	20 工作日	22/5/2012	18/6/2012							
113	Construction of Abutment B (RHS) (Completed)	19 工作日	10/3/2011	5/4/2011							
121	Construction of decking (Completed)	37 工作日	11/5/2012	27/7/2012							
126	Demolition of Bridge TB-B (Completed)	17 工作日	17/5/2012	8/6/2012							
129	Lighting at Footbridge TB05	10 工作日	3/7/2012	16/7/2012							
130	Construction of Drawpits / Ductings	6 工作日	3/7/2012	10/7/2012							
131	Public lighting installation (CE2313)	3 工作日	11/7/2012	13/7/2012							
132	Public lighting installation (CE2314)	3 工作日	11/7/2012	13/7/2012							
133	T&C	1 工作日	16/7/2012	16/7/2012							
134	Construction of Gabion Wall at TB-B (Completed)	5 工作日	11/6/2012	15/6/2012							
138											
139											
140	Inclined Gabion Wall (Ch 327-448 LHS) (Completed)	13 工作日	11/5/2012	29/5/2012							
145	Drainage & Footpath (Ch 330-400 LHS)	30 工作日	18/7/2011	26/8/2011							
146	Construction of drainage & footpath	30 工作日	18/7/2011	26/8/2011							
147	Gabion Wall (Ch 330-345 RHS) T&C (Completed)	16 工作日	15/11/2011	6/12/2011							
151	Drainage & Footpath (Ch 400-450 LHS)	20 工作日	29/8/2011	23/9/2011							
152	Construction of drainage & footpath	20 工作日	29/8/2011	23/9/2011							
153											
154	Step 3 (Ch327)	12 工作日	14/5/2012	29/5/2012							
155	Stilling Basin	7 工作日	14/5/2012	22/5/2012							



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					H2	H1	H2	H1	H2	H1	H2
156	Ramp and Slab	5 工作日	23/5/2012	29/5/2012							
157											
158	Ch 45-100	505 工作日	1/11/2010	5/10/2012							
159	Additional Boulder Trap	166 工作日	7/10/2011	25/5/2012							
160											
161	Footbridge TB02 (Ch 150)	505 工作日	1/11/2010	5/10/2012							
162	Construction of Abutment A (LHS)	23 工作日	1/11/2010	1/12/2010							
170	Construction of decking	14 工作日	23/7/2012	9/8/2012							
171	Erection of steel deck+ conc deck	4 工作日	23/7/2012	26/7/2012							
172	XXConcreting	0 工作日	26/7/2012	26/7/2012							
173	Deck finishing	10 工作日	27/7/2012	9/8/2012							
174	Railing installation	7 工作日	27/7/2012	6/8/2012							
175	Lighting at Footbridge TB02	51 工作日	27/7/2012	5/10/2012							
176	Construction of Drawpits / Ductings	21 工作日	27/7/2012	24/8/2012							
177	Public lighting installation (CE2308)	12 工作日	27/8/2012	11/9/2012							
178	Public lighting installation (CE2309)	12 工作日	12/9/2012	27/9/2012							
179	Removal of existing lighting (VA2642-A1)	6 工作日	28/9/2012	5/10/2012							
180											
181											
182											
183	Gabion Wall (Ch 150-178 LHS) TG3A	154 工作日	5/4/2011	4/11/2011							
187	Gabion Wall (Ch 178-230 LHS) TGSATG2	15 工作日	3/10/2011	21/10/2011							
190	Maintenance Staircase (Ch 178 LHS)	4 工作日	31/10/2011	31/11/2011							
192	Drainage & Footpath (Ch 150-Ch230 LHS)	30 工作日	13/8/2012	21/9/2012							
193	Drainage & Footpath	30 工作日	13/8/2012	21/9/2012							
194	Inclined Gabion Wal (Ch 110-130 RES)	91 工作日	5/3/2012	9/7/2012							
195	Remove shotcrete (Completed)	5 工作日	5/3/2012	9/3/2012							
196	Concreting	10 工作日	18/6/2012	29/6/2012							
197	No-fine	3 工作日	27/2/2012	4/7/2012							
198	Gabion	3 工作日	5/7/2012	9/7/2012							
199	Maintenance Staircase (Ch 130 RHS)	4 工作日	4/7/2012	9/7/2012							
200	Formwork and concreting	4 工作日	4/7/2012	9/7/2012							
201	Drainage & Footpath (Ch 0-150 RHS)	45 工作日	10/7/2012	10/9/2012							
202	Construction of drainage & footpath	45 工作日	10/7/2012	10/9/2012							
203											
204	Inclined Gabion Wall (Ch 130-220 RES)	55 工作日	5/3/2012	18/5/2012							
205	Remove Shotcrete (Completed)	2 工作日	5/3/2012	6/3/2012							
206	Concreting (Completed)	35 工作日	7/3/2012	24/4/2012							
207	No-fine (Completed)	10 工作日	25/4/2012	8/5/2012							
208	Gabion	8 工作日	9/5/2012	18/5/2012							
209											
210	Footbridge TB03 (Ch 200)	229 工作日	26/10/2011	10/9/2012							
211	Construction of Abutment B (RHS)	41 工作日	26/10/2011	21/12/2011							

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					H2	H1	H2	H1	H2	H1	H2	H1
219	Construction of Decking (TB03)	85 工作日	26/3/2012	20/7/2012								
220	Modification of LHS table top	25 工作日	26/3/2012	27/4/2012								
221	Erection of steel deck+ conc deck	4 工作日	3/7/2012	6/7/2012								
222	Deck finishing	10 工作日	9/7/2012	20/7/2012								
223	Railing installation	2 工作日	9/7/2012	10/7/2012								
224	Lighting at Footbridge TB03	27 工作日	11/7/2012	16/8/2012								
225	Construction of Drawpits / Ductings	12 工作日	11/7/2012	26/7/2012								
226	Public lighting Installation (CE2321)	6 工作日	27/7/2012	3/8/2012								
227	Public lighting Installation (CE2322)	6 工作日	6/8/2012	13/8/2012								
228	T&C	1 工作日	14/8/2012	14/8/2012								
229	Removal of existing lighting (VA1309-Z1)	2 工作日	15/8/2012	16/8/2012								
230	Step 1 (Ch 178)	10 工作日	9/7/2012	20/7/2012								
231	Stilling Basin	5 工作日	9/7/2012	13/7/2012								
232	Ramp and Slab	5 工作日	16/7/2012	20/7/2012								
233												
234	Lighting CH 175-250	21 工作日	13/8/2012	10/9/2012								
235	Construction of Drawpits / Ductings	12 工作日	13/8/2012	28/8/2012								
236	Public lighting Installation (CE2319)	6 工作日	29/8/2012	5/9/2012								
237	Public lighting Installation (CE2320)	6 工作日	29/8/2012	5/9/2012								
238	Public lighting Installation (CE2323)	6 工作日	29/8/2012	5/9/2012								
239	Public lighting Installation (CE2324)	6 工作日	29/8/2012	5/9/2012								
240	T&C	1 工作日	6/9/2012	6/9/2012								
241	Removal of existing lighting (VE2641-A1)	2 工作日	7/9/2012	10/9/2012								
242	Removal of existing lighting (VA1310-A1)	2 工作日	7/9/2012	10/9/2012								
243												
244	Ch. 23-45 (Completed)	570 工作日	30/8/2010	21/1/2012								
245	Retaining Wall at Access D (Boulder Trap)	41 工作日	1/9/2010	27/10/2010								
265	Filling Work at Boulder Trap (RHS of downstream)	6 工作日	30/8/2010	6/9/2010								
267	Dwarf Wall (Ch 60-75) RHS	23 工作日	3/10/2011	2/11/2011								
276	Box Culvert 03 (Ch 45) (Completed)	31 工作日	3/11/2011	15/12/2011								
287	Retaining Wall at Access D (Boulder Trap)	340 工作日	18/7/2011	21/1/2012								
319												
320	Ch. 350-450	489 工作日	3/1/2011	15/11/2012								
321	Gabion Wall (Ch 350-400 LHS) TR1 (AD) (Completed)	43 工作日	31/10/2011	28/12/2011								
326	Gabion Wall (Ch 400-450 LHS) TR1 (AD) (Completed)	48 工作日	22/12/2011	27/2/2012								
331	TB06	489 工作日	3/1/2011	15/11/2012								
332	Footbridge TB06 (Ch 400)	162 工作日	22/12/2011	3/8/2012								
333	Construction of Abutment A (LHS)	30 工作日	22/12/2011	1/2/2012								
342	Construction of decking	14 工作日	11/5/2012	30/5/2012								
347	Lighting at Footbridge TB06	14 工作日	17/7/2012	3/8/2012								
348	Construction of Drawpits / Ductings	6 工作日	17/7/2012	24/7/2012								
349	Public lighting Installation (CE2311)	3 工作日	25/7/2012	27/7/2012								
350	Public lighting Installation (CE2310)	3 工作日	30/7/2012	1/8/2012								

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					H2	H1	H2	H1	H2	H1	H2
351	T&C	2 工作日	2/8/2012	3/8/2012							
352	Demolition of Bridge TB-C	4 工作日	31/5/2012	5/6/2012							
355	Construction of Gabion Wall at TB-C	35 工作日	6/6/2012	24/7/2012							
359	Gabion Wall (Ch. 400-450 RHS) TR1 (replaced by AD1)	30 工作日	3/1/2011	11/2/2011							
360	Step 4	20 工作日	11/5/2012	7/6/2012							
364	Basin	5 工作日	11/5/2012	17/5/2012							
365	Ramp and Slab	5 工作日	18/5/2012	24/5/2012							
366	Step 5	10 工作日	25/5/2012	7/6/2012							
367	Basin	5 工作日	25/5/2012	31/5/2012							
368	Ramp and Slab	5 工作日	1/6/2012	7/6/2012							
369											
370											
371	Box Culvert TB01 (Ch. 450) (Completed)	40 工作日	10/3/2011	4/5/2011							
381											
382	Drainage & Footpath (Ch.330-450) RHS	30 工作日	4/9/2012	15/10/2012							
383	Drainage & Footpath	30 工作日	4/9/2012	15/10/2012							
384											
385	Lighting at CH 350-380	23 工作日	16/10/2012	15/11/2012							
386	Construction of Drawpits / Ductings	14 工作日	16/10/2012	2/11/2012							
387	Public lighting Installation (CE2312)	7 工作日	5/11/2012	13/11/2012							
388	T&C	2 工作日	14/11/2012	15/11/2012							
389											
390	Ch. 450-525	424 工作日	16/3/2011	29/10/2012							
391	Retaining Wall (ch 450-500) TR2 (RHS)	48 工作日	3/10/2011	7/12/2011							
434	Retaining Wall (ch 450-500) TR2 (LHS)	54 工作日	29/11/2011	10/2/2012							
483											
484	Drainage & Footpath (Ch. 450-490 RHS)	20 工作日	15/6/2012	12/7/2012							
485	Construction of drainage & footpath and wall stem 2nd portion	20 工作日	15/6/2012	12/7/2012							
486	Retaining Wall (Ch. 500-530) TR3 (RHS)	338 工作日	16/3/2011	29/6/2012							
487	Base Slab Construction Bay 1 (RHS)	28 工作日	16/3/2011	22/4/2011							
492	Wall Stem Construction Bay 1 (RHS)	10 工作日	25/4/2011	6/5/2011							
497	Base Slab Construction Bay 1 (RHS)	10 工作日	4/6/2012	15/6/2012							
498	Excavation and Formation	5 工作日	4/6/2012	8/6/2012							
499	Formwork and rebar fixing	3 工作日	11/6/2012	13/6/2012							
500	Concreting	1 工作日	14/6/2012	14/6/2012							
501	Stripping off formwork	1 工作日	15/6/2012	15/6/2012							
502	Wall Stem Construction Bay 2 (RHS)	10 工作日	18/6/2012	29/6/2012							
507											
508	Cascades (Ch. 500 LHS)	28 工作日	3/10/2011	9/11/2011							
514											
515	Retaining Wall (Ch. 500-530) TR3 (LHS)	54 工作日	9/11/2011	23/11/2012							
538											
539	Drainage & Footpath (Ch. 490-525 RHS)	10 工作日	16/10/2012	29/10/2012							

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					H2	H1	H2	H1	H2	H1	H2	H1
540	Construction of drainage & footpath	10 工作日	16/10/2012	29/10/2012								
541	Footbridge TB07 (Ch 525)	213 工作日	3/10/2011	25/7/2012								
542	Temporary Pedestrian Division	14 工作日	3/10/2011	20/10/2011								
543	Demolition of existing Footbridge TB-D (Ch 525)	3 工作日	3/7/2012	5/7/2012								
545	Construction of Abutment A	28 工作日	31/5/2012	9/7/2012								
547	Construction of Abutment B	33 工作日	11/6/2012	25/7/2012								
556	Footbridge TB07 (Ch 525)	31 工作日	11/6/2012	23/7/2012								
566	Construction of decking	16 工作日	11/6/2012	27/7/2012								
567	Erection of steel deck+ conc deck	4 工作日	11/6/2012	14/6/2012								
568	Deck finishing	10 工作日	15/6/2012	28/6/2012								
569	NA	0 工作日	28/6/2012	28/6/2012								
570	Railing installation	2 工作日	29/6/2012	2/7/2012								
571	Footbridge TB07 Lighting	15 工作日	3/7/2012	23/7/2012								
572	Construction of Drawpits / Ducting	7 工作日	3/7/2012	11/7/2012								
573	Public lighting installation (CE2328)	6 工作日	12/7/2012	19/7/2012								
574	Public lighting installation (CE2328)	6 工作日	12/7/2012	19/7/2012								
575	T&C	2 工作日	20/7/2012	23/7/2012								
576												
577	Ch 525-615	547 工作日	15/10/2010	19/11/2012								
578	Retaining Wall (Ch 535-546) TR4 (LHS)	37 工作日	11/5/2012	2/7/2012								
598												
599	Retaining Wall (Ch 535-546) TR4 (RHS)	25 工作日	23/5/2012	26/6/2012								
600	Excavation and Formation	5 工作日	23/5/2012	29/5/2012								
601	Base Slab Construction Bay 1+2 (RHS)	8 工作日	30/5/2012	8/6/2012								
602	Formwork and rebar fixing (with DWF)	5 工作日	30/5/2012	5/6/2012								
603	Concreting	1 工作日	6/6/2012	6/6/2012								
604	Stripping off formwork	2 工作日	7/6/2012	8/6/2012								
605	Wall Stem Construction Bay 1 (RHS) del	0 工作日	8/6/2012	8/6/2012								
610	Base Slab Construction Bay 2 (RHS) del	0 工作日	8/6/2012	8/6/2012								
614	Wall Stem Construction Bay 1+2 (RHS)	12 工作日	11/6/2012	26/6/2012								
615	Formwork and rebar fixing	5 工作日	11/6/2012	15/6/2012								
616	Concreting	1 工作日	18/6/2012	18/6/2012								
617	Stripping off formwork	2 工作日	19/6/2012	20/6/2012								
618	Backfill	4 工作日	21/6/2012	26/6/2012								
619	Retaining Wall TR5 Ch (546-596 RHS) TR5 (AD)	269 工作日	15/10/2010	26/10/2011								
627												
628	Retaining Wall TR5A CH546-585 LHS	58 工作日	16/5/2012	3/8/2012								
629	River diversion, Excavation and Formation	24 工作日	27/6/2012	30/7/2012								
630	Base Slab Construction TR5A Bay 1 LHS	8 工作日	11/7/2012	20/7/2012								
634	Wall Stem Construction TR5A Bay 1 LHS	9 工作日	23/7/2012	2/8/2012								
639	Base Slab Construction TR5A Bay 2 LHS	8 工作日	23/7/2012	1/8/2012								
643	Wall Stem Construction TR5A Bay 2 LHS	9 工作日	16/5/2012	28/5/2012								

專案: Master Programme TPR 11 May  
日期: 22/5/2012

任務 進度 摘要 外部任務 期限  
 分割 里程碑 專案摘要報告 外部里程碑

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識別碼	任務名稱	工期	開始時間	完成時間	2010年		2011年		2012年		2013年	
					H2	H1	H2	H1	H2	H1	H2	H1
644	Formwork and rebar fixing	4 工作日	16/5/2012	21/5/2012								
645	Concreting	1 工作日	22/5/2012	22/5/2012								
646	Stripping off formwork	1 工作日	23/5/2012	23/5/2012								
647	Backfill	3 工作日	24/5/2012	28/5/2012								
648	Base Slab Construction TR5A Bay 3 LHS	8 工作日	11/7/2012	20/7/2012								
652	Wall Stem Construction TR5A Bay 3 LHS	10 工作日	23/7/2012	3/8/2012								
657	Box Culvert TB02 (ch 580)	39 工作日	24/1/2012	16/3/2012								
658												
668												
669	Retaining Wall TR5A & TR6 CH585-595 LHS	50 工作日	7/2/2012	16/4/2012								
670	River/Haai Road Diversion (to TR3 and TR5 RHS)	3 工作日	7/2/2012	9/2/2012								
671	Excavation and Blinding	14 工作日	10/2/2012	29/2/2012								
672	Base Slab Construction TR6 Bay 1 LHS	10 工作日	1/3/2012	14/3/2012								
676	Wall Stem Construction TR6 Bay 1 LHS	10 工作日	15/3/2012	28/3/2012								
681	Base Slab Construction TR5A Bay 4 LHS	8 工作日	14/3/2012	23/3/2012								
685	Wall Stem Construction TR5A Bay 4 LHS	10 工作日	26/3/2012	6/4/2012								
690	Base Slab Construction TR5A Bay 5 LHS	8 工作日	22/3/2012	2/4/2012								
694	Wall Stem Construction TR5A Bay 5 LHS	10 工作日	3/4/2012	16/4/2012								
699												
700	Retaining Wall (ch 595-615) TR3 (Bay 3)	36 工作日	3/10/2011	21/11/2011								
715	Concrete Slab (Ch546 - Ch596) LHS	27 工作日	15/6/2012	23/7/2012								
716	Bay 1	11 工作日	15/6/2012	29/6/2012								
717	Excavation/Blinding	3 工作日	15/6/2012	19/6/2012								
718	Formwork and rebar fixing for DWF	4 工作日	20/6/2012	25/6/2012								
719	Concreting of DWF	1 工作日	26/6/2012	26/6/2012								
720	Formwork and rebar fixing for slab	4 工作日	22/6/2012	27/6/2012								
721	Concreting of slab	1 工作日	28/6/2012	28/6/2012								
722	Stripping off formwork	1 工作日	29/6/2012	29/6/2012								
723	Bay 2	12 工作日	20/6/2012	5/7/2012								
724	Excavation/Blinding	2 工作日	20/6/2012	21/6/2012								
725	Formwork and rebar fixing for DWF	4 工作日	26/6/2012	29/6/2012								
726	Concreting of DWF	1 工作日	27/2012	27/2012								
727	Formwork and rebar fixing for slab	4 工作日	28/6/2012	3/7/2012								
728	Concreting of slab	1 工作日	4/7/2012	4/7/2012								
729	Stripping off formwork	1 工作日	5/7/2012	5/7/2012								
730	Bay 3	14 工作日	22/6/2012	11/7/2012								
731	Excavation/Blinding	2 工作日	22/6/2012	25/6/2012								
732	Formwork and rebar fixing for DWF	4 工作日	29/6/2012	4/7/2012								
733	Concreting of DWF	1 工作日	5/7/2012	5/7/2012								
734	Formwork and rebar fixing for slab	4 工作日	4/7/2012	9/7/2012								
735	Concreting of slab	1 工作日	10/7/2012	10/7/2012								
736	Stripping off formwork	1 工作日	11/7/2012	11/7/2012								
737	Bay 4	16 工作日	26/6/2012	17/7/2012								

專案: Master Programme TPR 11 May  
 日期: 22/5/2012

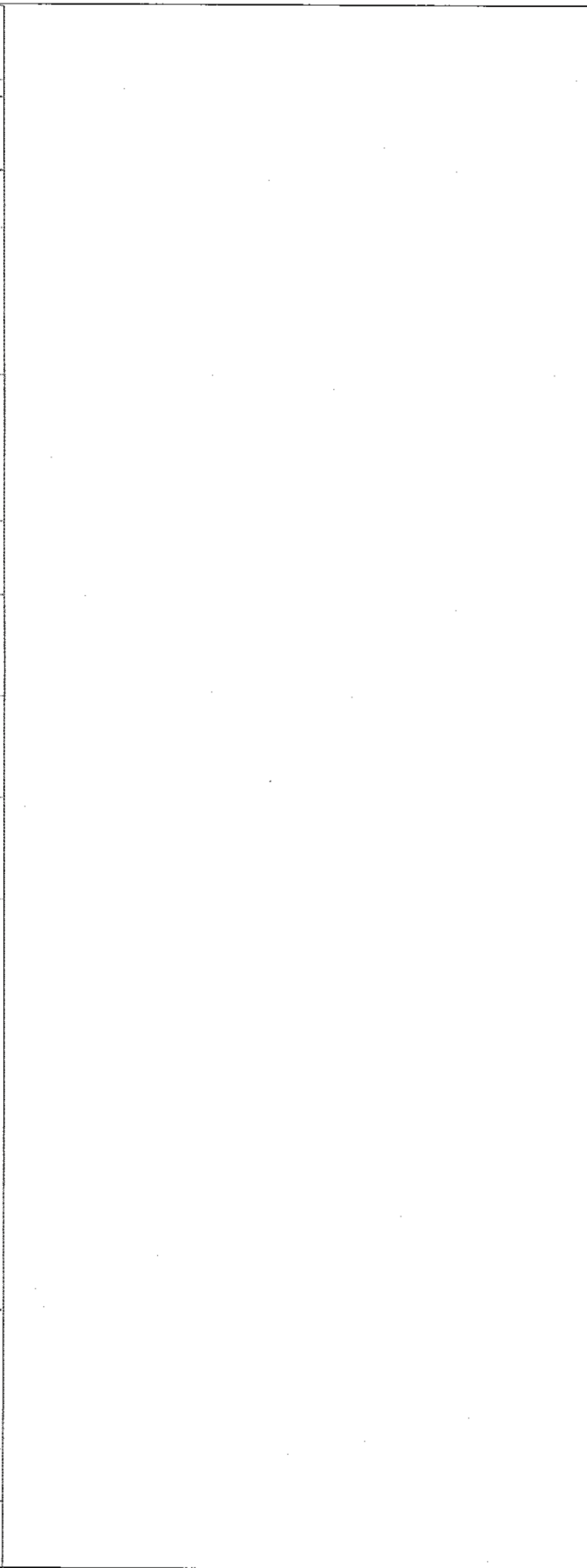
任務 進度 里程碑

摘要 專案摘要報告 里程碑

外部任務 外部里程碑

期限

識別碼	任務名稱	工期	開始時間	完成時間	2010年		2011年		2012年		2013年	
					H2	H1	H2	H1	H2	H1	H2	H1
738	Excavation/Blinding	2 工作日	26/6/2012	27/6/2012								
739	Formwork and rebar fixing for DWF	4 工作日	5/7/2012	10/7/2012								
740	Concreting of DWF	1 工作日	11/7/2012	11/7/2012								
741	Formwork and rebar fixing for slab	4 工作日	10/7/2012	13/7/2012								
742	Concreting of slab	1 工作日	16/7/2012	16/7/2012								
743	Stripping off formwork	1 工作日	17/7/2012	17/7/2012								
744	Bay 5	18 工作日	28/6/2012	23/7/2012								
751												
752	Drainage and Footpath (Ch525-615 LHS & RHS)	15 工作日	16/10/2012	5/11/2012								
753	Construction of footpath & drainage works	15 工作日	16/10/2012	5/11/2012								
754	Lighting at CH 550-610	10 工作日	6/11/2012	19/11/2012								
755	Construction of Drawpits / Ducting	6 工作日	6/11/2012	13/11/2012								
756	Public lighting Installation (CE2325)	2 工作日	14/11/2012	15/11/2012								
757	Public lighting Installation (CE2326)	2 工作日	14/11/2012	15/11/2012								
758	Public lighting Installation (CE2327)	2 工作日	14/11/2012	15/11/2012								
759	T&C	1 工作日	16/11/2012	16/11/2012								
760	Removal of existing lighting (CE1600-32)	1 工作日	19/11/2012	19/11/2012								



專案: Master Programme TPR 11 May  
日期: 22/5/2012

任務 進度 里程碑

概要 專案概要報告

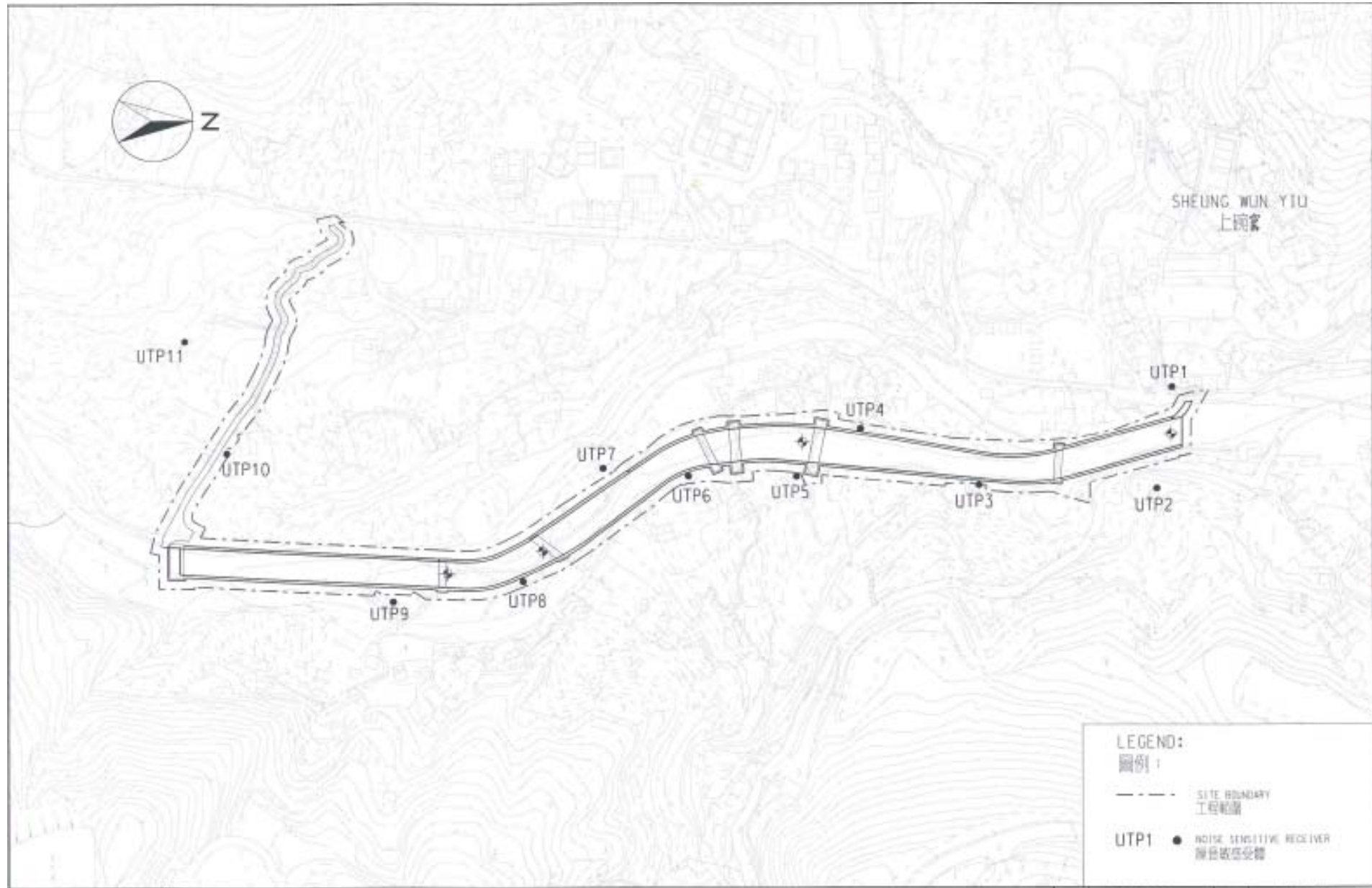
外部任務 外部里程碑

期限

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## **Appendix C**

### **Environmental Monitoring Locations**



## **Appendix D**

### **Calibration certificates of the monitoring equipment**

**Equipment Calibration List**

<b>Items</b>	<b>Aspect</b>	<b>Description of Equipment</b>	<b>Date of Calibration</b>	<b>Date of Next Calibration</b>
1	Noise	Bruel & Kjaer Integrating Sound Level Meter (Serial No. 2285762) AUES Equipment ID: EQ006	7 May 2012	7 May 2013
2		Bruel & Kjaer Integrating Sound Level Meter (Serial No. 2285722) AUES Equipment ID: EQ009	20 July 2012	20 July 2013
3		Bruel & Kjaer Integrating Sound Level Meter (Serial No. 2285721) AUES Equipment ID: EQ010	20 April 2012	20 April 2013
4		Bruel & Kjaer Integrating Sound Level Meter (Serial No. 2337676) AUES Equipment ID: EQ065	18 May 2012	18 May 2013
5		Rion NL-31 Sound Level Meter (Serial No. 00410221) AUES Equipment ID: EQ067	8 May 2012	8 May 2013
6		Bruel & Kjaer Acoustical Calibrator (Serial No. 2326408)	7 May 2012	7 May 2013





# Certificate of Calibration 校正證書

Certificate No. : C122713  
證書編號

**ITEM TESTED / 送檢項目 ( Job No. / 序引編號 : IC12-0960 )**

Description / 儀器名稱 : Integrating Sound Level Meter (EQ006)  
Manufacturer / 製造商 : Bruel & Kjaer  
Model No. / 型號 : 2238  
Serial No. / 編號 : 2285762  
Supplied By / 委託者 : Action-United Environmental Services and Consulting  
Unit A, 20/F., Gold King Industrial Building,  
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

**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** : 7 May 2012

**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 Precision Measurement Ltd., UK
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By  
測試

  
L K Yeung

Certified By  
核證

  
K C Lee

Date of Issue  
簽發日期

8 May 2012

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. : C122713  
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 B & K Acoustic Calibrator 4231, S/N : 2326408 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	C120016
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 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L <sub>AFF</sub>	A	F	94.00	1	94.1	± 0.7

#### 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 130	L <sub>AFF</sub>	A	F	94.00	1	94.1 (Ref.)
				104.00		104.1
				114.00		114.1

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

### 6.2 Time Weighting

#### 6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L <sub>AFF</sub>	A	F	94.00	1	94.1	Ref.
	L <sub>ASP</sub>		S			94.1	± 0.1
	L <sub>AIP</sub>		I			94.2	± 0.1

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. : C122713  
證書編號

### 6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
30 - 110	L <sub>AFP</sub>	A	F	106.0	Continuous	106.0	Ref.
	L <sub>AFMax</sub>				200 ms	105.0	-1.0 ± 1.0
	L <sub>ASP</sub>	S	Continuous		106.0	Ref.	
	L <sub>ASMax</sub>		500 ms		102.0	-4.1 ± 1.0	

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L <sub>AFP</sub>	A	F	94.00	31.5 Hz	55.2	-39.4 ± 1.5
					63 Hz	68.0	-26.2 ± 1.5
					125 Hz	77.9	-16.1 ± 1.0
					250 Hz	85.4	-8.6 ± 1.0
					500 Hz	90.8	-3.2 ± 1.0
					1 kHz	94.1	Ref.
					2 kHz	95.3	+1.2 ± 1.0
					4 kHz	95.1	+1.0 ± 1.0
					8 kHz	93.0	-1.1 (+1.5 ; -3.0)
					12.5 kHz	89.9	-4.3 (+3.0 ; -6.0)

#### 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L <sub>CFP</sub>	C	F	94.00	31.5 Hz	91.5	-3.0 ± 1.5
					63 Hz	93.4	-0.8 ± 1.5
					125 Hz	93.9	-0.2 ± 1.0
					250 Hz	94.1	0.0 ± 1.0
					500 Hz	94.1	0.0 ± 1.0
					1 kHz	94.1	Ref.
					2 kHz	93.9	-0.2 ± 1.0
					4 kHz	93.3	-0.8 ± 1.0
					8 kHz	91.0	-3.0 (+1.5 ; -3.0)
					12.5 kHz	87.9	-6.2 (+3.0 ; -6.0)

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. : C122713  
證書編號

### 6.4 Time Averaging

UUT Setting				Applied Value					UUT	IEC 60804
Range (dB)	Parameter	Frequency Weighting	Integrating Time	Frequency (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)	Reading (dB)	Type I Spec. (dB)
30 - 110	L <sub>Aeq</sub>	A	10 sec.	4	1	1/10	110.0	100	100.0	± 0.5
			60 sec.					90	90.0	± 0.5
			5 min.					80	79.4	± 1.0
								70	69.3	± 1.0

Remarks : - Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value :

94 dB	: 31.5 Hz - 125 Hz	: ± 0.40 dB
	250 Hz - 500 Hz	: ± 0.30 dB
	1 kHz	: ± 0.20 dB
	2 kHz	: ± 0.40 dB
	4 kHz	: ± 0.50 dB
	8 kHz	: ± 0.70 dB
	12.5 kHz	: ± 1.20 dB
	104 dB : 1 kHz	: ± 0.10 dB (Ref. 94 dB)
	114 dB : 1 kHz	: ± 0.10 dB (Ref. 94 dB)
	Burst equivalent level	: ± 0.2 dB (Ref. 110 dB continuous sound level)

- 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.



輝創工程有限公司

Sun Creation Engineering Limited

Calibration and Testing Laboratory

# Certificate of Calibration 校正證書

Certificate No. : C124263  
證書編號

**ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC12-0960)**

Description / 儀器名稱 : Integrating Sound Level Meter (EQ009)  
Manufacturer / 製造商 : Bruel & Kjaer  
Model No. / 型號 : 2238  
Serial No. / 編號 : 2285722  
Supplied By / 委託者 : Action-United Environmental Services and Consulting  
Unit A, 20/F., Gold King Industrial Building,  
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

**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** : 20 July 2012

**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 Precision Measurement Ltd., UK
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By  
測試

  
L K Yeung

Certified By  
核證

  
K C Lee

Date of Issue  
簽發日期

20 July 2012

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 Hing On Lane, Tuen Mun, New Territories, Hong Kong

輝創工程有限公司 - 校正及檢測實驗室

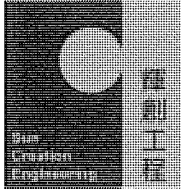
c/o 香港新界屯門興安里一號青山灣機樓四樓

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. : C124263

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 laboratory acoustic calibrator was performed before the test from 6.1.1.2 to 6.4.
- 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>
CL280	40 MHz Arbitrary Waveform Generator	C120016
CL281	Multifunction Acoustic Calibrator	DC110233

5. Test procedure : MA101N.

6. Results :

6.1 Sound Pressure Level

6.1.1 Reference Sound Pressure Level

6.1.1.1 Before Self-calibration

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 130	L <sub>AFF</sub>	A	F	94.00	1	93.6

6.1.1.2 After Self-calibration

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L <sub>AFF</sub>	A	F	94.00	1	94.0	± 0.7

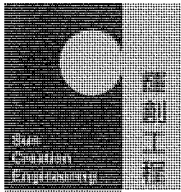
6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 130	L <sub>AFF</sub>	A	F	94.00	1	94.0 (Ref.)
				104.00		104.0
				114.00		113.9

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

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面批准。



輝創工程有限公司

Sun Creation Engineering Limited

Calibration and Testing Laboratory

# Certificate of Calibration 校正證書

Certificate No. : C124263

證書編號

## 6.2 Time Weighting

### 6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L <sub>AFP</sub>	A	F	94.00	1	94.0	Ref.
	L <sub>ASP</sub>		S			94.0	± 0.1
	L <sub>AIP</sub>		I			94.0	± 0.1

### 6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
30 - 110	L <sub>AFP</sub>	A	F	106.0	Continuous	106.0	Ref.
	L <sub>AFMax</sub>				200 ms	105.0	-1.0 ± 1.0
	L <sub>ASP</sub>	S	Continuous		106.0	Ref.	
	L <sub>ASMax</sub>		500 ms		102.0	-4.1 ± 1.0	

## 6.3 Frequency Weighting

### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L <sub>AFP</sub>	A	F	94.00	31.5 Hz	54.5	-39.4 ± 1.5
					63 Hz	67.7	-26.2 ± 1.5
					125 Hz	77.8	-16.1 ± 1.0
					250 Hz	85.3	-8.6 ± 1.0
					500 Hz	90.7	-3.2 ± 1.0
					1 kHz	94.0	Ref.
					2 kHz	95.2	+1.2 ± 1.0
					4 kHz	95.2	+1.0 ± 1.0
					8 kHz	94.0	-1.1 (+1.5 ; -3.0)
					12.5 kHz	89.7	-4.3 (+3.0 ; -6.0)

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 Hing On Lane, Tuen Mun, New Territories, Hong Kong

輝創工程有限公司 – 校正及檢測實驗室

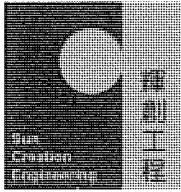
c/o 香港新界屯門興安里一號青山灣機樓四樓

Tel/電話: 2927 2606

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# Certificate of Calibration 校正證書

Certificate No. : C124263  
證書編號

## 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L <sub>CFP</sub>	C	F	94.00	31.5 Hz	90.9	-3.0 ± 1.5
					63 Hz	93.2	-0.8 ± 1.5
					125 Hz	93.8	-0.2 ± 1.0
					250 Hz	94.0	0.0 ± 1.0
					500 Hz	94.0	0.0 ± 1.0
					1 kHz	94.0	Ref.
					2 kHz	93.8	-0.2 ± 1.0
					4 kHz	93.2	-0.8 ± 1.0
					8 kHz	90.9	-3.0 (+1.5 ; -3.0)
					12.5 kHz	87.7	-6.2 (+3.0 ; -6.0)

## 6.4 Time Averaging

UUT Setting				Applied Value					UUT Reading (dB)	IEC 60804 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Integrating Time	Frequency (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)		
30 - 110	L <sub>Aeq</sub>	A	10 sec.	4	1	1/10	110.0	100	99.9	± 0.5
			60 sec.			1/10 <sup>2</sup>		90	89.7	± 0.5
			5 min.			1/10 <sup>3</sup>		80	79.1	± 1.0
						1/10 <sup>4</sup>		70	69.1	± 1.0

Remarks : - Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value : 94 dB : 31.5 Hz - 125 Hz : ± 0.35 dB  
 250 Hz - 500 Hz : ± 0.30 dB  
 1 kHz : ± 0.20 dB  
 2 kHz - 4 kHz : ± 0.35 dB  
 8 kHz : ± 0.45 dB  
 12.5 kHz : ± 0.70 dB  
 104 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)  
 114 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)  
 Burst equivalent level : ± 0.2 dB (Ref. 110 dB continuous sound level)

- 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.

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# Certificate of Calibration 校正證書

Certificate No. : C122427  
證書編號

**ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC12-0960)**

Description / 儀器名稱 : Integrating Sound Level Meter (EQ010)  
Manufacturer / 製造商 : Bruel & Kjaer  
Model No. / 型號 : 2238  
Serial No. / 編號 : 2285721  
Supplied By / 委託者 : Action-United Environmental Services and Consulting  
Unit A, 20/F., Gold King Industrial Building,  
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

**TEST CONDITIONS / 測試條件**

Temperature / 溫度 :  $(23 \pm 2)^{\circ}\text{C}$       Relative Humidity / 相對濕度 :  $(55 \pm 20)\%$   
Line Voltage / 電壓 : ---

**TEST SPECIFICATIONS / 測試規範**

Calibration check

**DATE OF TEST / 測試日期** : 20 April 2012

**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 Precision Measurement Ltd., UK
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By :   
測試 : L K Yeung

Certified By :   
核證 : K C Lee

Date of Issue : 23 April 2012  
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. : C122427  
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 B & K Acoustic Calibrator 4231, S/N : 2713428 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	C120016
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 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L <sub>AFP</sub>	A	F	94.00	1	94.0	± 0.7

#### 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 130	L <sub>AFP</sub>	A	F	94.00	1	94.0 (Ref.)
				104.00		104.0
				114.00		114.0

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

### 6.2 Time Weighting

#### 6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L <sub>AFP</sub>	A	F	94.00	1	94.0	Ref.
	L <sub>ASP</sub>		S			94.0	± 0.1
	L <sub>AIP</sub>		I			94.1	± 0.1

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. : C122427  
證書編號

### 6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
30 - 110	L <sub>AFP</sub>	A	F	106.0	Continuous	106.0	Ref.
	L <sub>AFMax</sub>				200 ms	105.0	-1.0 ± 1.0
	L <sub>ASP</sub>	S	Continuous		106.0	Ref.	
	L <sub>ASMax</sub>		500 ms		101.9	-4.1 ± 1.0	

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L <sub>AFP</sub>	A	F	94.00	31.5 Hz	54.6	-39.4 ± 1.5
					63 Hz	67.8	-26.2 ± 1.5
					125 Hz	77.8	-16.1 ± 1.0
					250 Hz	85.3	-8.6 ± 1.0
					500 Hz	90.7	-3.2 ± 1.0
					1 kHz	94.0	Ref.
					2 kHz	95.2	+1.2 ± 1.0
					4 kHz	95.0	+1.0 ± 1.0
					8 kHz	92.9	-1.1 (+1.5 ; -3.0)
					-12.5 kHz	89.7	-4.3 (+3.0 ; -6.0)

#### 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L <sub>CFP</sub>	C	F	94.00	31.5 Hz	91.1	-3.0 ± 1.5
					63 Hz	93.3	-0.8 ± 1.5
					125 Hz	93.8	-0.2 ± 1.0
					250 Hz	94.0	0.0 ± 1.0
					500 Hz	94.0	0.0 ± 1.0
					1 kHz	94.0	Ref.
					2 kHz	93.8	-0.2 ± 1.0
					4 kHz	93.2	-0.8 ± 1.0
					8 kHz	90.9	-3.0 (+1.5 ; -3.0)
					12.5 kHz	87.8	-6.2 (+3.0 ; -6.0)

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. : C122427  
證書編號

### 6.4 Time Averaging

UUT Setting				Applied Value					UUT	IEC 60804
Range (dB)	Parameter	Frequency Weighting	Integrating Time	Frequency (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)	Reading (dB)	Type 1 Spec. (dB)
30 - 110	L <sub>Aeq</sub>	A	10 sec.	4	1	1/10	110.0	100	99.9	± 0.5
			60 sec.			1/10 <sup>2</sup>		90	89.6	± 0.5
			5 min.			1/10 <sup>3</sup>		80	79.8	± 1.0
						1/10 <sup>4</sup>		70	69.8	± 1.0

Remarks : - Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value :

94 dB : 31.5 Hz - 125 Hz	: ± 0.40 dB
250 Hz - 500 Hz	: ± 0.30 dB
1 kHz	: ± 0.20 dB
2 kHz	: ± 0.40 dB
4 kHz	: ± 0.50 dB
8 kHz	: ± 0.70 dB
12.5 kHz	: ± 1.20 dB
104 dB : 1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB : 1 kHz	: ± 0.10 dB (Ref. 94 dB)
Burst equivalent level	: ± 0.2 dB (Ref. 110 dB continuous sound level)

- 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.



輝創工程有限公司

Sun Creation Engineering Limited

Calibration and Testing Laboratory

# Certificate of Calibration 校正證書

Certificate No. : C123007  
證書編號

## ITEM TESTED / 送檢項目 ( Job No. / 序引編號 : IC12-0960 )

Description / 儀器名稱 : Integrating Sound Level Meter (EQ065)  
Manufacturer / 製造商 : Bruel & Kjaer  
Model No. / 型號 : 2238  
Serial No. / 編號 : 2337676  
Supplied By / 委託者 : Action-United Environmental Services and Consulting  
Unit A, 20/F., Gold King Industrial Building,  
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

## TEST CONDITIONS / 測試條件

Temperature / 溫度 :  $(23 \pm 2)^{\circ}\text{C}$       Relative Humidity / 相對濕度 :  $(55 \pm 20)\%$   
Line Voltage / 電壓 : ---

## TEST SPECIFICATIONS / 測試規範

Calibration check

DATE OF TEST / 測試日期 : 18 May 2012

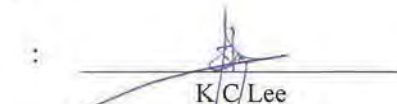
## TEST RESULTS / 測試結果

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).

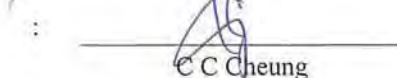
The test equipment used for calibration are traceable to National Standards via :

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

Tested By  
測試

:   
K C Lee

Certified By  
核證

:   
C C Cheung

Date of Issue : 22 May 2012  
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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Sun Creation Engineering Limited - Calibration & Testing Laboratory

c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing 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. : C123007  
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 laboratory acoustic calibrator was performed before the test from 6.1.1.2 to 6.4.
- 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	C120016
CL281	Multifunction Acoustic Calibrator	DC110233

- Test procedure : MA101N.

- Results :

- 6.1 Sound Pressure Level

- 6.1.1 Reference Sound Pressure Level

- 6.1.1.1 Before Self-calibration

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 130	L <sub>AFP</sub>	A	F	94.00	1	94.3

- 6.1.1.2 After Self-calibration

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L <sub>AFP</sub>	A	F	94.00	1	94.1	± 0.7

- 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
50 - 130	L <sub>AFP</sub>	A	F	94.00	1	94.1 (Ref.)
				104.00		104.1
				114.00		114.1

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

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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c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing 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. : C123007  
證書編號

### 6.2 Time Weighting

#### 6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
50 - 130	L <sub>AFP</sub>	A	F	94.00	1	94.1	Ref.
	L <sub>ASP</sub>		S			94.1	± 0.1
	L <sub>AIP</sub>		I			94.1	± 0.1

#### 6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
30 - 110	L <sub>AFP</sub>	A	F	106.0	Continuous	106.0	Ref.
	L <sub>AFMax</sub>				200 ms	105.1	-1.0 ± 1.0
	L <sub>ASP</sub>	S	Continuous		106.0	Ref.	
	L <sub>ASMax</sub>		500 ms		102.0	-4.1 ± 1.0	

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L <sub>AFP</sub>	A	F	94.00	31.5 Hz	55.0	-39.4 ± 1.5
					63 Hz	68.0	-26.2 ± 1.5
					125 Hz	78.0	-16.1 ± 1.0
					250 Hz	85.4	-8.6 ± 1.0
					500 Hz	90.8	-3.2 ± 1.0
					1 kHz	94.1	Ref.
					2 kHz	95.3	+1.2 ± 1.0
					4 kHz	95.1	+1.0 ± 1.0
					8 kHz	93.0	-1.1 (+1.5 ; -3.0)
					12.5 kHz	89.9	-4.3 (+3.0 ; -6.0)

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. : C123007  
證書編號

### 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
50 - 130	L <sub>CFP</sub>	C	F	94.00	31.5 Hz	91.3	-3.0 ± 1.5
					63 Hz	93.3	-0.8 ± 1.5
					125 Hz	93.9	-0.2 ± 1.0
					250 Hz	94.0	0.0 ± 1.0
					500 Hz	94.1	0.0 ± 1.0
					1 kHz	94.1	Ref.
					2 kHz	93.9	-0.2 ± 1.0
					4 kHz	93.2	-0.8 ± 1.0
					8 kHz	91.1	-3.0 (+1.5 ; -3.0)
					12.5 kHz	88.0	-6.2 (+3.0 ; -6.0)

### 6.4 Time Averaging

UUT Setting				Applied Value					UUT Reading (dB)	IEC 60804 Type 1 Spec. (dB)
Range (dB)	Parameter	Frequency Weighting	Integrating Time	Frequency (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)		
30 - 110	L <sub>Aeq</sub>	A	10 sec.	4	1	1/10	110.0	100	99.9	± 0.5
			60 sec.					90	89.7	± 0.5
			5 min.					80	79.7	± 1.0
								70	69.7	± 1.0

Remarks : - Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value :

94 dB : 31.5 Hz - 125 Hz	: ± 0.35 dB
250 Hz - 500 Hz	: ± 0.30 dB
1 kHz	: ± 0.20 dB
2 kHz - 4 kHz	: ± 0.35 dB
8 kHz	: ± 0.45 dB
12.5 kHz	: ± 0.70 dB
104 dB : 1 kHz	: ± 0.10 dB (Ref. 94 dB)
114 dB : 1 kHz	: ± 0.10 dB (Ref. 94 dB)
Burst equivalent level	: ± 0.2 dB (Ref. 110 dB continuous sound level)

- 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. : C122715  
證書編號

**ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC12-0960)**

Description / 儀器名稱 : Sound Level Meter (EQ067)  
Manufacturer / 製造商 : Rion  
Model No. / 型號 : NL-31  
Serial No. / 編號 : 00410221  
Supplied By / 委託者 : Action-United Environmental Services and Consulting  
Unit A, 20/F., Gold King Industrial Building,  
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

**TEST CONDITIONS / 測試條件**

Temperature / 溫度 :  $(23 \pm 2)^{\circ}\text{C}$       Relative Humidity / 相對濕度 :  $(55 \pm 20)\%$   
Line Voltage / 電壓 : ---

**TEST SPECIFICATIONS / 測試規範**

Calibration check

**DATE OF TEST / 測試日期** : 8 May 2012

**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 Precision Measurement Ltd., UK
- Fluke Everett Service Center, USA
- Agilent Technologies, USA

Tested By :   
測試 : L K Yeung

Certified By :   
核證 : K C Lee

Date of Issue : 9 May 2012  
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. : C122715  
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 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	C120016
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 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	93.9	± 0.7

#### 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	93.9 (Ref.)
				104.00		103.9
				114.00		113.9

IEC 60651 Type 1 Spec. : ± 0.4 dB per 10 dB step and ± 0.7 dB for overall different.

### 6.2 Time Weighting

#### 6.2.1 Continuous Signal

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 120	L <sub>A</sub>	A	Fast	94.00	1	93.9	Ref.
			Slow				

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# Certificate of Calibration

## 校正證書

Certificate No. : C122715  
證書編號

### 6.2.2 Tone Burst Signal (2 kHz)

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Burst Duration		
20 -110	L <sub>A</sub>	A	Fast	106.00	Continuous	106.0	Ref.
	L <sub>A</sub> <sup>max</sup>				200 ms	105.1	-1.0 ± 1.0
	L <sub>A</sub>	Slow	Continuous		106.0	Ref.	
	L <sub>A</sub> <sup>max</sup>		500 ms		102.0	-4.1 ± 1.0	

### 6.3 Frequency Weighting

#### 6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 120	L <sub>A</sub>	A	Fast	94.00	31.5 Hz	54.2	-39.4 ± 1.5
					63 Hz	67.7	-26.2 ± 1.5
					125 Hz	77.7	-16.1 ± 1.0
					250 Hz	85.2	-8.6 ± 1.0
					500 Hz	90.6	-3.2 ± 1.0
					1 kHz	93.9	Ref.
					2 kHz	95.2	+1.2 ± 1.0
					4 kHz	95.0	+1.0 ± 1.0
					8 kHz	92.8	-1.1 (+1.5 ; -3.0)
					12.5 kHz	89.9	-4.3 (+3.0 ; -6.0)

#### 6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 60651 Type 1 Spec. (dB)
Range (dB)	Mode	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 120	L <sub>C</sub>	C	Fast	94.00	31.5 Hz	90.8	-3.0 ± 1.5
					63 Hz	93.0	-0.8 ± 1.5
					125 Hz	93.7	-0.2 ± 1.0
					250 Hz	93.9	0.0 ± 1.0
					500 Hz	93.9	0.0 ± 1.0
					1 kHz	93.9	Ref.
					2 kHz	93.8	-0.2 ± 1.0
					4 kHz	93.2	-0.8 ± 1.0
					8 kHz	91.0	-3.0 (+1.5 ; -3.0)
					12.5 kHz	88.1	-6.2 (+3.0 ; -6.0)

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Sun Creation Engineering Limited – Calibration & Testing Laboratory

c/o 4/F, Tsing Shan Wan Exchange Building, 1 Hing 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. : C122715  
證書編號

### 6.4 Time Averaging

UUT Setting				Applied Value					UUT	IEC 60804
Range (dB)	Mode	Frequency Weighting	Integrating Time	Freq. (kHz)	Burst Duration (ms)	Burst Duty Factor	Burst Level (dB)	Equivalent Level (dB)	Reading (dB)	Type I Spec. (dB)
20 - 110	L <sub>Aeq</sub>	A	10 sec.	4	1	1/10	110	100	100.0	± 0.5
								90	90.0	± 0.5
			60 sec.					80	80.0	± 1.0
			5 min.					70	70.0	± 1.0

Remarks : - Mfr's Spec. : IEC 60651 Type 1 & IEC 60804 Type 1

- Uncertainties of Applied Value : 94 dB : 31.5 Hz - 125 Hz: ± 0.35 dB  
250 Hz - 500 Hz : ± 0.30 dB  
1 kHz : ± 0.20 dB  
2 kHz - 4 kHz : ± 0.35 dB  
8 kHz : ± 0.45 dB  
12.5 kHz : ± 0.70 dB  
104 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)  
114 dB : 1 kHz : ± 0.10 dB (Ref. 94 dB)  
Burst equivalent level : ± 0.2 dB (Ref. 110 dB continuous sound level)

- 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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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. : C122712  
證書編號

**ITEM TESTED / 送檢項目** ( Job No. / 序引編號 : IC12-0960 )

Description / 儀器名稱 : Acoustical Calibrator (EQ081)  
Manufacturer / 製造商 : Bruel & Kjaer  
Model No. / 型號 : 4231  
Serial No. / 編號 : 2326408  
Supplied By / 委託者 : Action-United Environmental Services and Consulting  
Unit A, 20/F., Gold King Industrial Building,  
35-41 Tai Lin Pai Road, Kwai Chung, N.T.

**TEST CONDITIONS / 測試條件**

Temperature / 溫度 :  $(23 \pm 2)^{\circ}\text{C}$       Relative Humidity / 相對濕度 :  $(55 \pm 20)\%$   
Line Voltage / 電壓 : ---

**TEST SPECIFICATIONS / 測試規範**

Calibration check

**DATE OF TEST / 測試日期** : 7 May 2012

**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 : L K Yeung

Certified By :   
核證 : K C Lee

Date of Issue : 8 May 2012  
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. : C122712  
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	C113350
CL281	Multifunction Acoustic Calibrator	DC110233
TST150A	Measuring Amplifier	C120886

- Test procedure : MA100N.

- 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	94.0	± 0.2	± 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	1.000 0	1 kHz ± 0.1 %	± 0.1

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.

## **Appendix E**

### **Event and Action Plan**

## Event Action Plan for Construction Noise

EVENT	ACTION			
	ET Leader	IEC	ER	Contractor
Action Level	<ol style="list-style-type: none"> <li>1. Notify IEC and Contractor</li> <li>2. Carry out investigation.</li> <li>3. Report the results of investigation to the IEC, ER 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 analyzed results submitted by the ET.</li> <li>2. Review the proposed remedial measures by the Contractor and advise the ER 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 analyzed noise problem</li> <li>4. Check 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. Notify IEC, ER, EPD and Contractor</li> <li>2. Identify source.</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, ER and EPD the causes and actions taken for the exceedances</li> <li>7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results</li> <li>8. If exceedance stops, cease additional monitoring.</li> </ol>	<ol style="list-style-type: none"> <li>1. Discuss amongst ER, 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 ER 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 analyzed noise problem</li> <li>4. Check remedial measures properly implemented.</li> <li>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</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 ER until the exceedance is abated</li> </ol>



## Event Action Plan for Ecology

Event	Action			
	ET	ER	IEC	Contractor
<b>Non-conformity on one occasion</b>	<ol style="list-style-type: none"> <li>1. Identify Source</li> <li>2. Inform the IEC and the ER;</li> <li>3. Discuss remedial actions with the IEC, the ER and the Contractor</li> <li>4. Monitor remedial actions until rectification has been completed</li> </ol>	<ol style="list-style-type: none"> <li>1. Check report</li> <li>2. Check the Contractor's working method</li> <li>3. Discuss with the ET and the Contractor on possible remedial measures,</li> <li>4. Advise the Contractor on effectiveness of proposed remedial measures</li> <li>5. Check implementation of remedial measures</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure Remedial measures are properly implemented</li> </ol>	<ol style="list-style-type: none"> <li>1. Amend working methods</li> <li>2. Rectify damage and undertake any necessary replacement</li> </ol>
<b>Repeated Non conformity</b>	<ol style="list-style-type: none"> <li>1. Identify Source</li> <li>2. Inform the IEC and the ER</li> <li>3. Increase monitoring frequency</li> <li>4. Discuss remedial actions with the IEC, the ER and the Contractor</li> <li>5. Monitor remedial actions until rectification has been completed.</li> <li>6. If exceedance stops, cease additional monitoring</li> </ol>	<ol style="list-style-type: none"> <li>1. Check the Contractor's working method</li> <li>2. Discuss with the ET and the Contractor on possible remedial measures</li> <li>3. Advise the Contractor on effectiveness of proposed remedial measures</li> <li>4. Check implementation of remedial measures</li> </ol>	<ol style="list-style-type: none"> <li>1. Ensure Remedial measures are properly implemented</li> </ol>	<ol style="list-style-type: none"> <li>1. Amend working methods</li> <li>2. Rectify damage and undertake any necessary replacement</li> </ol>

**Appendix F**

**Monitoring Schedule in Reporting Period  
and the Coming Month**

Monitoring / Inspection Schedule during the Reporting Period – August 2012

Date		Monitoring			Site Inspection		SSEMC
		Noise	Ecology	Vibration	General	Ecology	
Wed	1-Aug-12						
Thu	2-Aug-12						
Fri	3-Aug-12						
Sat	4-Aug-12						
Sun	5-Aug-12						
Mon	6-Aug-12						
Tue	7-Aug-12						
Wed	8-Aug-12						
Thu	9-Aug-12						
Fri	10-Aug-12						
Sat	11-Aug-12						
Sun	12-Aug-12						
Mon	13-Aug-12						
Tue	14-Aug-12						
Wed	15-Aug-12						
Thu	16-Aug-12						
Fri	17-Aug-12						
Sat	18-Aug-12						
Sun	19-Aug-12						
Mon	20-Aug-12						
Tue	21-Aug-12						
Wed	22-Aug-12						
Thu	23-Aug-12						
Fri	24-Aug-12						
Sat	25-Aug-12						
Sun	26-Aug-12						
Mon	27-Aug-12						
Tue	28-Aug-12						
Wed	29-Aug-12						
Thu	30-Aug-12						
Fri	31-Aug-12						

	Monitoring / Inspection Day
	Sunday or Public Holiday

Predict Monitoring / Site Inspection for the coming month – September 2012

Date		Monitoring			Site Inspection		SSEMC
		Noise	Ecology	Vibration	General	Ecology	
Sat	1-Sep-12						
Sun	2-Sep-12						
Mon	3-Sep-12						
Tue	4-Sep-12						
Wed	5-Sep-12						
Thu	6-Sep-12						
Fri	7-Sep-12						
Sat	8-Sep-12						
Sun	9-Sep-12						
Mon	10-Sep-12						
Tue	11-Sep-12						
Wed	12-Sep-12						
Thu	13-Sep-12						
Fri	14-Sep-12						
Sat	15-Sep-12						
Sun	16-Sep-12						
Mon	17-Sep-12						
Tue	18-Sep-12						
Wed	19-Sep-12						
Thu	20-Sep-12						
Fri	21-Sep-12						
Sat	22-Sep-12						
Sun	23-Sep-12						
Mon	24-Sep-12						
Tue	25-Sep-12						
Wed	26-Sep-12						
Thu	27-Sep-12						
Fri	28-Sep-12						
Sat	29-Sep-12						
Sun	30-Sep-12						

	Monitoring / Inspection Day
	Sunday or Public Holiday

## **Appendix G**

### **Meteorological Data of Reporting Period**

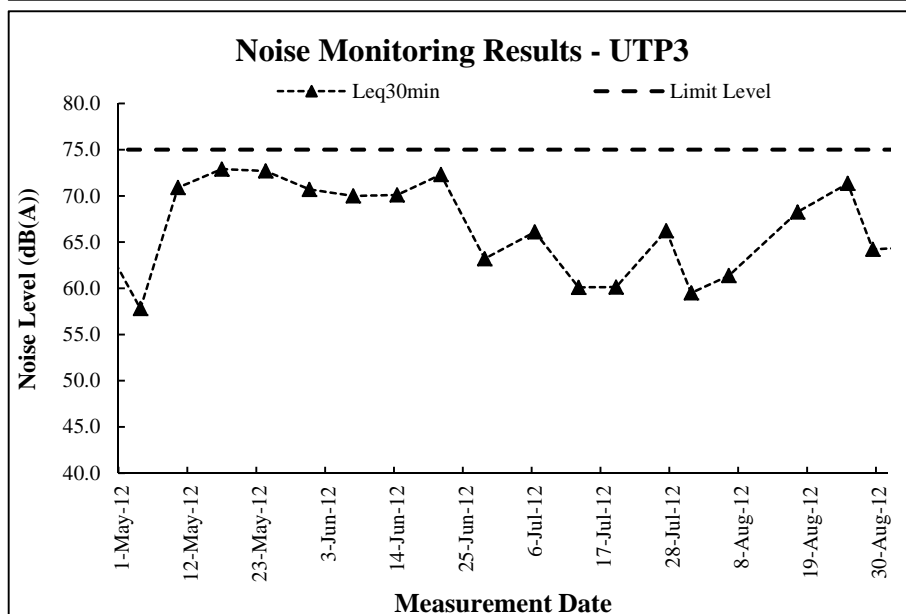
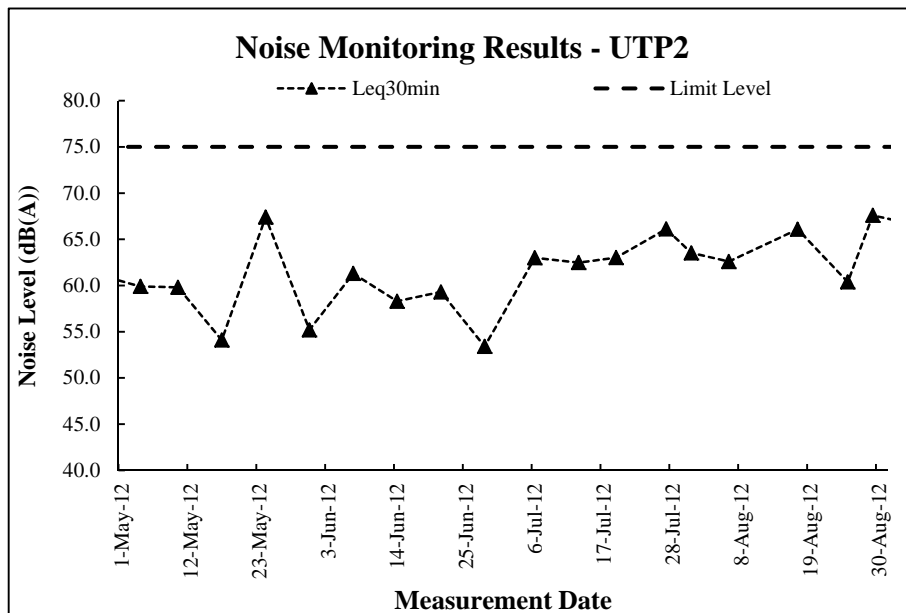
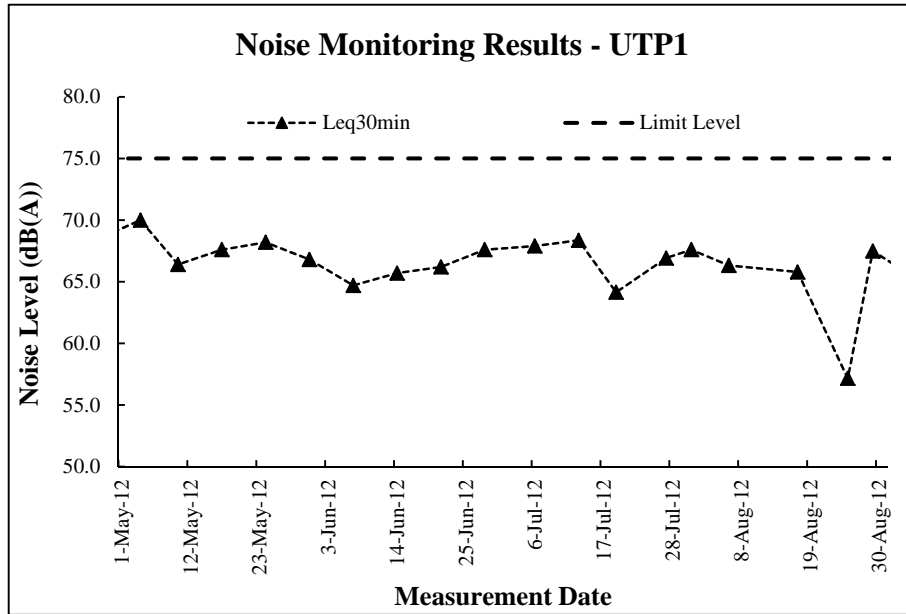
Meteorological Data in Reporting Period

Date		Weather	Total Rainfall (mm)	Tai Po Station		Shatin Station	
				Mean Air Temp. (°C)	Mean Relative Humidity (%)	Wind Speed (km/h)	Wind Direction
1-Aug-12	Wed	Isolated showers and thunderstorms	0.2	30.1	72.2	6.3	E/NE
2-Aug-12	Thu	Sunny periods with haze.	0.0	31.3	65	6.0	N/NE
3-Aug-12	Fri	Isolated showers and one or two thunderstorms.	Trace	30.3	66.5	6.6	S/SW
4-Aug-12	Sat	It will be very hot	0.4	29.2	75.2	5.6	S/SW
5-Aug-12	Sun	Light to moderate westerly winds.	6.8	28.7	84.5	8.5	N/NE
6-Aug-12	Mon	Isolated showers and thunderstorms	2.8	27.7	85.5	9.0	S/SW
7-Aug-12	Tue	Fine and very hot but hazy.	Trace	30.1	76.5	7.2	W/SW
8-Aug-12	Wed	Sunny periods with haze.	0.0	31.3	69.7	8.5	S/SW
9-Aug-12	Thu	Cloudy with showers and isolated thunderstorms.	0.0	31.2	67.2	11.2	SW
10-Aug-12	Fri	Moderate southwesterly winds.	7.7	29	82.5	12.2	SW
11-Aug-12	Sat	Light to moderate southerly winds.	64.7	27.6	79.7	10.5	SW
12-Aug-12	Sun	Mainly cloudy with showers	12.4	27.5	86.5	8.2	S/SW
13-Aug-12	Mon	Light to moderate southerly winds.	9.5	26.9	91.2	6.0	N/NE
14-Aug-12	Tue	Fine and very hot but hazy.	1.9	28.5	84	8.8	E
15-Aug-12	Wed	It will be very hot	0.0	29	77.5	6.5	N/NE
16-Aug-12	Thu	Cloudy with occasional squally showers and thunderstorms.	15.4	28.7	82.5	13.5	N/NE
17-Aug-12	Fri	Light winds.	Trace	26.8	83.7	14.5	SE
18-Aug-12	Sat	Mainly fine and hot	0.1	28.7	81.5	7.0	S/SW
19-Aug-12	Sun	Light winds.	0.0	29.1	80	9.7	S/SW
20-Aug-12	Mon	Hot during the day	0.0	28.2	83	7.2	S/SW
21-Aug-12	Tue	Sunny periods with haze	Trace	28.1	83	8.9	N/NE
22-Aug-12	Wed	fine , very hot , hazy	5.1	27.3	86.5	9.0	S/SW
23-Aug-12	Thu	isolated showers	0.0	27.6	77.7	8.1	S/SW
24-Aug-12	Fri	winds moderate	0.0	29.7	69.5	6.9	N/NW
25-Aug-12	Sat	Very hot, fine, haze.	Trace	29.7	70	7.2	N/NW
26-Aug-12	Sun	fine , very hot , hazy	0.0	30	58.5	8.5	N
27-Aug-12	Mon	Very hot, fine, haze.	0.0	30.5	61	7.0	W/SW
28-Aug-12	Tue	cloudy , isolated showers, thunderstorms	0.0	30.4	70.7	8.2	E/NE
29-Aug-12	Wed	Sunny periods, hot	2.4	30	73.5	10.6	S/SW
30-Aug-12	Thu	cloudy, a few showers,	Trace	28.1	84.5	8.2	N/NW
31-Aug-12	Fri	hot, sunny intervals	20.4	28.2	87.2	10.0	N/NW

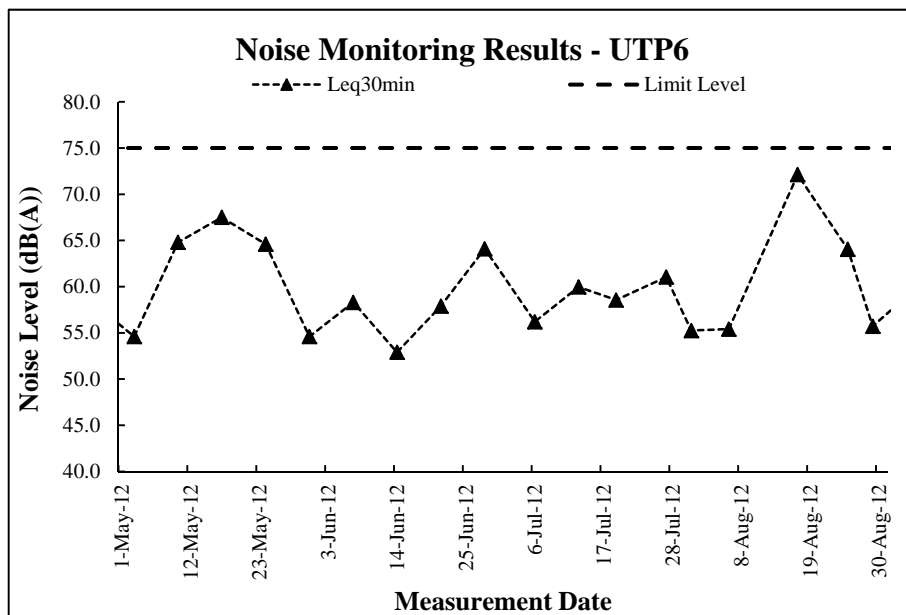
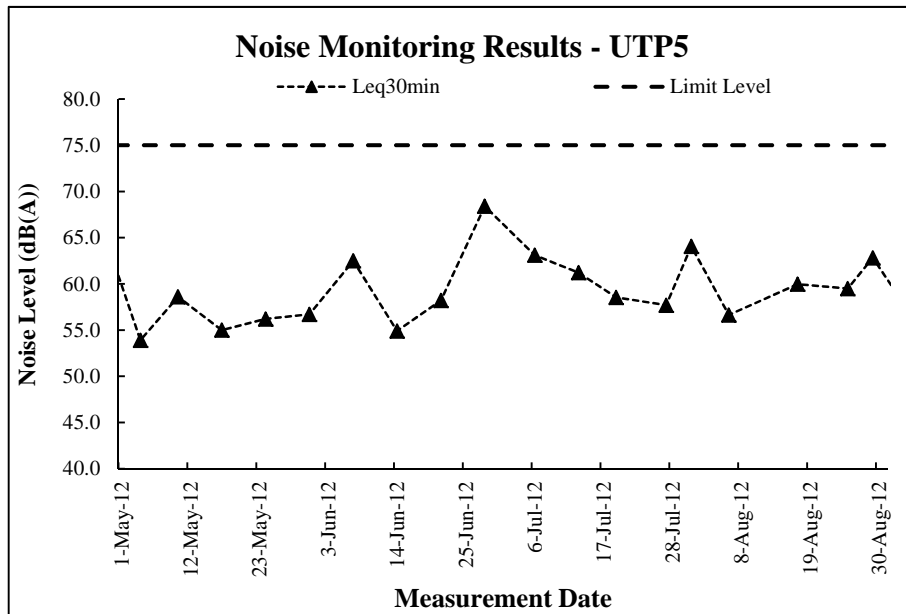
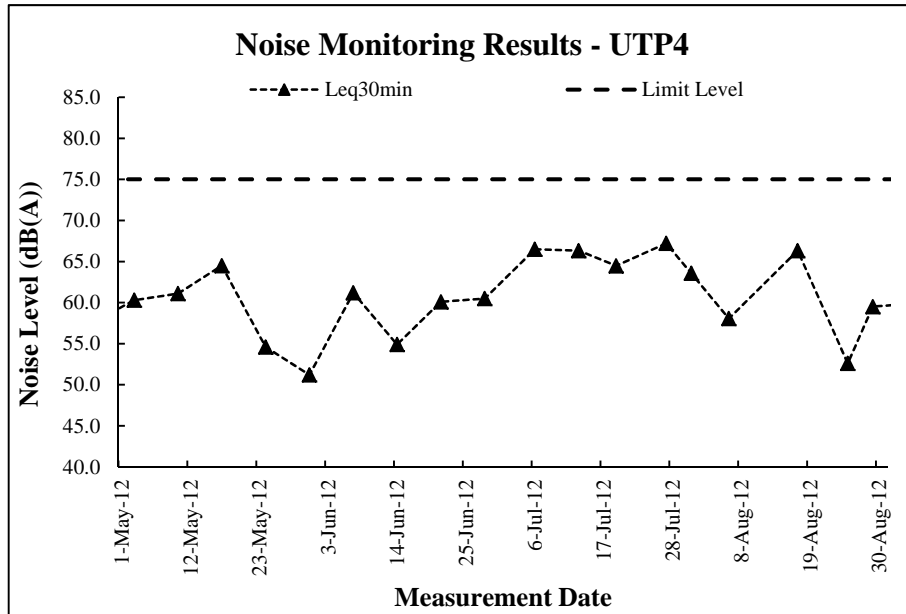
\* The record was downloaded from The Hong Kong Observatory Weather Stations

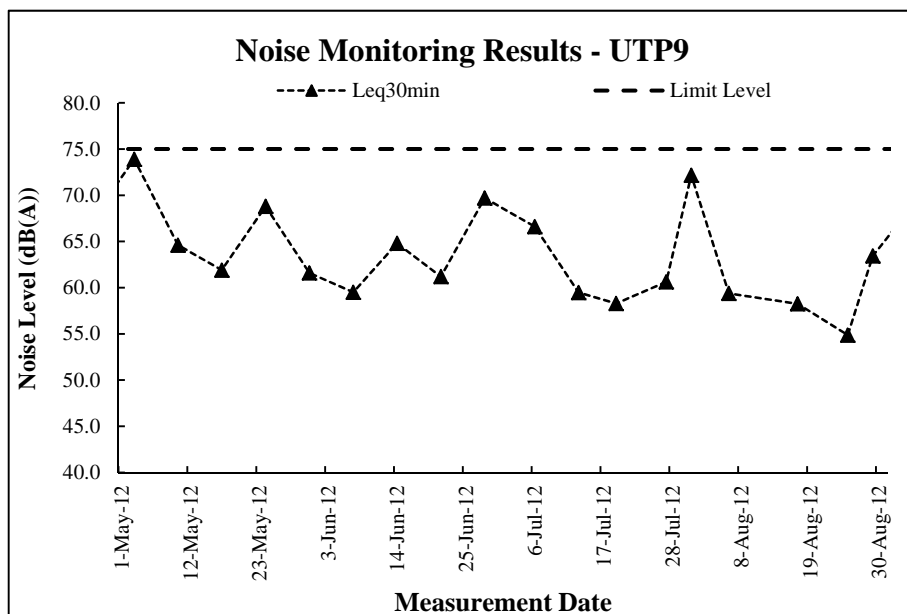
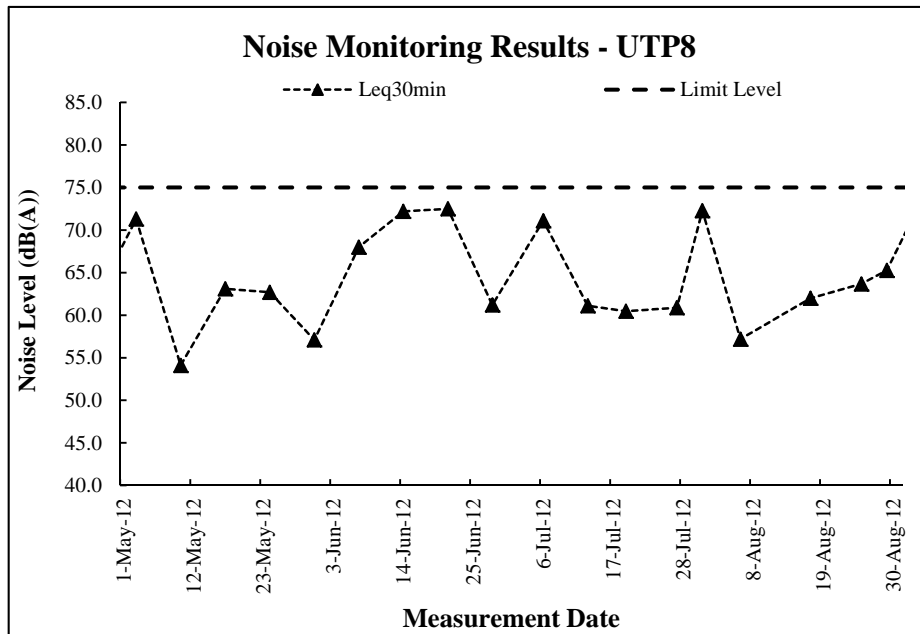
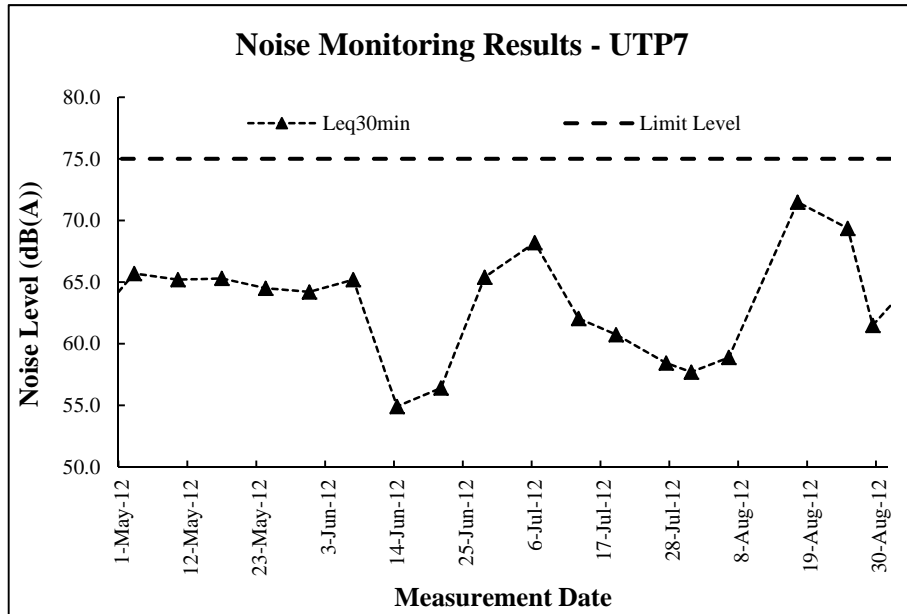
## **Appendix H**

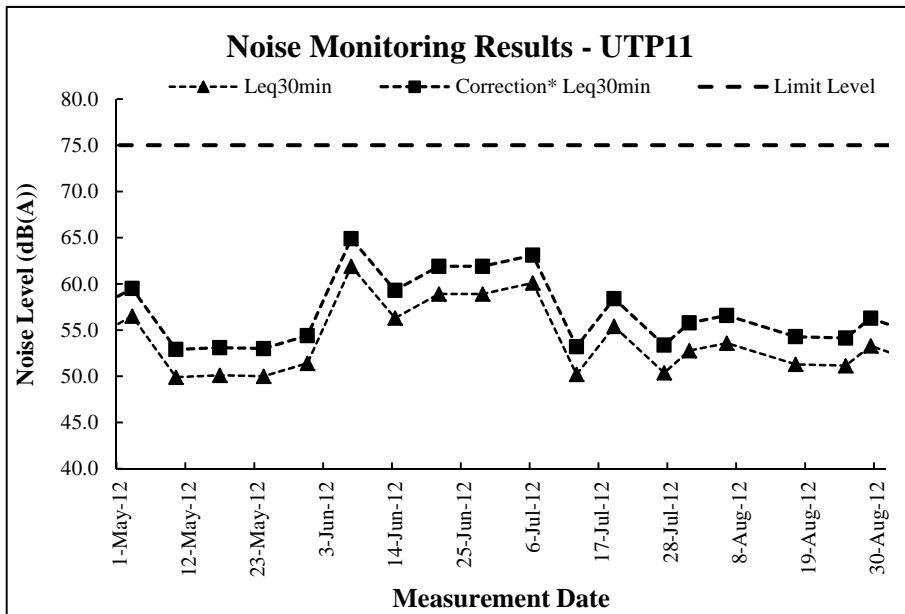
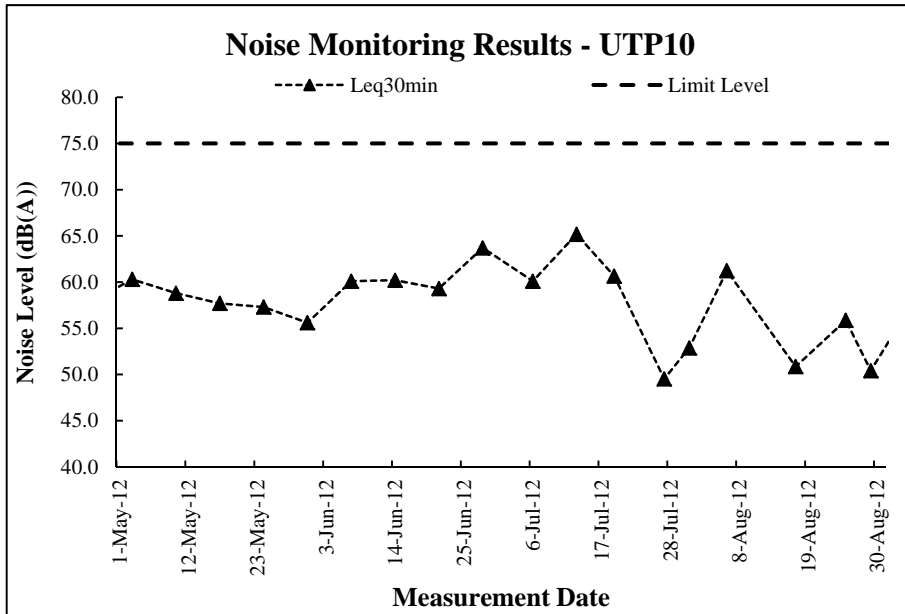
### **Graphical Plots of Noise Monitoring**











## **Appendix I**

### **Monthly Summary Waste Flow Table**

### Monthly Summary Waste Flow Table

Name of Department: DSD

Contract No.: DC/2007/06

#### Monthly Summary Waste Flow Table of Upper Tai Po River for 2012

Month	Actual Quantities of Inert C&D Materials Generated Monthly						Actual Quantities of C&D Wastes Generated Monthly				
	Total Quantity of Inert C&D Materials Generated	Hard Rock and Large Broken Concrete	Reused in the Contract	Reused in other Projects	Disposed as Public Fill	Imported Fill	Metals	Paper/ cardboard packaging	Plastics (see Note 3)	Chemical Waste*	Others, e.g. general refuse
	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000m <sup>3</sup> )	(in '000 kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000m <sup>3</sup> )
Jan	1.920	0.490	0.490	1.430	0.000	0.000	0.050	0.040	0.020	0.002	0.030
Feb	2.110	1.970	2.000	0.110	0.000	0.000	0.030	0.020	0.015	0.001	0.020
Mar	1.401	0.107	0.281	1.120	0.000	0.000	0.040	0.045	0.020	0.000	0.030
Apr	0.710	0.280	0.280	0.295	0.135	0.000	0.035	0.040	0.015	0.000	0.030
May	0.162	0.160	0.162	0.000	0.000	0.000	0.040	0.035	0.020	0.000	0.035
June	0.000	0.000	0.000	0.000	0.000	0.000	0.035	0.040	0.025	0.000	0.030
July	0.128	0.128	0.128	0.000	0.000	0.000	0.040	0.045	0.025	0.000	0.050
Aug	0.128	0.128	0.128	0.000	0.000	0.000	0.050	0.050	0.030	0.001	0.060
Sept											
Oct											
Nov											
Dec											
Total	6.559	3.263	3.469	2.955	0.135	0.000	0.320	0.315	0.170	0.004	0.285

\*For all the three rivers in the Contract

## **Appendix J**

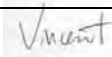

### **Bi-Annual Ecology Impact Monitoring Report**

**Contract No. DC/2007/06**  
**River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River**

**Ecological Impact Monitoring Report (No. 8)**  
**Upper Tai Po River**

**July 2012**



Prepared & Verified by: Vincent Liu		July 5, 2012
Validated by: Mark Shea		July 5, 2012
Ecology Team: China-Hong Kong Ecology Consultants		

# River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River

Contract No. DC/2007/06

## Ecological Impact Monitoring Report (No. 8) Upper Tai Po River

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Table 5-6 Fish species recorded at Upper Tai Po River.

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Figure 1-1 to 1-3. Transect line and sampling location within study area

APPENDIX I Summary of total accumulative complaint received.

APPENDIX II The list for mitigation measure for Upper Tai Po River construction site.



## 1 Introduction

- 1.1 The project of Drainage Improvement Works in Upper Tai Po River requires to carry out an ecological impact monitoring programme when the project commenced. The collected data was used to assess ecological impact during construction period.
- 1.2 Scope of ecological impact monitoring was detailed in the Particular Specification (PS) and EM & A Manual of the project. In brief, the survey need to collect data on abiotic such as water quality, substratum characteristics, water flow, and biotic data of flora and fauna.
- 1.3 China-Hong Kong Ecology Consultants was committed by Chiu Hing Construction and Transportation Co. Limited to undertake the ecological baseline survey in Oct 2007 and impact monitoring tasks for the project starting from January 2009. Monitoring frequency were twice a year.
- 1.4 This is the number 8 ecological impact monitoring report for the project conducted in July 2012. It contents the following subsections:
  - Summary of major points
  - Summary of the construction activities from January 2012 (last reporting time) to July 2012
  - Monitoring Methods and Results
  - Audit/review of monitoring results
  - Remedial measures adopted to restore the adverse condition
  - Record of complaints and remedial measures
  - Forecast of works programme and monitoring requirements; and
  - Comments and conclusions

## 2 Summary of Major Points

- Field ecological monitoring was undertaken on 5<sup>th</sup> July 2012;
- Stream habitat at most sections of Upper Tai Po River was changed due to drainage works (Photo 1-2);
- During the impact monitoring, the man power deployed and survey duration was the same as pervious monitoring events. (i.e. 3 field workers from China-Hong Kong Ecology Consultant and 2 environmental assistant from Chiu Hing Construction & Transportation Co. Ltd); and
- The number of target stream fauna (i.e., fish, *Parazacco spilurus*) recorded in July 2012 was lower than those recorded during baseline monitoring (before fish capture/relocation took place). *Parazacco spilurus* was only recorded from the reference site adjacent to the project site at upper stream. The reason for low fish population of *Parazacco spilurus* was due to river bed modification. The other target species including fish (*Pseudobagrus trilineatus*) and Hong Kong Newt (*Paramesotriton hongkongensis*) were not found within works area during both baseline and impact monitoring.

## 3 Summary of the Construction Activities

- 3.1 Major construction activities carried out by the contractor from January 2012 (last reporting time) to July 2012.
  - Construction of retaining walls

- Construction of gabion walls
- Construction of inclined gabion walls
- Construction of footbridges
- Construction of additional boulder trap
- Construction of stilling basins and gabion mattress
- Construction of dwarf wall
- Construction of box culvert
- Ground investigation
- Formation of river bed

## **4 Monitoring Methodology**

### **4.1 Avifauna**

Avifauna survey was conducted during the impact monitoring period. Special attention was given to those stream channel area where birds used as feeding and foraging habitat. In general, avifauna survey was taken in the morning or late afternoon when birds are more active (feeding and foraging). Numerical abundance was recorded at fixed count points within a fixed radius, e.g. 30-50m according to landscape feature and visual penetration extent. Duration of the point count of birds was standardised for 10 minutes at each location in order to collect comparable data. Transect count will also be used for the avifauna survey aimed to collect qualitative data. The transect route was shown in Figure 1-1 to 1-3. Binoculars and digital camera was the main instrument to be used. Nomenclature and protection status of the species followed those documented in the AFCD website ([www.hkbiddiversity.net](http://www.hkbiddiversity.net)) and Carey et al (2001).

The point count was conducted at two locations with one located at the lower portion of the river channel and the other located at the upper section of the river. The location of point counts were shown in Figure 1-1 to 1-3.

### **4.2 Fish and Newt Population**

Fish community including target species (Three-lined Chinese Stream Catfish and Predaceous Chub) and Hong Kong Newt population at the specified river channel was monitored by live trapping, hand nets and direct observation methods. Active searching at night for *Pseudobagrus trilineatus* has also been carried out. Sampling was conducted at two proposed sampling locations, i.e. upper and lower sections of the river and covered major type of stream habitats, e.g. stream pool and riffle. The number of the captured or observed fish was estimated and recorded. Nomenclature and protection status of the species followed those documented in the AFCD website ([www.hkbiddiversity.net](http://www.hkbiddiversity.net)) and Virginia et al (2004). Sampling sites were shown in Figure 1-1 to 1-3

### **4.3 Aquatic Macro-invertebrates**

Macro-invertebrates in the likely affected streams was surveyed. Two sampling sites within the affected stream sites was designed to collect necessary macroinvertebrate fauna for ecological impact monitoring information. Three replicates were taken at each sampling point and pool together for further sample process. Kick sampling (Photo 3-4) and hand netting was the main survey methodologies for stream organisms. Dissection microscope, digital camera was used to aid identification and enumeration. Numerical abundance, species identity was recorded. Nomenclature and protection status of the species will follow those documented in the AFCD website ([www.hkbiddiversity.net](http://www.hkbiddiversity.net)) and other literatures such as Dudgeon (1999). Sampling sites were shown in Figure 1-1 to 1-3.

#### **4.4 Adult Odonate Survey**

Adult Odonate survey was conducted within the monitoring area. Transect count was used for the survey. Binoculars, digital camera and hand net was utilized to aid identification. In general, all captured fauna was released immediately after on-site identification or taking photo. Numerical abundance, species identity and other notable behaviour was recorded. Nomenclature and protection status of the species followed those documented in the AFCD website ([www.hkbiddiversity.net](http://www.hkbiddiversity.net)) and Keith (2003). Adult Odonate survey was conducted along line transects in parallel with river channel within works area where access was permitted. Transect route were shown in Figure 1-1 to 1-3.

#### **4.5 Riparian Vegetation**

Riparian vegetation including aquatic and emergent was sampled by line a belt transects along the affected stream channel and riparian habitat. Species, relative abundance, average heights were recorded. Vegetation survey was conducted at two selected belt transects with one located at the lower portion of the river channel and the other at the upper section of the river respectively. The belt transects was run across the river channel and is aimed to collect quantitative data of vegetation. Similarly, qualitative data of plants was collected by recording plant species along line transect. Nomenclature and protection status of the species followed those documented in the AFCD website ([www.hkbiddiversity.net](http://www.hkbiddiversity.net) ) and Hong Kong Herbarium (2004). Sampling sites were shown in Figure 1-1 to 1-3.

#### **4.6 Abiotic Data Collection**

##### **Water Quality Monitoring**

Dissolved oxygen level, pH value, conductivity, salinity, Biochemical Oxygen Demand (BOD) and nutrient level (nitrate and ammonium) was sampled and analyzed by conventional methods in situ or send to laboratory.

##### **Sediment Characteristics**

Sediment/substrate characteristics was recorded of sediment cover in percentage e.g. mud, sand, rock, boulder and cemented bottom in the stream bed at sampling sites.

##### **Water Flow**

Water flow rates in river channel were measured by record of travel time of a floating material (e.g. floating ball) in a measured distance.

### **5 Monitoring Results**

#### **5.1 Vegetation**

Vegetation growing along the affected stream was surveyed at Upper Tai Po River. About 4 flora species was recorded within the survey transects along the affected stream courses. All recorded floras were common species. Compared with the baseline result, the number of flora species was reduced from 38 to 4 flora species. Most vegetation along the stream section was cleared in order to construct temporal assess road and new embankment. Moreover, previous heavy rainfall has also washed out most vegetation along channel.

Despite that, the vegetation was predicted to be re-colonized along the river channel after finished the construction work. Generally, belt transect for vegetation was only conducted in reference site only. The height of the dominated riparian grass and herb species were in a range from 0.2m to 1.5m. No rare or protected flora species was recorded. Results of vegetation survey and belt transect survey were given in **Table 5-1** and **Table 5-2**. Figure 1-1 to 1-3 shows the transect line for the flora surveys.

## 5.2 Fauna

### 5.2.1 Avifauna

Avifauna survey was undertaken along survey transects and at two selected point count locations. In total, 14 species of birds were recorded during bird surveys within project area which was comparatively less than the baseline result of 24 avifauna species on October 2007. The decrease of avifauna species would be due to seasonal variation between summer and autumn period. The project site was utilised by avifauna as foraging/ roosting area only. No breeding site was found within project site during current impact monitoring. Thus, it was predicted that adverse impact on avifauna species will be temporal during construction period. Transect and Point Count locations were shown on **Figure 1-1 to 1-3**. Result of bird survey was presented in the table 5-3

### 5.2.2 Adult Odonate Survey

Odonate survey was performed and species recorded at Upper Tai Po River were listed in **Table 5-4**. 5 species of dragonfly species were recorded during the surveys in current season which was comparatively slightly more than the baseline result of 4 odonate species on October 2007. Recorded species were the common and abundant in Hong Kong (Keith, 2003). Sampling location was shown on **Figure 1-1 to 1-3**.

### 5.2.3 Hong Kong Newt

Survey of Hong Kong Newt was conducted at Upper Tai Po River. No Hong Kong Newt species was recorded.

### 5.2.4 Aquatic Macro-invertebrates

Upper Tai Po River was flowing with constant water during survey. Aquatic-net and kick sampling was performed at the stream.

The stream benthos fauna collected was mainly comprised of insects, mollusks and as well as small fish (Photo 3). The density for stream benthos was low along the river channel. Apparently, stream benthic fauna was temporally de-faunated as a result of engineering works and heavy rainfall last year. Despite that, the aquatic macro-invertebrates was predicted to be re-colonized along the river channel after finished the construction work. Stream benthos fauna recorded in reference site was similar to previous monitoring period. Details of recorded of stream benthic fauna refers to **Table 5-5**. Sampling location was shown on **Figure 1-1 to 1-3**.

### 5.2.5 Stream Fish Fauna

Fish surveys (Photo 5) were performed at Upper Tai Po River during surveys. In total, 3 species freshwater fish were recorded within project area. Fish density was low along river channel. Compared with the baseline result, the number of fish species was lower than the result of baseline survey. The pelagic fish, *Parazacco spilurus* which have conservation interest, was restricted in the upper section of the surveyed river outside the works boundary

where the water was not affected by construction works. Small number of *Parazacco spilurus* (Photo 5) was recorded from the reference site adjacent to the project site at upper stream section. No record of *Parazacco spilurus* and reduced population of the fish was observed within project site. That would likely be due to the habitat change caused by river bed modification, which was in line with the prediction of impact in the Project Profile (Agreement No. CE50/2001).

Generally, most of the recorded fish fauna are common species in Hong Kong. *Parazacco spilurus* is a common freshwater fish species in Hong Kong but it was listed as vulnerable in China Red Data Book (hkbiodiversity website) and some of them were captures and released to an undisturbed upper stream habitat before construction works with most recently performed on the 1<sup>st</sup> September 2011 and 3<sup>rd</sup> October 2011. The locally rare fish species of Three-lined Chinese Stream Catfish was not recorded at affected stream section during day and night time surveys (Photo 6) during both baseline and impact monitoring periods. Details of records of fish fauna refers to **Table 5-6**. Sampling location was shown on **Figure 1-1 to 1-3**.

### **5.3 Abiotic Data**

Data on water quality and major stream hydrological feature (water flow and substratum) of the stream were collected and given in the Table 5.7.

Generally, the water quality was found slightly polluted at lower stream section mainly due to the domestic sewage discharge from villages. Concentration of Ammonia (0.03 mg/L) in lower stream section was comparatively higher than that measured at upper stream section. Fish with less tolerance to toxic ammonia would be eliminated from stream water. Currently, the level of ammonia concentration is considered low and it was likely due to dilution of the running water in the stream. Salinity was low, and it was indicated that the stream was not affected by tidal effect. Generally, water quality (including DO, BOD, pH and nutrients) measured within project area was kept in constant level when compared with previous monitoring result of abiotic data. The detailed abiotic information was shown in Table 5-7.

The stream substratum was comprised of over 80% stones or rocks at most of the stream sections with moderate water flow (up to 0.2m/second at pool and 0.5m/second at riffle).

## **6 Audit/Review of Monitoring Results**

Total population was decreased for the concerned Fish (*Parazacco spilurus*) population at river channel within project site in the current monitoring period than those recorded in baseline ecology survey. Reduced fish population including *Parazacco spilurus* was likely due to habitat change caused by river bed modification within project site. Habitat change due to river bed modification was stated in Project profile. The project profile also predicted some indirect localized disturbance would occur on aquatic community and direct impact to approx. 0.6km of lowland river habitat within project area during construction period. The decrease of concerned fish (*Parazacco spilurus*) population was caused by river bed change which was a unavoidable as predicted. Project profile stated that the new channel bed would be lined with natural materials such as small cobbles and boulders which are similar to the substratum before the construction work. Thus, it is predicted that the concerned fish (*Parazacco spilurus*) population would be restored after the completion of the construction work.

## **7 Remedial Measures Adopted to Restore the Adverse Condition**

There was no unacceptable adverse condition, which would affect adjacent habitats outside project area, was identified within the project area.

## **8 Record of Complaints and Remedial Measures**

There were 25 complaints at construction site for the Upper Tai Po river. The complaints were followed up with suitable mitigation measures by contractor. The complaints and remedial measures were shown on Appendix I & II.

## 9 Forecast of Works Programme and Monitoring Requirements

Major Construction activities carried out by the contractor anticipated for the coming month.

- Construction of inclined gabion walls
- Construction of retaining wall
- Construction of stilling basin and gabion mattress
- Formation of river bed
- Construction of footpath
- Construction of dwarf wall
- Construction of surface drains

## 10 Comments and Conclusions

Ecological impact monitoring was carried out during July 2012 and relevant biotic and abiotic data was collected according to the project specification and the EM & A Manual. One of the three target freshwater fauna species, i.e., fish *Parazacco spilurus*, was recorded at upper stream section, outside but adjacent to project boundary. The reduced population of the fish would likely due to the habitat change caused by river bed modification, which was predicted and stated in project profile and such disturbance would be reversible during the operation period. The fish was commonly seen in more upper stream courses which would be the source for late re-colonization of the newly built river channel. The locally rare fish species of Three-lined Chinese Stream Catfish and the Hong Kong Newt were not recorded at the affected stream section during day and night time surveys conducted for both baseline and impact monitoring.

Most aquatic and riparian vegetation along the stream section was cleared due to construction works. Plantation works along newly built up river banks would be undertaken at late stage of the project.

The water quality in the surveyed stream was found slightly polluted at lower stream section mainly due to the domestic sewage discharge from villages. No significant change in water quality was detected except the increased sediments in water after comparing the results with baseline monitoring data.

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Hong Kong Biodiversity Website :

<http://www.afcd.gov.hk/english/conservation/hkbiodiversity/hkbiodiversity.html>

## **PHOTOS**





Photo 1: General view of the works area



Photo 2: General view of the works area



Photo 3: Kick sampling



Photo 4: Stream benthos sampling



Photo 5: Captured fish sample



Photo 6: Night survey

## **TABLE**

Table 5-1. Flora species recorded at the transect along the Upper Tai Po stream including riparian habitat.

Family	Species name	Species name in Chinese	Oct-07	Jan-09	Jul-09	Jan-10	Jul-10	Jan-11	Jul-11	Jan-12	Jul-12
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐	+	+	+	+	+	+			
Musaceae	<i>Musa paradisiaca</i>	大蕉	+	+	+	+	+				
Commelinaceae	<i>Commelina communis</i>	鴨躑躅	+	+	+	+	+	+	+	+	+
Fabaceae	<i>Pueraria lobata</i>	野葛	+	+	+	+	+	+			
Gramineae	<i>Panicum repens</i>	枯骨草	+	+	+	+	+	+	+	+	
Asteraceae	<i>Bidens alba</i>	白花鬼針草	+	+	+	+	+	+	++	+	+
Araceae	<i>Alocasia odora</i>	海芋	+	+	+	+	+	+			
Araceae	<i>Colocasia esculenta</i>	芋	+	+	+	+	+	+			
Moraceae	<i>Ficus hispida</i>	對葉榕	+	+	+	+	+	+			
Ulmaceae	<i>Celtis sinensis</i>	朴樹	+	+	+	+	+	+			
Athyriaceae	<i>Callipteris esculenta</i>	菜蕨	+	+	+	+	+	+			
Verbenaceae	<i>Lantana camara</i>	馬纓丹	+	+	+	+	+	+			
Sapindaceae	<i>Dimocarpus longan</i>	龍眼	+	+	+	+	+	+			
Solanaceae	<i>Solanum torvum</i>	水茄	+	+	+	+	+	+			
Equisetaceae	<i>Equisetum debile</i>	筆管草	+	+	+	+	+				
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨	+	+	+	+	+	+			
Bombacaceae	<i>Bombax ceiba</i>	木棉	+	+	+	+	+	+			
Lauraceae	<i>Cinnamomum camphora</i>	樟樹	+	+	+	+	+	+			
Myrtaceae	<i>Psidium guajava</i>	番石榴	+	+	+	+	+	+			
Caprifoliaceae	<i>Viburnum odoratissimum</i>	珊瑚樹	+	+	+	+	+				
Sapindaceae	<i>Litchi chinensis</i>	荔枝	+	+	+	+	+	+			
Rutaceae	<i>Clausena lansium</i>	黃皮	+	+	+	+	+	+			
Lauraceae	<i>Litsea glutinosa</i>	潺槁樹	+	+	+	+	+				
Euphorbiaceae	<i>Glochidion zeylanicum</i>	香港算盤子	+	+	+	+	+				
Asteraceae	<i>Ageratum conyzoides</i>	勝紅薊	+	+	+	+	+	+	+	+	
Urticaceae	<i>Boehmeria nivea</i>	苧麻	+	+	+	+	+	+	+		
Convolvulaceae	<i>Ipomoea aquatica</i>	通菜	+	+	+	+	+				
Gramineae	<i>Microstegium ciliatum</i>	剛秀竹	++	+	+	+	+	+	+	+	+
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	++	+	+	+	+	+	+	+	+
Gramineae	<i>Pennisetum purpureum</i>	象草	+	+	+	+	+	+			
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍	+	+	+	+	+	+	+	+	
Asteraceae	<i>Synedrella nodiflora</i>	金腰箭	+	+	+	+	+	+			
Gramineae	<i>Coix lacryma-jobi</i>	薏苡	+	+	+	+	+	+		+	
Amaranthaceae	<i>Alternanthera philoxeroides</i>	空心蓮子草	+	+	+	+	+	+			
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊	+	+	+	+	+	+	+	+	
Polygonaceae	<i>Polygonum barbatum</i>	毛蓼	+	+	+	+	+	+			
Myrtaceae	<i>Cleistocalyx operculatus</i>	水翁	+	+	+	+	+	+	+	+	
Gramineae	<i>Phragmites karka</i>	卡開蘆	+	+	+	+	+	+		+	
Solanaceae	<i>Solanum nigrum</i>	龍葵				+	+	+	+	+	
Cucurbitaceae	<i>Benincasa hispida</i>	冬瓜						+			

Note:

+, occurred; ++, common; +++, abundant

Table 5-2. Flora species recorded from belt transect survey at the Upper Tai Po stream (T1- Upper stream sampling site and T2 - Lower stream sampling site )

Family	Species	Stream Transect	Baseline survey				Impact monitoring					
			Oct-07		Jan-09		Reference		T1		T2	
			Height (m)	%	Height(m)	%	Height (m)	%	Height(m)	%	Height (m)	%
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.4	15	1	40	0.5	5	0.5	5		
Moraceae	<i>Ficus hispida</i>	對葉榕	1	2			5	5			2	10
Ulmaceae	<i>Celtis sinensis</i>	朴樹	5	2							6	15
Gramineae	<i>Microstegium ciliatum</i>	剛秀竹	1.2	45	1.2	30			0.8	10	0.5	12
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐	2	2			5	5	3	5	1.5	4
Araceae	<i>Alocasia odora</i>	海芋	1.5	23							1.5	25
Araceae	<i>Colocasia esculenta</i>	芋	0.3	<1	0.4	<1	0.3	2				
Myrtaceae	<i>Cleistocalyx operculatus</i>	水翁					0.4	10	7	5		
Athyriaceae	<i>Callipteris esculenta</i>	菜蕨			0.6	1	0.8	10			0.4	10
Gramineae	<i>Phragmites karka</i>	卡開蘆					1.5	51				
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨	0.4	10							0.4	10
Equisetaceae	<i>Equisetum debile</i>	筆管草			0.6	<1	0.3	2				
Asteraceae	<i>Ageratum conyzoides</i>	勝紅薊							0.4	2		
Commelinaceae	<i>Commelina communis</i>	鴨跖草										
Solanaceae	<i>Solanum nigrum</i>	龍葵										
Euphorbiaceae	<i>Mallotus paniculatus</i>	白楸										
Gramineae	<i>Eleusine indica</i>	牛筋草										
Gramineae	<i>Pennisetum purpureum</i>	象草									3	4
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊										
Asteraceae	<i>Bidens alba</i>	白花鬼針草										
Gramineae	<i>Panicum repens</i>	枯骨草										
Gramineae	<i>Coix lacryma-jobi</i>	薏苡										
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍										
Cucurbitaceae	<i>Benincasa hispida</i>	冬瓜										
Bare Gound								10		73		10

- Reference point was the sampling location outside the works area used to compare with the data within works area.

Table 5-2. Flora species recorded from belt transect survey at the Upper Tai Po stream (T1- Upper stream sampling site and T2 - Lower stream sampling site )

Family	Species	Stream Transect	Impact monitoring						Impact monitoring					
			Jul-09						Jan-10					
			Reference		T1		T2		Reference		T1		T2	
Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%		
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.5	5					0.5	3	0.2	5	0.2	2
Moraceae	<i>Ficus hispida</i>	對葉榕	5	5			2	10	5	5				
Ulmaceae	<i>Celtis sinensis</i>	朴樹					6	15						
Gramineae	<i>Microstegium ciliatum</i>	剛秀竹					0.7	30						
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐	5	5	3	5	1.5	5	5	5				
Araceae	<i>Alocasia odora</i>	海芋					2	30						
Araceae	<i>Colocasia esculenta</i>	芋	0.3	2	0.8	5			0.3	1				
Myrtaceae	<i>Cleistocalyx operculatus</i>	水翁	0.4	10	7	5			0.4	10	7	5		
Athyriaceae	<i>Callipteris esculenta</i>	菜蕨	0.8	10			0.4	2	0.8	6				
Gramineae	<i>Phragmites karka</i>	卡開蘆	1.5	51					1.5	53				
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨					0.4	2						
Equisetaceae	<i>Equisetum debile</i>	筆管草	0.3	2					0.3	2				
Asteraceae	<i>Ageratum conyzoides</i>	勝紅薊			0.4	2					0.2	2		
Commelinaceae	<i>Commelina communis</i>	鴨跖草							0.2	5	0.2	5	0.2	5
Solanaceae	<i>Solanum nigrum</i>	龍葵											0.4	5
Euphorbiaceae	<i>Mallotus paniculatus</i>	白楸									0.3	5		
Gramineae	<i>Eleusine indica</i>	牛筋草			0.5	5						5		
Gramineae	<i>Pennisetum purpureum</i>	象草												
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊												
Asteraceae	<i>Bidens alba</i>	白花鬼針草												
Gramineae	<i>Panicum repens</i>	枯骨草												
Gramineae	<i>Coix lacryma-jobi</i>	薏苡												
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍												
Cucurbitaceae	<i>Benincasa hispida</i>	冬瓜												
Bare Gound				10		78		6		10		73		88

- Reference point was the sampling location outside the works area used to compare with the data within works area.

Table 5-2. Flora species recorded from belt transect survey at the Upper Tai Po stream (T1- Upper stream sampling site and T2 - Lower stream sampling site )

Family	Species	Stream Transect	Impact monitoring						Impact monitoring					
			Jul-10						Jan-11					
			Reference		T1		T2		Reference		T1		T2	
Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%		
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.5	20	0.5	60			0.5	10				
Moraceae	<i>Ficus hispida</i>	對葉榕	5	5										
Ulmaceae	<i>Celtis sinensis</i>	朴樹					4m	5						
Gramineae	<i>Microstegium ciliatum</i>	剛秀竹	1	35	1	5	0.5	10	1	15	1	5	0.5	2
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐	5	5							4m	5		
Araceae	<i>Alocasia odora</i>	海芋					2	10					0.4	3
Araceae	<i>Colocasia esculenta</i>	芋												
Myrtaceae	<i>Cleistocalyx operculatus</i>	水翁	0.4	10					0.4	5	5m	5		
Athyriaceae	<i>Callipteris esculenta</i>	菜蕨	0.8	6										
Gramineae	<i>Phragmites karka</i>	卡開蘆	1.5	10					1.5	2				
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨												
Equisetaceae	<i>Equisetum debile</i>	筆管草												
Asteraceae	<i>Ageratum conyzoides</i>	勝紅薊											0.3	2
Commelinaceae	<i>Commelina communis</i>	鴨跖草			0.5	20							0.2	4
Solanaceae	<i>Solanum nigrum</i>	龍葵												
Euphorbiaceae	<i>Mallotus paniculatus</i>	白楸												
Gramineae	<i>Eleusine indica</i>	牛筋草												
Gramineae	<i>Pennisetum purpureum</i>	象草												
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊												
Asteraceae	<i>Bidens alba</i>	白花鬼針草									0.5	5		3
Gramineae	<i>Panicum repens</i>	枯骨草												
Gramineae	<i>Coix lacryma-jobi</i>	薏苡												
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍												
Cucurbitaceae	<i>Benincasa hispida</i>	冬瓜											0.2	5
Bare Gound				9		15		65		68		80		89

- Reference point was the sampling location outside the works area used to compare with the data within works area.

Table 5-2. Flora species recorded from belt transect survey at the Upper Tai Po stream (T1- Upper stream sampling site and T2 - Lower stream sampling site )

Family	Species	Stream Transect	Chinese name	Impact monitoring						Impact monitoring					
				Reference		T1		T2		Reference		T1		T2	
				Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Asteraceae	<i>Mikania micrantha</i>		薇甘菊	0.5	10					0.4	20				
Moraceae	<i>Ficus hispida</i>		對葉榕												
Ulmaceae	<i>Celtis sinensis</i>		朴樹												
Gramineae	<i>Microstegium ciliatum</i>		剛秀竹	1	2										
Euphorbiaceae	<i>Macaranga tanarius</i>		血桐												
Araceae	<i>Alocasia odora</i>		海芋												
Araceae	<i>Colocasia esculenta</i>		芋												
Myrtaceae	<i>Cleistocalyx operculatus</i>		水翁												
Athyriaceae	<i>Callipteris esculenta</i>		菜蕨												
Gramineae	<i>Phragmites karka</i>		卡開蘆	1.5	2										
Thelypteridaceae	<i>Cyclosorus parasiticus</i>		華南毛蕨												
Equisetaceae	<i>Equisetum debile</i>		筆管草												
Asteraceae	<i>Ageratum conyzoides</i>		勝紅薊	1.2	10					0.4	20				
Commelinaceae	<i>Commelina communis</i>		鴨跖草							0.4	10				
Solanaceae	<i>Solanum nigrum</i>		龍葵					0.5	4						
Euphorbiaceae	<i>Mallotus paniculatus</i>		白楸												
Gramineae	<i>Eleusine indica</i>		牛筋草					0.3	5						
Gramineae	<i>Pennisetum purpureum</i>		象草												
Asteraceae	<i>Wedelia chinensis</i>		蟛蜞菊												
Asteraceae	<i>Bidens alba</i>		白花鬼針草					0.2	2						
Gramineae	<i>Panicum repens</i>		枯骨草	1.5	5					1.5	5				
Gramineae	<i>Coix lacryma-jobi</i>		薏苡							1.5	5				
Convolvulaceae	<i>Ipomoea cairica</i>		五爪金龍							0.2	5				
Cucurbitaceae	<i>Benincasa hispida</i>		冬瓜												
Bare Gound					71		100		89		35		100		100

- Reference point was the sampling location outside the works area used to compare with the data within works area.

Table 5-2. Flora species recorded from belt transect survey at the Upper Tai Po stream (T1- Upper stream sampling site and T2 - Lower stream sampling site )

Family	Species	Stream Transect	Chinese name	Impact monitoring					
				Reference		T1		T2	
				Height (m)	%	Height (m)	%	Height (m)	%
Asteraceae	<i>Mikania micrantha</i>		薇甘菊	0.4	10				
Moraceae	<i>Ficus hispida</i>		對葉榕						
Ulmaceae	<i>Celtis sinensis</i>		朴樹						
Gramineae	<i>Microstegium ciliatum</i>		剛秀竹	1	55				
Euphorbiaceae	<i>Macaranga tanarius</i>		血桐						
Araceae	<i>Alocasia odora</i>		海芋						
Araceae	<i>Colocasia esculenta</i>		芋						
Myrtaceae	<i>Cleistocalyx operculatus</i>		水翁						
Athyriaceae	<i>Callipteris esculenta</i>		菜蕨						
Gramineae	<i>Phragmites karka</i>		卡開蘆						
Thelypteridaceae	<i>Cyclosorus parasiticus</i>		華南毛蕨						
Equisetaceae	<i>Equisetum debile</i>		筆管草						
Asteraceae	<i>Ageratum conyzoides</i>		勝紅薊						
Commelinaceae	<i>Commelina communis</i>		鴨跖草	0.4	5				
Solanaceae	<i>Solanum nigrum</i>		龍葵						
Euphorbiaceae	<i>Mallotus paniculatus</i>		白楸						
Gramineae	<i>Eleusine indica</i>		牛筋草						
Gramineae	<i>Pennisetum purpureum</i>		象草						
Asteraceae	<i>Wedelia chinensis</i>		蟛蜞菊						
Asteraceae	<i>Bidens alba</i>		白花鬼針草						
Gramineae	<i>Panicum repens</i>		枯骨草						
Gramineae	<i>Coix lacryma-jobi</i>		薏苡	1.5	5				
Convolvulaceae	<i>Ipomoea cairica</i>		五爪金龍	0.2	5				
Cucurbitaceae	<i>Benincasa hispida</i>		冬瓜						
Bare Gound					20		100		100

- Reference point was the sampling location outside the works area used to compare with the data within works area.



Table 5-3 Avifauna recorded along survey transects and at two selected point count locations for Upper Tai Po River. (PC1- Upper stream section and PC2- Lower stream section )

Common Name	Species name	Chinese name	Status*	Rarity*	Baseline survey			Impact monitoring			Impact monitoring			
					Oct-07			Jan-09			Jul-09			
					Abundance			Abundance			Abundance			
					T	PC1	PC2	T	PC1	PC2	T	PC1	PC2	
Black Kite	<i>Milvus lineatus</i>	麻鷹	R, WV	C	+									
Black -crown Night Heron	<i>Nycticorax nycticorax</i>	夜鷺	R, WV	C										
Black-collared Starling	<i>Sturnus nigricollis</i>	黑領棕鳥	R	C	+	1	1							
Chinese Bulbul	<i>Pycnonotus sinensis</i>	白頭鶇	R	C	+	3	2	++	5	6	++	4	7	
Chinese Pond Heron	<i>Ardeola bacchus</i>	池鷺	R	C	+			++	6	3	+	2	3	
Common Kingfisher	<i>Alcedo atthis</i>	普通翠鳥	PM, WV	C	+									
Common Koel	<i>Eudynamis scolopacea</i>	噪鵲	R	C	+									
Common Sandpiper	<i>Actitis hypoleucos</i>	磯鶇	WV&PM	C	+									
Common Tailorbird	<i>Orthotomus sutorius</i>	長尾縫葉鶇	R	C	+		1	+	1	1	+		1	
Crested Myna	<i>Acridotheres cristatellus</i>	八哥	R	C		1								
Domestic pigeon	<i>Columba sp.</i>	鴿	--	C		3								
Great Coucal	<i>Centropus sinensis</i>	褐翅鴉鵲	R	C	+	1								
Grey Wagtail	<i>Motacilla cinerea</i>	灰鶇鶇	WV	C										
Japanese White Eye	<i>Zosterops japonica</i>	暗綠繡眼鳥	R	C		2		++	2	3	+	1	4	
Little Egret	<i>Egretta garzetta</i>	小白鷺	R	C	+			+	1		+		1	
Rufous-backed Shrike	<i>Lanius schach</i>	棕背伯勞	R	C										
Magpie	<i>Pica pica</i>	喜鵲	R	C		1								
Magpie Robin	<i>Copsychus saularis</i>	鶇鶇	R	C	+	1	1				+	1	3	
Olive Backed pipit	<i>Anthus hodgsoni</i>	樹鶇	WV	C	+			+	1	3				
Crested bulbul	<i>Pycnonotus jocosus</i>	紅耳鶇	R	C	+	2		+++	6	7	++	2	6	
Spotted Dove	<i>Streptopelia chinensis</i>	珠頸斑鳩	R	C	+		2	+	1		+	1	3	
Scaly-breasted Munia	<i>Lonchura punctulata</i>	斑文鳥	R	C										
Eurasian Tree Sparrow	<i>Passer montanus</i>	麻鶇	R	C	+	3	2							
Violet Whistling Thrush	<i>Myiophonus caeruleus</i>	紫嘯鶇	R	C	+									
White Wagtail	<i>Motacilla alba</i>	白鶇鶇	WV, R	C	+		1							
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	白胸苦惡鳥	R	C	+									
Yellow Bellid Prinia	<i>Prinia flaviventris</i>	灰頭鶇鶇	R	C	+									
Yellow Wagtail	<i>Motacilla flava</i>	黃鶇鶇	WV&PM	C		1								
Little Swift	<i>Apus affinis</i>	小白腰雨燕	R, SpM	C										
Green Sandpiper	<i>Tringa ochropus</i>	白腰草鶇	WV	U										
Barn Swallow	<i>Hirundo rustica</i>	家燕	SV, SpM	C										
Great Tit	<i>Parus major (commixtus)</i>	大山雀	R	C										
Blue Magpie	<i>Urocissa erythrorhyncha</i>	紅咀藍鶇	R	C										
Scarlet Minivet	<i>Pericrocotus flammeus</i>	赤紅山椒鳥	R	C										
Scarlet-backed Flowerpecker	<i>Dicaeum cruentatum</i>	朱背啄花鳥	R	C										
Common Blackbird	<i>Turdus merula</i>	烏鶇	WV, PM	C										
Silver-eared Mesia	<i>Leiothrix argentauris</i>	銀耳相思鳥	R	C										
Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>	白喉紅臀鶇	R	C										
Number of birds									23	23		11	28	
No. of species									8	8	6	8	6	8

Note: R – Resident; WV – Winter visitor; PM – Passage migrant; C – Common; U – Uncommon; SpM – Spring migrant; T – transect count; PC1 – Point count location 1; PC2 – Point count location 2

\*Sourced from Carey, G.J., Chalmers, M.L., Diskin, D.A., Kennerley, P.R., Leader, P.J., Leven, M.R., Lewthwaite, R.W., Melville, D.S., Turnbull, M. and Yung, L. (2001) The Avifauna of Hong Kong. Hong Kong Bird Watching Society.

Table 5-3 Avifauna recorded along survey transects and at two selected point count locations for Upper Tai Po River. (PC1- Upper stream section and PC2- Lower stream section )

Common Name	Species name	Chinese name	Status*	Rarity*	Impact monitoring			Impact monitoring			Impact monitoring			
					Jan-10			Jul-10			Jan-11			
					Abundance			Abundance			Abundance			
					T	PC1	PC2	T	PC1	PC2	T	PC1	PC2	
Black Kite	<i>Milvus lineatus</i>	麻鷹	R,WV	C	+							+		
Black -crown Night Heron	<i>Nycticorax nycticorax</i>	夜鷺	R,WV	C				+				+		
Black-collared Starling	<i>Sturnus nigricollis</i>	黑領椋鳥	R	C	+			+		1	+			
Chinese Bulbul	<i>Pycnonotus sinensis</i>	白頭鶇	R	C	+++	7	6	+++	6	3	+	4	2	
Chinese Pond Heron	<i>Ardeola bacchus</i>	池鷺	R	C	++	3	3	++	2	2	+	1	1	
Common Kingfisher	<i>Alcedo atthis</i>	普通翠鳥	PM, WV	C				+				+		
Common Koel	<i>Eudynamis scolopacea</i>	噪鵲	R	C			2					+		
Common Sandpiper	<i>Actitis hypoleucos</i>	磯鶇	WV&PM	C								+		
Common Tailorbird	<i>Orthotomus sutorius</i>	長尾縫葉鶇	R	C	++		10	+	1		+		1	
Crested Myna	<i>Acridotheres cristatellus</i>	八哥	R	C				+			+	2		
Domestic pigeon	<i>Columba sp.</i>	鴿	--	C				+						
Great Coucal	<i>Centropus sinensis</i>	褐翅鴉鵂	R	C				+	1		+			
Grey Wagtail	<i>Motacilla cinerea</i>	灰鶇鶇	WV	C							+	2	1	
Japanese White Eye	<i>Zosterops japonica</i>	暗綠繡眼鳥	R	C	+++	4	6	++	3	2	+	5	2	
Little Egret	<i>Egretta garzetta</i>	小白鷺	R	C	+		1	+	1	1		1	1	
Rufous-backed Shrike	<i>Lanius schach</i>	棕背伯勞	R	C	+	1		+	1					
Magpie	<i>Pica pica</i>	喜鵲	R	C										
Magpie Robin	<i>Copsychus saularis</i>	鵲鶇	R	C	+	2	1	+	2	2	+	1	1	
Olive Backed pipit	<i>Anthus hodgsoni</i>	樹鶇	WV	C								+		
Crested bulbul	<i>Pycnonotus jocosus</i>	紅耳鶇	R	C	+++	4	5	++	3	2	+	2	1	
Spotted Dove	<i>Streptopelia chinensis</i>	珠頸斑鳩	R	C	+	1	2	+	1	1	+	1	1	
Scaly-breasted Munia	<i>Lonchura punctulata</i>	斑文鳥	R	C										
Eurasian Tree Sparrow	<i>Passer montanus</i>	麻鶇	R	C	+			+	4	3	+			
Violet Whistling Thrush	<i>Myiophonus caeruleus</i>	紫嘯鶇	R	C										
White Wagtail	<i>Motacilla alba</i>	白鶇鶇	WV, R	C	++	2	3	+	1	1	+	2	2	
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	白胸苦惡鳥	R	C	+		1	+		1				
Yellow Bellid Prinia	<i>Prinia flaviventris</i>	灰頭鶇鶇	R	C							+			
Yellow Wagtail	<i>Motacilla flava</i>	黃鶇鶇	WV&PM	C										
Little Swift	<i>Apus affinis</i>	小白腰雨燕	R, SpM	C										
Green Sandpiper	<i>Tringa ochropus</i>	白腰草鶇	WV	U							+			
Barn Swallow	<i>Hirundo rustica</i>	家燕	SV, SpM	C										
Great Tit	<i>Parus major (commixtus)</i>	大山雀	R	C	+	2	1	+	1					
Blue Magpie	<i>Urocissa erythrorhyncha</i>	紅咀藍鶇	R	C	+		2							
Scarlet Minivet	<i>Pericrocotus flammeus</i>	赤紅山椒鳥	R	C	+									
Scarlet-backed Flowerpecker	<i>Dicaeum cruentatum</i>	朱背啄花鳥	R	C	+									
Common Blackbird	<i>Turdus merula</i>	烏鶇	WV, PM	C							+			
Silver-eared Mesia	<i>Leiothrix argentauris</i>	銀耳相思鳥	R	C							+			
Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>	白喉紅臀鶇	R	C										
Number of birds						26	43		27	19		21	13	
No. of species						18	9	13	19	13	11	23	10	

Note: R – Resident; WV – Winter visitor; PM – Passage migrant; C – Common; U – Uncommon; SpM – Spring migrant; T – transect count; PC1 – Point count location 1; PC2 – Point count location 2

\*Sourced from Carey, G.J., Chalmers, M.L., Diskin, D.A., Kennerley, P.R., Leader, P.J., Leven, M.R., Lewthwaite, R.W., Melville, D.S., Turnbull, M. and Yung, L. (2001) The Avifauna of Hong Kong. Hong Kong Bird Watching Society.

Table 5-3 Avifauna recorded along survey transects and at two selected point count locations for Upper Tai Po River. (PC1- Upper stream section and PC2- Lower stream section )

Common Name	Species name	Chinese name	Status*	Rarity*	Impact monitoring			Impact monitoring			Impact monitoring						
					Jul-11			Jan-12			Jul-12						
					Abundance	Abundance	Abundance	T	PC1	PC2	T	PC1	PC2	T	PC1	PC2	
Black Kite	<i>Milvus lineatus</i>	麻鷹	R, WV	C				+									
Black -crown Night Heron	<i>Nycticorax nycticorax</i>	夜鷺	R, WV	C													
Black-collared Starling	<i>Sturnus nigricollis</i>	黑領椋鳥	R	C	+		1	+		1	+						
Chinese Bulbul	<i>Pycnonotus sinensis</i>	白頭鶇	R	C	+	1		+	1		++	2	1				
Chinese Pond Heron	<i>Ardeola bacchus</i>	池鷺	R	C	+	1					+						
Common Kingfisher	<i>Alcedo atthis</i>	普通翠鳥	PM, WV	C													
Common Koel	<i>Eudynamis scolopacea</i>	噪鵲	R	C	+						+						
Common Sandpiper	<i>Actitis hypoleucos</i>	磯鶇	WV&PM	C	+												
Common Tailorbird	<i>Orthotomus sutorius</i>	長尾縫葉鶇	R	C	+			+			+						
Crested Myna	<i>Acridotheres cristatellus</i>	八哥	R	C	+		2	+			+						
Domestic pigeon	<i>Columba sp.</i>	鴿	--	C	+												
Great Coucal	<i>Centropus sinensis</i>	褐翅鴉鵲	R	C	+												
Grey Wagtail	<i>Motacilla cinerea</i>	灰鶇鶇	WV	C				+	1	2							
Japanese White Eye	<i>Zosterops japonica</i>	暗綠繡眼鳥	R	C	+			+			+	2					
Little Egret	<i>Egretta garzetta</i>	小白鷺	R	C	+												
Rufous-backed Shrike	<i>Lanius schach</i>	棕背伯勞	R	C	+												
Magpie	<i>Pica pica</i>	喜鵲	R	C				+									
Magpie Robin	<i>Copsychus saularis</i>	鵲鴝	R	C	+	1		+		2	+	1	1				
Olive Backed pipit	<i>Anthus hodgsoni</i>	樹鶇	WV	C													
Crested bulbul	<i>Pycnonotus jocosus</i>	紅耳鶇	R	C	+	1	2	+	2		+++	5	3				
Spotted Dove	<i>Streptopelia chinensis</i>	珠頸斑鳩	R	C	+	1		++	4	3	++	1	2				
Scaly-breasted Munia	<i>Lonchura punctulata</i>	斑文鳥	R	C													
Eurasian Tree Sparrow	<i>Passer montanus</i>	麻鶇	R	C	+		1	+			+						
Violet Whistling Thrush	<i>Myiophonus caeruleus</i>	紫嘯鶇	R	C													
White Wagtail	<i>Motacilla alba</i>	白鶇鶇	WV, R	C	+			++	2	1	+	1	1				
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	白胸苦惡鳥	R	C				+									
Yellow Bellid Prinia	<i>Prinia flaviventris</i>	灰頭鶇鶇	R	C	+			+			+						
Yellow Wagtail	<i>Motacilla flava</i>	黃鶇鶇	WV&PM	C													
Little Swift	<i>Apus affinis</i>	小白腰雨燕	R, SpM	C													
Green Sandpiper	<i>Tringa ochropus</i>	白腰草鶇	WV	U													
Barn Swallow	<i>Hirundo rustica</i>	家燕	SV, SpM	C	+						+++	3	2				
Great Tit	<i>Parus major (commixtus)</i>	大山雀	R	C				+									
Blue Magpie	<i>Urocissa erythrorhyncha</i>	紅咀藍鶇	R	C													
Scarlet Minivet	<i>Pericocotus flammeus</i>	赤紅山椒鳥	R	C													
Scarlet-backed Flowerpecker	<i>Dicaeum cruentatum</i>	朱背啄花鳥	R	C													
Common Blackbird	<i>Turdus merula</i>	烏鶇	WV, PM	C													
Silver-eared Mesia	<i>Leiothrix argentauris</i>	銀耳相思鳥	R	C													
Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>	白喉紅臀鶇	R	C	+		1										
Number of birds						5	7		10	9		15	10				
No. of species						20	5	5	16	5	5	14	7	6			

Note: R – Resident; WV – Winter visitor; PM – Passage migrant; C – Common; U – Uncommon; SpM – Spring migrant; T – transect count; PC1 – Point count location 1; PC2 – Point count location 2

\*Sourced from Carey, G.J., Chalmers, M.L., Diskin, D.A., Kennerley, P.R., Leader, P.J., Leven, M.R., Lewthwaite, R.W., Melville, D.S., Turnbull, M. and Yung, L. (2001) The Avifauna of Hong Kong. Hong Kong Bird Watching Society.

Table 5-4. Odonate species recorded at the Upper Tai Po stream

Species	Common name	Chinese name	Status	Commonness	Baseline survey	Impact monitoring			
					Oct-07	Jan-09	Jul-09	Jan-10	Jul-10
<i>Orthetrum chrysis</i>	Red-faced Skimmer	華麗灰蜻	NP	VC		+	+		+
<i>Crocothemis servilia servilia</i>	Crimson Darter	紅蜻	NP	VC	+		+		+
<i>Coperia marginipes</i>	Yellow Featherlegs	黃狹扇蟳	NP	VC					
<i>Prodasineura autumnalis</i>	Black Threadtail	烏齒原蟳	NP	VC					
<i>Trithemis festiva</i>	Indigo Dropwing	靑褐蜻	NP	VC					
<i>Neurobasis chinensis</i>	Chinese Greenwing	華艷色蟳	NP	C					+
<i>Rhinocypha perforata</i>	Common Blue Jewel	三斑鼻蟳	NP	VC					+
<i>Pantala flavescens</i>	Wandering Glider	黃蜻	NP	VC	+		+	+	+
<i>Orthetrum glaucum</i>	Common blue skimmer	黑尾灰蜻	NP	VC	+	+	+		
<i>Trithemis Aurora</i>	Crimson dropwing	靑褐蜻	NP	VC	+				+
<i>Urothemis signata signata</i>	Scarlet Basket	赤斑曲鈎脈蜻	NP	C					
<i>Pseudagrion rubriceps rubriceps</i>	Orange-faced Sprite	丹頂斑蟳	NP	C					
<i>Euphaea decorata</i>	Black-banded Gossamerwing	方帶幽蟳	NP	VC					
<i>Palpopleura sexmaculata sexmaculata</i>	Asian Widow	六斑曲緣蜻	NP	C					
<i>Orthetrum luzonicum</i>	Marsh Skimmer	呂宋灰蜻	NP	VC					

Note: NP – Not protected in Hong Kong

“VC” – Very Common; “UC” – Uncommon; “C” - Common

“+” – Species exists in the survey site

“++” – Species common in the survey site

“+++” – Species abundance in the survey site

Table 5-4. Odonate species recorded at the Upper Tai Po stream

Species	Common name	Chinese name	Status	Commonness	Impact monitoring			
					Jan-11	Jul-11	Jan-12	Jul-12
<i>Orthetrum chrysis</i>	Red-faced Skimmer	華麗灰蜻	NP	VC				+
<i>Crocothemis servilia servilia</i>	Crimson Darter	紅蜻	NP	VC				
<i>Coperia marginipes</i>	Yellow Featherlegs	黃狹扇螳	NP	VC				
<i>Prodasineura autumnalis</i>	Black Threadtail	烏齒原螳	NP	VC				
<i>Trithemis festiva</i>	Indigo Dropwing	靛褐蜻	NP	VC		+		+
<i>Neurobasis chinensis</i>	Chinese Greenwing	華艷色螳	NP	C				
<i>Rhinocypha perforata</i>	Common Blue Jewel	三斑鼻螳	NP	VC				
<i>Pantala flavescens</i>	Wandering Glider	黃蜻	NP	VC	+	++	+	+
<i>Orthetrum glaucum</i>	Common blue skimmer	黑尾灰蜻	NP	VC				
<i>Trithemis Aurora</i>	Crimson dropwing	靛褐蜻	NP	VC				
<i>Urothemis signata signata</i>	Scarlet Basket	赤斑曲鈎脈蜻	NP	C		+		
<i>Pseudagrion rubriceps rubriceps</i>	Orange-faced Sprite	丹頂斑螳	NP	C		+		
<i>Euphaea decorata</i>	Black-banded Gossamerwing	方帶幽螳	NP	VC		+		
<i>Palpopleura sexmaculata sexmaculata</i>	Asian Widow	六斑曲緣蜻	NP	C				+
<i>Orthetrum luzonicum</i>	Marsh Skimmer	呂宋灰蜻	NP	VC				+

Note: NP – Not protected in Hong Kong

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“+” – Species exists in the survey site

“++” – Species common in the survey site

“+++” – Species abundance in the survey site

Table 5-5 Aquatic Macro invertebrates recorded at Upper Tai Po River (T1- Upper stream sampling site and T2- Lower stream sampling site )

Species	Chinese name	Sampling point	Baseline survey		Impact monitoring			Impact monitoring		
			Oct-07		Jan-09			Jul-09		
			T1	T2	Reference	T1	T2	Reference	T1	T2
<b>Invertebrates</b>										
<i>Pomacea canaliculata</i>	蘋果螺	NP VC					+		+	++
<i>Physella acuta</i>	尖膀胱螺	NP VC								
<i>Melanoides tuberculata</i>	瘤擬黑螺	NP VC					+		+	+
<i>Radix plicatulus</i>	羅白螺	NP VC		++			+			+
<i>Biomphalaria sp.</i>	--	NP VC		+			+			+
<i>Brotia hainanensis</i>	--	NP VC	++	+	++				++	
<i>Sinotaia quadrata</i>	田螺	NP VC					++		+	++
<i>Indobaetis sp.</i>	--	NP VC	+		+				+	
<i>Baetis sp.</i>	--	NP VC	+		+				+	
<i>Chironomus sp.</i>	蠓幼虫	NP VC	+	+	+				+	
<i>Mnais sp.</i>	--	NP VC		+	+				+	
<i>Orthetrum sp.</i>	--	NP VC	+	+	+				+	
<i>Perla sp</i>	--	NP VC								
<i>Aulocodes sp.</i>	--	NP VC								
<i>Tipulidae spp.</i>	--	NP VC								
<i>Arctopora sp.</i>	--	NP VC								
<i>Anisocentropus sp.</i>	--	NP VC								
<i>Rhaphium sp.</i>	--	NP VC								
<b>Crustacea</b>										
<i>Macrobrachium hainanense</i>	海南沼蝦	NP VC			+				+	
<i>Caridina contonensis</i>	廣東米蝦	NP VC			+				+	
<i>Cryptopotamon anacoluthon</i>	鯉刺溪蟹	NP C			+				+	
<b>Fish</b>										
<i>Gambusia affinis</i>	食蚊魚	NP VC	+	+			+		+	+
<i>Poecilia reticulata</i>	孔雀花魚將	NP VC	+	+			+			+
<i>Schistura fasciolata</i>	橫紋南鰍	NP C			+				+	+
<i>Rhinogobius spp.</i>	鰕虎魚	NP C			+		+		+	+

Note: NP – Not protected in Hong Kong

“VC” – Very Common; “UC” – Uncommon; “C” - Common

“+” – Species exists in the survey site

“++” – Species common in the survey site

“+++” – Species abundance in the survey site

- Reference point was the sampling location outside the works area used to compare the with the data within works area.

Table 5-5 Aquatic Macro invertebrates recorded at Upper Tai Po River (T1- Upper stream sampling site and T2- Lower stream sampling site )

Species	Chinese name	Reference	VC	Impact monitoring			Impact monitoring			Impact monitoring		
				Jan-10	Jul-10	Jan-11	Jan-10	Jul-10	Jan-11	Jan-10	Jul-10	Jan-11
Invertebrates		NP	VC	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2
<i>Pomacea canaliculata</i>	蘋果螺	NP	VC	+		+	+		++			+
<i>Physella acuta</i>	尖膀胱螺	NP	VC							+	+	++
<i>Melanoides tuberculata</i>	瘤擬黑螺	NP	VC	+		+	+		++	+		
<i>Radix plicatulus</i>	羅白螺	NP	VC		+	+		+	+			
<i>Biomphalaria sp.</i>	--	NP	VC		+	+		+	+			
<i>Brotia hainanensis</i>	--	NP	VC	++	+		++	+		+		
<i>Sinotaia quadrata</i>	田螺	NP	VC			++			+++			
<i>Indobaetis sp.</i>	--	NP	VC	+	+		+	+		+		
<i>Baetis sp.</i>	--	NP	VC	+	+		+	+		+		
<i>Chironomus sp.</i>	蠓幼虫	NP	VC	+		+	+	+	+	+	+	+
<i>Mnais sp.</i>	--	NP	VC	+	+		+	+		+	+	+
<i>Orthetrum sp.</i>	--	NP	VC	+	+		+	+		+	+	
<i>Perla sp</i>	--	NP	VC		+			+				
<i>Aulocodes sp.</i>	--	NP	VC		+			+				
<i>Tipulidae spp.</i>	--	NP	VC		+			+				
<i>Arctopora sp.</i>	--	NP	VC					+				
<i>Anisocentropus sp.</i>	--	NP	VC					+				
<i>Rhaphium sp.</i>	--	NP	VC									
<b>Crustacea</b>												
<i>Macrobrachium hainanense</i>	海南沼蝦	NP	VC	+	+		+	+	+	+	+	
<i>Caridina contonensis</i>	廣東米蝦	NP	VC	+	++		+	++	+	+	+	+
<i>Cryptopotamon anacoluthon</i>	鯉刺溪蟹	NP	C	+			+	+				
<b>Fish</b>												
<i>Gambusia affinis</i>	食蚊魚	NP	VC		+	++		+	++		+	+
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC		+	+++		+	+++		+	+
<i>Schistura fasciolata</i>	橫紋南鯽	NP	C	+	+		+	+		+		
<i>Rhinogobius spp.</i>	鰕虎魚	NP	C	+	++		+	++		+		

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“+” – Species exists in the survey site

“++” – Species common in the survey site

“+++” – Species abundance in the survey site

- Reference point was the sampling location outside the works area used to compare the with the data within works area.

Table 5-5 Aquatic Macro invertebrates recorded at Upper Tai Po River (T1- Upper stream sampling site and T2- Lower stream sampling site )

Species	Chinese name	Reference	T1	T2	Impact monitoring			Impact monitoring			Impact monitoring		
					Reference	T1	T2	Reference	T1	T2	Reference	T1	T2
<b>Invertebrates</b>													
			Sampling point										
<i>Pomacea canaliculata</i>	蘋果螺	NP	VC	+		+	+	+	+	+			
<i>Physella acuta</i>	尖膀胱螺	NP	VC				+			+			
<i>Melanoides tuberculata</i>	瘤擬黑螺	NP	VC	+		+		+	+	+	+		
<i>Radix plicatulus</i>	羅白螺	NP	VC	+		+	+	+	+	+			
<i>Biomphalaria sp.</i>	--	NP	VC	+			+						
<i>Brotia hainanensis</i>	--	NP	VC	+	+		+			+			
<i>Sinotaia quadrata</i>	田螺	NP	VC	+			+			+	+		
<i>Indobaetis sp.</i>	--	NP	VC										
<i>Baetis sp.</i>	--	NP	VC							+			
<i>Chironomus sp.</i>	蠓幼虫	NP	VC	+	+	+	+	+	+	+	+	+	
<i>Mnais sp.</i>	--	NP	VC	+	+		+	+		+	+		
<i>Orthetrum sp.</i>	--	NP	VC	+			+	+		+	+		
<i>Perla sp</i>	--	NP	VC										
<i>Aulocodes sp.</i>	--	NP	VC										
<i>Tipulidae spp.</i>	--	NP	VC										
<i>Arctopora sp.</i>	--	NP	VC										
<i>Anisocentropus sp.</i>	--	NP	VC										
<i>Rhaphium sp.</i>	--	NP	VC								+	+	
<b>Crustacea</b>													
<i>Macrobrachium hainanense</i>	海南沼蝦	NP	VC	+						+			
<i>Caridina contonensis</i>	廣東米蝦	NP	VC	+	+		+			+	+		
<i>Cryptopotamon anacoluthon</i>	鯉刺溪蟹	NP	C	+						+			
<b>Fish</b>													
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+						+	+	+	
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC	+						+			
<i>Schistura fasciolata</i>	橫紋南鯿	NP	C	+			+			+			
<i>Rhinogobius spp.</i>	鰕虎魚	NP	C	+			+			+			

Note: NP – Not protected in Hong Kong

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“+” – Species exists in the survey site

“++” – Species common in the survey site

“+++” – Species abundance in the survey site

- Reference point was the sampling location outside the works area used to compare the with the data within works area.



Table 5-6 Fish species recorded at Upper Tai Po River (T1-  
 Upper stream sampling site and T2 - Lower stream sampling  
 site )

Species		Status	Commonness	Baseline survey		Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring		
				Oct-07		Jan-09			Jul-09			Jan-10			Jul-10		
				T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	++		+			+	+	++	+	+	++	+	+	+++
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+		+	+		+	+	+	+	+	++	+	+	++
<i>Poecilia reticulata</i>	孔雀花魚將	NP	C	++	+			++			+		+	+++		+	++
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鯰	NP	C	+		+			+			+			+	+	
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	++			+		+	+		+	++		+	+++
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C	+													++
<i>Parazacco spilurus</i>	異鱗	V and NP	C	++		+	+		+			+			+	+	
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C	+		+	+		+			+	++	+	+	++	+
<i>Schistura fasciolata</i>	橫紋南鰍	NP	C	+		+			+	+		+			+	+	
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C	+													+
<i>Misgurnus anguillicaudatus</i>	泥鰍	NP				+			+			+			+		
<i>Cyprinus carpio var. viridiviolaceus</i>	錦鯉															+	
2x2m fish number				70	60	15	8	25	10	20	100	10	2	8	10	7	100

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“+” – Species exists in the survey site

“++” – Species common in the survey site

“+++” – Species abundance in the survey site

V – Listed as vulnerable in China Fish Red Data Book

- Reference point was the sampling location outside the works area used to compare with the data within works area.

Table 5-6 Fish species recorded at Upper Tai Po River (T1-  
 Upper stream sampling site and T2 - Lower stream sampling  
 site )

Species		Status	Commonness	Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring		
				Jan-11			Jul-11			Jan-12			Jul-12		
				Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+		+		+	+	++	+			
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+			+		+	+	+	+			
<i>Poecilia reticulata</i>	孔雀花魚將	NP	C			+	+		+	+	+				
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰍	NP	C	++	++		+	+		+			+		
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+	+	+	+		++	+	+	
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C				+		+	+		++			
<i>Parazacco spilurus</i>	異鱗	V and NP	C	+	+		+			+	+		+		
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C	+			+			+	+		+	+	
<i>Schistura fasciolata</i>	橫紋南鰍	NP	C	+	+		+		+	+			+		
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C			+	+		+	+				+	
<i>Misgurnus anguillicaudatus</i>	泥鰍	NP		+			+						+		
<i>Cyprinus carpio var. viridiviolaceus</i>	錦鯉														
2x2m fish number				10	5	20	6	2	4	6	2	5	5	2	2

Note: NP – Not protected in Hong Kong

“VC” – Very Common; “UC” – Uncommon; “C” - Common

“+” – Species exists in the survey site

“++” – Species common in the survey site

“+++” – Species abundance in the survey site

V – Listed as vulnerable in China Fish Red Data Book  
 - Reference point was the sampling location outside the works area used to compare with the data within works area.

Table 5-7 Abiotic data for Upper Tai Po River (T1- Upper stream sampling site and T2- Lower stream sampling site )

Stream	Oct-07 (baseline survey)	Jan-09		Jul-09		Jan-10		Jul-10		Jan-11		Jul-11		Jan-12		Jul-12	
	T1	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
<b>Replicate</b>	T1	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
<b>DO (mg/L)</b>	8.2	9	4	6.3	6	9.4	8.8	9	6.5	10.5	9.8	9	8.2	8.8	8.4	7.6	7.8
<b>pH</b>	6.9	7.18	6.86	7.28	6.96	8.2	8.5	7.3	7.2	6.9	7.1	7.1	7.3	6.8	7.6	6.9	7.8
<b>Nitrate (mg N/L)</b>	0.39	0.1	1.3	0.07	1.32	0.12	0.71	0.1	0.5	0.1	0.5	0.1	0.5	<0.1	0.5	0.29	0.26
<b>Ammonia (mg/L)</b>	PO4-P ( μ g P/L): <100	PO4-P ( μ g P/L): <100		0.01	0.22	<0.01	0.2	0.1	0.2	0.01	0.3	0.01	0.2	<0.01	0.3	<0.01	0.03
<b>Salinity (ppt)</b>	<0.1	<0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.01
<b>Conductivity (mS/cm)</b>	40	40	190	34	118	42	72	49	43	50	60	50	60	65	74	52	54
<b>BOD (mg/L)</b>	<2	<2	12	<2	<2	<2	2	<2	2	2	<2	<2	2	<2	3	<2	<2
<b>Water flow at pool (m/s)</b>	0.01-0.2	0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.2	
<b>Water flow at riffle (m/s)</b>	0.2-0.5	0.2-0.5		0.2-0.5		0.2-0.5		0.2-0.5		0.2-0.5		0.2-0.5		0.2-0.5		0.2-0.5	
<b>Sand (%)</b>	15	15		15	25	15	25	15	25	15	25	15	15	15	15	15	15
<b>Stone (%)</b>	80	80		80	70	80	70	80	70	80	70	80	70	80	70	80	70
<b>Mud (%)</b>	5	5		5	5	5	5	5	5	5	5	5	5	5	5	5	5
<b>Concrete(%)</b>	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10	0	10

## **FIGURE**

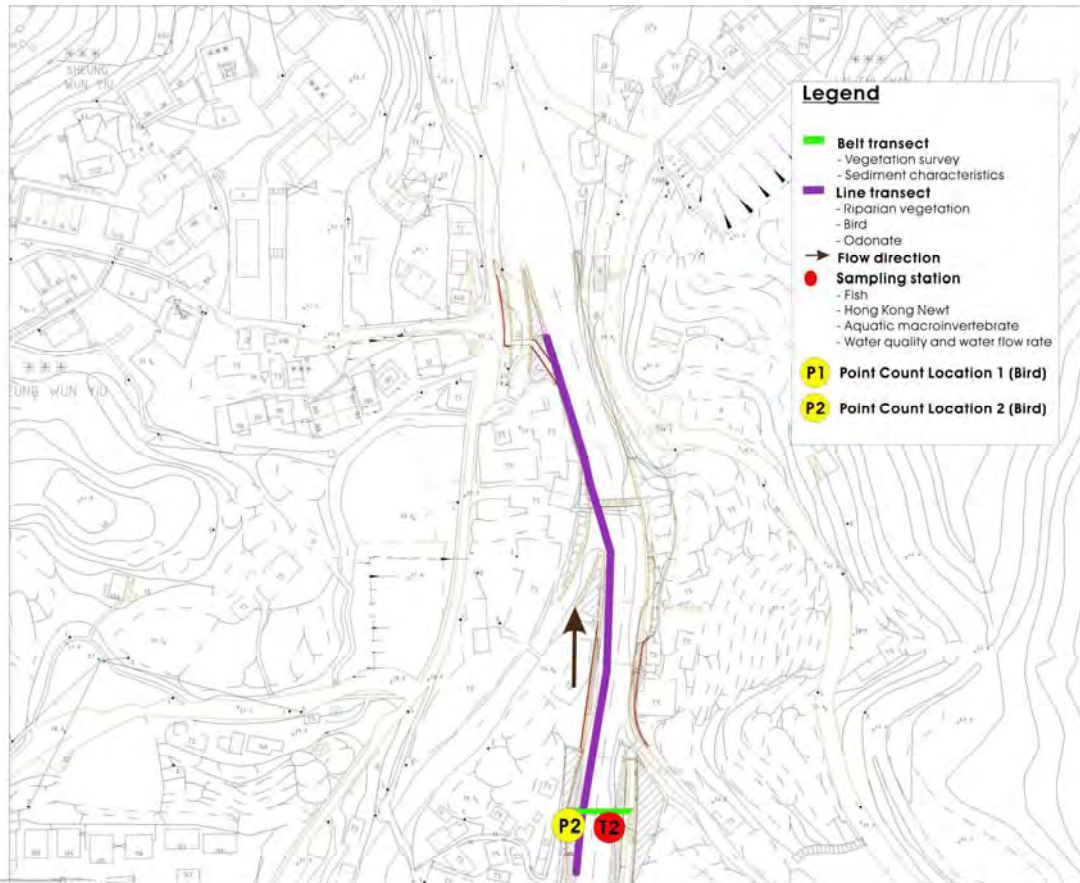


Figure 1-1. Sampling location of impact monitoring at Upper Tai Po River(Lower Section)

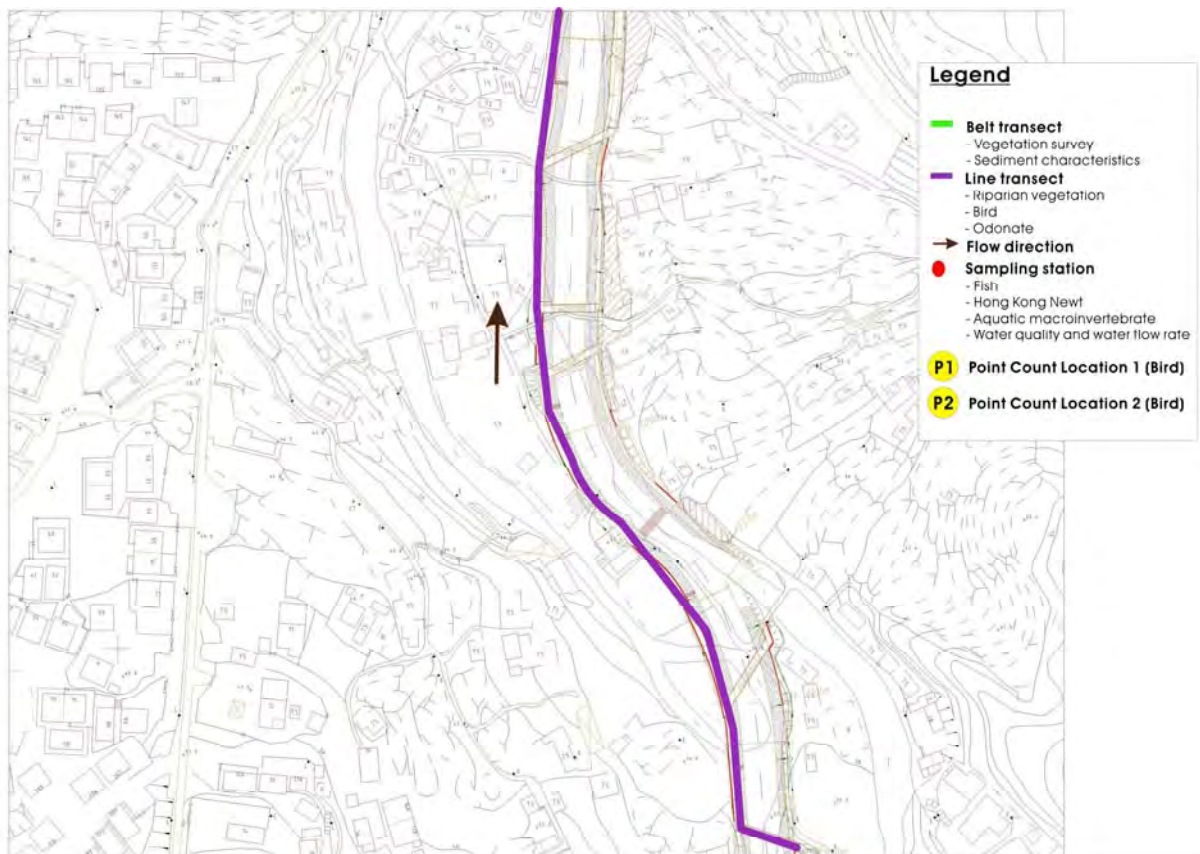


Figure 1-2. Sampling location of impact monitoring at Upper Tai Po River(Middle Section)

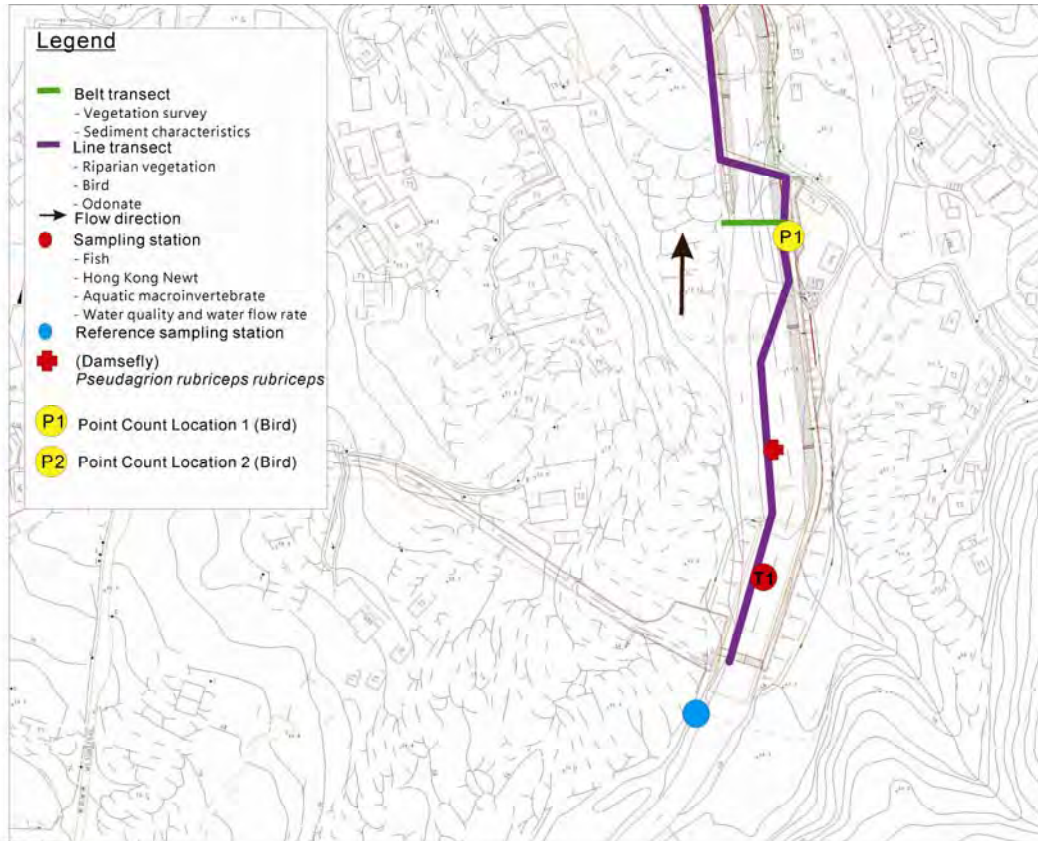


Figure 1-3. Sampling location of Impact monitoring at Upper Tai Po River(Upper Section)

## Appendix I.: Summary of Total Accumulative Complaint Received

Case No.	EPD Complaint Reference	Date Received	Incident Location	Media/Nature
9(E*)	EP/3/N05/RN/24567-08	05/11/2008	UTPR	Muddy Water
10(E*)	EP/3/N05/RN/24849-08	10/11/2008	UTPR	Muddy Water
12(E*)	EP/3/N05/RN/26619-08	28/11/2008	UTPR, Wilson Trial	Muddy Water
15(P#*)	NA	27/11/2008	UTPR Wilson Drive	Dust Generation
21(E*)	ICC#1-174345035	24/3/2009	UTPR near Sha Po Tsai Village	Noise
25(E*)	ICC#1-219109670	06/02/2010	Tai Po River	Noise generation at night
27(E*)	EP3/N05/RN/00004775-10	12/03/2010	Tai Po River	Muddy Water
28(#)	NA	07/04/2010	Tai Po River	Noise generation
30(E*)	NCF-N05/RN/00007763-10	21/04/2010	Tai Po River	Muddy Water
31(E*)	EP3/N05/RN/00009177-10	10/05/2010	Tai Po River	Muddy Water
34(E*)	EP3/N05/RN/00023471 -10	11/11/2010	Tai Po River	Muddy Water
35(E*)	EP3/N05/RN/00023818 -10	16/11/2010	Tai Po River	Muddy Water
36(E*)	EP3/N05/RN/00003752-11	02/03/2011	Tai Po River	Noise Generation
37(E#)	NA	07/03/2011	Tai Po River	Dust Generation
38(E*)	EP3/N05/RN/00004753-11	16/03/2011	Tai Po River	Muddy Water
39(E*)	EP3/N05/RN/00008234-11	03/05/2011	Tai Po River	Noise generation on Public holiday
40(E*)	ECRS No. 3270	06/05/2011	Tai Po River	Dust Generation
42(E*)	EP3/N05/RN/00009991-11	24/5/2011	Tai Po River	Noise Generation
45(E*)	ECRS No. 5769	21/06/2011	Tai Po River	Stagnant Water generation
46(E*)	EP3/N05/RN/00018630-11	09/09/2011	Tai Po River	Dust and Noise generation
47(E*)	EP3/N05/RN/00018630-11	14/09/2011	Tai Po River	Dust generation
49(E*)	EP3/N05/RN/00021938-11	27/10/2011	Tai Po River	Muddy water
50(E*)	EP3/N05/RN/00024845-11	01/12/2011	Tai Po River	Dust emission and earth deposition
52(E*)	EP3/N05/RN/00002212-12	07/02/2012	Tai Po River	Noise and Dust generation
57(E*)	DC0706-CL-120330-1	30/03/2012	Tai Po River	Deposited Mud and Dust

\* : transferred from EPD / DSD

**Appendix II.** The mitigation measure for Upper Tai Po River construction site.

Dust

- Arrange staff to clean access road when construction vehicles pass the road.
- The access at downstream would be cleaned twice per day.
- Wheel washing bays were provided to prevent dust emission.
- Wheels of the construction vehicles are required to be cleaned before leaving the site.
- Watering along the access road is carried out every day.

Muddy Water

- Earth bunds with geotextile were provided to reduce sand and/or mud being washed into the river.
- Sand bags were provided to prevent muddy water from overflowing to the river. Muddy water was treated by effective Wet Seps before being discharged to the river.

Noise

- Work 25mins then take a rest for 10mins.
- Noise barriers were provided.
- Machines shall not be operated at same time and should be pointing away from Noise Sensitive Receiver.
- Construction plants shall be maintained regularly.