



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**

**64TH MONTHLY ENVIRONMENTAL MONITORING AND
AUDIT REPORT FOR UPPER TAI PO RIVER –
DECEMBER 2013**

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

Quality Index

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Ver.	Date	Description
1	6 January 2014	First submission
2	10 January 2014	Site information updated
3	16 January 2014	Amended against RE and IEC's comments on 14 & 15 January 2014
4	21 January 2014	Amended against IEC's comments on 17 January 2014

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EXECUTIVE SUMMARY

ES.01. This is the **sixty-fourth (64th)** 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 **1st to 31st December 2013** (hereinafter “the Reporting Period”).

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 the Reporting Period. The noise monitoring results collected in the Reporting Period are presented in **Section 4**.

ES.04. In the Reporting Period, weekly ecological inspections were carried out on **2nd, 9th, 16th, 23rd and 30th December 2013**. According to inspection findings, no advice and action was recommended by the ecologist.

ES.05. In the Reporting Period, joint weekly environmental site inspections with the Contractor, ET, IEC and ER were carried out on **4th, 11th, 18th, 23rd and 30th December 2013**. During the Reporting Period, **1** observation was identified and recorded by the ET.

ES.06. In addition, the post-construction period for the Project is commenced on 1st January 2014, therefore the construction period for the Project is ended on 31st December 2013.

ES.07. As no piling work conducted, no vibration monitoring was performed in this Reporting Period.

ES.08. Environmental monitoring activities under the EM&A programme in the Reporting Period are summarized in the following table.

Issues	Environmental Monitoring Parameters / Inspection	Occurrences
Construction Noise	L _{Aeq(30min)} Daytime	55
Inspection / Audit	Weekly Environmental inspection by the ET	5
Ecological	Ecological Impact Monitoring	0
	Weekly inspection by the Ecologist	5

BREACH OF ACTION AND LIMIT (A/L) LEVELS

ES.09. 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.10. In the Reporting Period, no environmental complaint was received.

NOTIFICATION OF SUMMONS AND SUCCESSFUL PROSECUTION

ES.11. No summons and prosecution was received in the Reporting Period.

REPORTING CHANGE

ES.12. No reporting change was made in the Reporting Period.

FUTURE KEY ISSUES

- ES.13. The construction activity of the project is ended on 31st December 2013 and the post-construction period is commenced on 1st January 2014. The Contractor was reminded that mitigation measures as stipulated in the EM&A manual should be properly maintained during the post-construction period.

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1.0 INTRODUCTION

PROJECT BACKGROUND

- 1.01 This is the **sixty-fourth (64th)** 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 15th September 2008 and substantially completed on 31 December 2012. The improvement works comprise of 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 12th 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.
- 1.04 This report presents the results of the environmental monitoring conducted at Upper Tai Po River in **December 2013**. It includes weekly site inspections to verify the implementation of the mitigation measures as recommended in 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:
- | | |
|-------------------|--|
| Section 1 | Introduction |
| Section 2 | Construction Progress and Submission |
| Section 3 | EM&A Program Requirement for Upper Tai Po River |
| Section 4 | Noise Monitoring Results |
| Section 5 | Vibration Monitoring Results |
| Section 6 | Ecology Monitoring Results |
| Section 7 | Site Inspections |
| Section 8 | Waste Management |
| Section 9 | Environmental Complaint and Non-Compliance |
| Section 10 | Implementation Status of Mitigation Measures |
| Section 11 | Impact Forecast |
| Section 12 | Conclusions and Recommendations |

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 majority of construction activities undertaken at Upper Tai Po River had been completed. The remaining works carried out in the Reporting Period are listed below:-

- Construction of access road
- Construction of surface drains
- Installation of utilities

2.03 The master and outstanding works construction programmes 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	WT00015956-2013	4 June 2013	31 Mar 2018	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"> A-weighted equivalent continuous sound pressure level (30min) (hereinafter ‘L_{Aeq(30min)}’ during the normal working hours; and A-weighted equivalent continuous sound pressure level (15min) (hereinafter ‘L_{Aeq(15min)}’ for construction work during the restricted hours.
*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 *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 is 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 meters as listed in **Table 3-3** comply with *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 $L_{eq(5min)}$ measurements is used as the monitoring parameter for the time period between 0700-1900 hours on weekdays. $L_{eq(15min)}$ in three consecutive $L_{eq(5min)}$ 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 generates a known sound pressure level at a known frequency. The checking is performed before and after 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. The targeted monitoring buildings are Fan Sin Temple (VM2) and Wun Yiu Kiln Site of Sheung Wun Yiu (VM1), they are located within 300m of the proposed work areas. The vibration

monitoring measures would record the vibration levels in the vicinity at entrance ground level and external wall of Temple buildings.

- 3.14 Vibration samples will be taken using a SVAN 949 analyzer. This analyzer is equipped with a connecting cable MIL-C-17/28 RG 058 and a DYTRAN 3185D accelerometer. The frequency range will be set to 200 Hz and the number of sampling points will be set to 1024, resulting in a frequency resolution of around 0.2 Hz. Hanning window functions will be selected and maximum hold functions shall be applied over the event to pick up the peak-to-peak amplitude.
- 3.15 Measurements will be recorded by attaching the accelerometer to the structural foundation, such as structural steel beam(s) of the building. The accelerometer will be orientated, either x-, y- or z-directional in order to pick to the maximum amplitude. If measurements have to be taken on a floor or a hard surface next to a structure, the accelerometer shall be attached firmly on the surface (or to a triangular metal bracket glued to a spiked plate).
- 3.16 The monitoring would be taken at the closest accessible point to the historic building to enable assessment of the potential risk arising from the vibration associated with the prospective work activities.
- 3.17 Vibration monitoring works will be conducted upon commencement of piling/ drilling process. Monitoring will be carried out weekly in the first month and bi-weekly in the subsequent months of piling/ drilling process during the construction period if no exceedance of limit were recorded. No disturbance will be made to the fabrics of Fan Sin Temple during the vibration monitoring process.

DETERMINATION OF ACTION/LIMIT (A/L) LEVELS

- 3.18 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

- 3.19 Guidance regarding vibration limits is provided by the following British Standards “BS 7385 - Measurement and evaluation of vibration in buildings. Part 2: Guide to damage levels from ground borne vibration” (or their equivalent ISO standards). **Table 3-5** is shown the transient vibration guide values for cosmetic building damage

Table 3-5 Transient Vibration Guide Values for Cosmetic Building Damage (BS7385:Part 2 1993)

Type of Building		Peak component particle velocity (mm/s) in frequency range of predominant pulse
1	Reinforced or framed structures	50 at 4 Hz and above
2	Un-reinforced or light framed structures	15 at 4 Hz, increasing to 20 at 15 Hz, increasing to 50 at 40 Hz and above.

BS 7385 suggests vibration levels, above which damage is unlikely to occur in 95% of buildings. For cosmetic damage, the level is 15 mm/s at 4 Hz, increasing to 20 mm/s at 15 Hz, increasing to 50 mm/s at 40

Hz and above. Minor structural damage is possible at vibration levels twice those given above, major damage at four times the levels given.

EQUIPMENT CALIBRATION

- 3.20 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 noise monitoring equipment used for the impact monitoring program in the Reporting Period are attached in *Appendix D*.

METEOROLOGICAL INFORMATION

- 3.21 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 are 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 st L _{eq5min}	2 nd L _{eq5min}	3 rd L _{eq5min}	4 th L _{eq5min}	5 th L _{eq5min}	6 th L _{eq5min}	L _{Aeq} 30min	Sound Level Meter ID
6-Dec-13	10:22	67.3	63.8	66.6	63.1	68.1	63.2	66	EQ006
12-Dec-13	15:13	60.1	63.2	65.3	60.8	62.0	68.9	65	EQ065
18-Dec-13	11:43	62.5	58.5	64.7	60.6	61.5	63.1	62	EQ065
24-Dec-13	13:00	61.3	61.4	60.8	62.7	60.4	61.2	61	EQ065
30-Dec-13	15:11	56.8	59.1	56.6	57.2	57.6	55.5	57	EQ006
Limit Level in dB(A)								75	

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 st L _{eq5min}	2 nd L _{eq5min}	3 rd L _{eq5min}	4 th L _{eq5min}	5 th L _{eq5min}	6 th L _{eq5min}	L _{Aeq} 30min	Sound Level Meter ID
6-Dec-13	09:46	61.7	63.0	65.4	63.9	58.0	58.6	63	EQ006
12-Dec-13	13:56	61.4	61.5	61.3	61.2	61.8	61.8	62	EQ067
18-Dec-13	11:45	60.2	58.6	57.6	60.9	59.3	61.7	60	EQ013
24-Dec-13	11:19	58.7	53.8	54.6	56.7	58.1	57.1	57	EQ065
30-Dec-13	15:40	60.4	56.2	52.9	55.3	49.7	57.6	57	EQ008
Limit Level in dB(A)								75	

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 st L _{eq5min}	2 nd L _{eq5min}	3 rd L _{eq5min}	4 th L _{eq5min}	5 th L _{eq5min}	6 th L _{eq5min}	L _{Aeq} 30min	Sound Level Meter ID
6-Dec-13	16:42	64.4	64.6	64.7	64.1	66.7	65.2	65	EQ006
12-Dec-13	13:55	58.0	55.7	54.9	53.8	55.2	55.6	56	EQ065
18-Dec-13	11:06	68.4	62.8	62.4	62.5	62.4	63.9	64	EQ065
24-Dec-13	14:37	60.2	60.5	60.6	60.6	60.5	60.2	60	EQ065
30-Dec-13	14:36	64.8	64.8	65	65.1	65.3	65.6	65	EQ006
Limit Level in dB(A)								75	

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 st L _{eq5min}	2 nd L _{eq5min}	3 rd L _{eq5min}	4 th L _{eq5min}	5 th L _{eq5min}	6 th L _{eq5min}	L _{Aeq} 30min	Sound Level Meter ID
6-Dec-13	16:08	53.1	51.8	52.7	54.6	56.0	55.6	54	EQ006
12-Dec-13	15:14	67.9	69.0	68.1	68.1	68.7	68.1	68	EQ006
18-Dec-13	11:06	54.8	61.1	62.5	57.2	60.3	64.1	61	EQ013
24-Dec-13	16:13	60.5	55.6	50.7	51.0	59.4	65.6	60	EQ065
30-Dec-13	14:04	51.7	46.9	47.8	47.2	46.8	47.4	48	EQ006
Limit Level in dB(A)								75	

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 st L _{eq5min}	2 nd L _{eq5min}	3 rd L _{eq5min}	4 th L _{eq5min}	5 th L _{eq5min}	6 th L _{eq5min}	L _{Aeq} 30min	Sound Level Meter ID
6-Dec-13	15:32	52.8	51.5	52.0	60	56.8	55.8	56	EQ006
12-Dec-13	13:57	56.1	56.7	56.1	55	56.2	58.6	57	EQ008
18-Dec-13	11:05	59.6	68.4	68.4	64.7	70.6	75.7	70	EQ008
24-Dec-13	16:44	63.9	62.8	64.6	64.3	64.8	62	64	EQ065
30-Dec-13	13:33	45.8	50.3	52.1	47.2	44.2	44.7	48	EQ006
Limit Level in dB(A)								75	

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 st L _{eq5min}	2 nd L _{eq5min}	3 rd L _{eq5min}	4 th L _{eq5min}	5 th L _{eq5min}	6 th L _{eq5min}	L _{Aeq} 30min	Sound Level Meter ID
6-Dec-13	14:59	51.8	51.8	54.4	51.9	53.2	52.7	53	EQ006
12-Dec-13	14:00	48.5	54.7	47.2	45.2	45.0	46.6	49	EQ011
18-Dec-13	10:33	64.7	59.8	59.2	63.1	58.9	63.1	62	EQ008
24-Dec-13	13:34	68.5	71.4	72.2	54.8	62.0	60.2	68	EQ065
30-Dec-13	13:02	46.8	46.8	51.9	50.5	53.6	45.8	50	EQ008
Limit Level in dB(A)								75	

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 st L _{eq5min}	2 nd L _{eq5min}	3 rd L _{eq5min}	4 th L _{eq5min}	5 th L _{eq5min}	6 th L _{eq5min}	L _{Aeq} 30min	Sound Level Meter ID
6-Dec-13	14:28	59.9	60.1	54.2	63.7	5.7	50.2	59	EQ006
12-Dec-13	15:01	57.2	50.0	48.0	51.7	50.2	49.0	52	EQ011
18-Dec-13	10:30	52.6	53.6	53.9	53.2	53.7	56.0	54	EQ065
24-Dec-13	14:05	61.5	52.8	62.0	61.7	63.5	63.2	62	EQ065
30-Dec-13	11:41	49.0	48.8	48.9	48.6	49.6	50.7	49	EQ008
Limit Level in dB(A)								75	

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 st L _{eq5min}	2 nd L _{eq5min}	3 rd L _{eq5min}	4 th L _{eq5min}	5 th L _{eq5min}	6 th L _{eq5min}	L _{Aeq} 30min	Sound Level Meter ID
6-Dec-13	13:19	54.5	54.0	52.2	54.1	60.9	55.3	56	EQ006
12-Dec-13	14:34	51.0	53.3	50.3	48.8	48.8	50.9	51	EQ008
18-Dec-13	10:25	59.3	63.9	53.6	54.6	55.7	55.1	59	EQ013
24-Dec-13	15:12	52.0	51.9	58.3	51.3	51.1	52.1	54	EQ065
30-Dec-13	10:01	50.2	49.0	49.5	51.0	52.2	49.5	50	EQ006
Limit Level in dB(A)								75	

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 st L _{eq5min}	2 nd L _{eq5min}	3 rd L _{eq5min}	4 th L _{eq5min}	5 th L _{eq5min}	6 th L _{eq5min}	L _{Aeq} 30min	Sound Level Meter ID
6-Dec-13	13:56	63.9	58.4	51.4	58.7	60.1	56.6	60	EQ006
12-Dec-13	14:33	57.7	57.5	56.0	51.2	54.6	50.1	55	EQ065
18-Dec-13	09:52	55.2	56.5	58.3	55.0	54.4	57.8	56	EQ013
24-Dec-13	15:42	50.7	49.7	50.6	51.7	51.1	52.0	51	EQ065
30-Dec-13	09:26	50.6	49.5	48.2	51.7	53.6	51.8	51	EQ006
Limit Level in dB(A)								75	

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

acoustical principles and EPD guidelines.

Table 4-10 Construction Noise Monitoring Results at UTP10

Date	Start Time	1 st L _{eq5min}	2 nd L _{eq5min}	3 rd L _{eq5min}	4 th L _{eq5min}	5 th L _{eq5min}	6 th L _{eq5min}	L _{Aeq} 30min	Sound Level Meter ID
6-Dec-13	10:58	50.1	49.6	50.0	48.3	47.6	48.7	49	EQ006
12-Dec-13	14:57	57.2	54.7	56.4	56.2	55.6	54.8	56	EQ067
18-Dec-13	09:48	54.3	64.9	51.8	53.1	60.2	56.2	59	EQ008
24-Dec-13	10:32	58.7	46.9	44.2	42.8	44.9	47.8	52	EQ065
30-Dec-13	10:37	43.5	44.9	45.7	49.8	43.2	54.6	49	EQ006
Limit Level in dB(A)								75	

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 st L _{eq5min}	2 nd L _{eq5min}	3 rd L _{eq5min}	4 th L _{eq5min}	5 th L _{eq5min}	6 th L _{eq5min}	L _{eq30min}	Corrected L _{Aeq} 30min	Sound Level Meter ID
6-Dec-13	11:31	52.9	47.7	48.0	48.5	46.5	58.0	52	55	EQ006
12-Dec-13	15:29	62.0	61.5	63.0	60.6	56.4	56.6	61	64	EQ067
18-Dec-13	09:47	50.4	49.5	62.7	48.6	47.3	47.7	56	59	EQ065
24-Dec-13	09:59	47.0	44.1	42.5	44.3	56.1	43.9	50	53	EQ065
30-Dec-13	11:10	55.0	51.1	48.7	48.2	48.0	45.8	51	54	EQ006
Limit Level in dB(A)								75		

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. The major construction activities under the Project which generate notable construction noise were largely completed and noise sources during the course of noise monitoring are mostly external noise such as road traffic and animals barking. The observed noise sources during the course of noise monitoring are summarized in in **Appendix J**.
- 4.05 Although all noise measurement results are 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 the 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 In the Reporting Period, weekly ecological inspections were carried out on 2nd, 9th, 16th, 23rd and 30th December 2013. 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
2 nd December 2013	No Major findings in this inspection	No Advice is required	No Action is required to be taken	N/A
9 th December 2013	No Major findings in this inspection	No Advice is required	No Action is required to be taken	N/A
16 th December 2013	No Major findings in this inspection	No Advice is required	No Action is required to be taken	N/A
23 rd December 2013	No Major findings in this inspection	No Advice is required	No Action is required to be taken	N/A
30 th December 2013	No Major findings in this inspection	No Advice is required	No Action is required to be taken	N/A

6.02 Furthermore, a bi-annual ecological impact monitoring for wet season has been carried out on 25th July 2013 and the report is being prepared by the ecologist and also submitted in August 2013.

7.0 **SITE INSPECTION**

REGULAR SITE INSPECTION AND AUDITING

- 7.01 In the Reporting Period, joint weekly environmental site inspections with the Contractor, ET, IEC and ER were carried out on **4th, 11th, 18th, 23rd and 30th December 2013**. In the Reporting Period, **1** observation was recorded were identified by the ET.
- 7.02 Observations for the site inspection and monthly audit within the Reporting Period are summarized in **Table 7-1**.

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

Date	Findings / Deficiencies	Follow-Up Status
4 th December 2013	No environmental issue was observed during the inspection	N.A.
11 th December 2013	No environmental issue was observed during the inspection	N.A.
18 th December 2013	No environmental issue was observed during the inspection	N.A.
23 rd December 2013	<ul style="list-style-type: none"> Construction materials placed nearly tree protection area was observed in the works area of Upper Tai Po River, the Contractor was reminded to remove the construction materials from the tree protection area. 	To be follow on January 2014.
30 th December 2013	No environmental issue was observed during the inspection	N.A.

- 7.03 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 works 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 I*. 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 ³)	0
Reused in the Contract (Inert) (in '000m ³)	0
Reused in other Projects (Inert) (in '000m ³)	0
Disposal as Public Fill (Inert) (in '000m ³)	0

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

Type of Waste	Quantity	Disposal Method
Metal (in '000kg)	0	--
Paper / Cardboard Packing (in '000kg)	0	--
Plastic (in '000kg)	0	--
Chemical Wastes (in '000kg)	0	--
General Refuses (in '000m ³)	0	--

8.04 According to the waste flow table provided and confirmed by the Contractor, the quantity of wastes for inert C&D materials and C&D wastes on December 2013 are zero.

8.05 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.

9.02 The statistical summary of environmental complaint, summons and prosecution, is presented in *Tables 9-1, 9-2 and 9-3*.

Table 9-1 Statistical Summary of Environmental Complaint

Complaint Nature	Environmental Complaint Statistics		
	Cumulative (Sep 2008 – Nov 2013)	Frequency (December 2013)	Total
Air/Dust	8	0	8
Noise	5	0	5
Water	12	0	12
Housekeeping Hygiene	1	0	1
Chemical Waste	0	0	0
Overall	26	0	26

Table 9-2 Statistical Summary of Environmental Summons

Complaint Nature	Environmental Summons Statistics		
	Cumulative (Sep 2008 – Nov 2013)	Frequency (December 2013)	Total
Air/Dust	0	0	0
Noise	0	0	0
Water	0	0	0
Housekeeping Hygiene	0	0	0
Chemical Waste	0	0	0
Overall	0	0	0

Table 9-3 Statistical Summary of Environmental Prosecution

Complaint Nature	Environmental Prosecution Statistics		
	Cumulative (Sep 2008 – Nov 2013)	Frequency (December 2013)	Total
Air/Dust	0	0	0
Noise	0	0	0
Water	0	0	0
Housekeeping Hygiene	0	0	0
Chemical Waste	0	0	0
Overall	0	0	0

10.0 IMPLEMENTATION STATUS OF MITIGATION MEASURES

10.01 The environmental mitigation measures recommended in EM&A Manual covering 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) Materials stockpiled on site 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 Powered Mechanical Equipments (PMEs) 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 Air Sensitive Receivers (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 site area of Tai Po River 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 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 oil, lubricants, grease, silt, grit and debris from the wastewater before discharging 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 Professional Persons Environmental Consultative Committee (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 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 works do not exceed the threshold limit otherwise contractor have to review the work method and construction activities have to be slowed 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 works area at 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 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"> • Earth bund was constructed in the existing river to isolate the active work areas and stream water.
Air Quality	<ul style="list-style-type: none"> • Increase watering frequency to reduce dust emissions from all exposed site surface, particularly during dry weather; • Frequent watering for particularly dusty construction areas and areas close to air sensitive receivers; • Cover all excavated or stockpiled dusty materials by impervious sheeting or sprayed with water to maintain the entire surface wet; • Public roads around the site entrance/exit regularly kept clean and free from dust; and • Tarpaulin covering of any dusty materials on a vehicle leaving the site.
Noise	<ul style="list-style-type: none"> • Reduce construction machines as used within the site; • Use of quiet plant and working methods; • Scheduling of construction works nearly the NSR; and • Alternative use of plant items within one worksite, where practicable.
Waste and Chemical Management	<ul style="list-style-type: none"> • Excavated materials such as soils and cobbles were reused as far as possible to minimize off-site disposal. Scrap metals or abandoned equipment should be recycled if possible; • Waste arising kept to a minimum and be handled, transported and disposed of in a suitable manner, if any; and • Chemical waste handling was in accordance with the Code of Practice on the Packaging, Handling and Storage of Chemical Wastes.
General	<ul style="list-style-type: none"> • Tidy and clean general kept the site.

11.0 CONCLUSIONS AND RECOMMENDATION

CONCLUSIONS

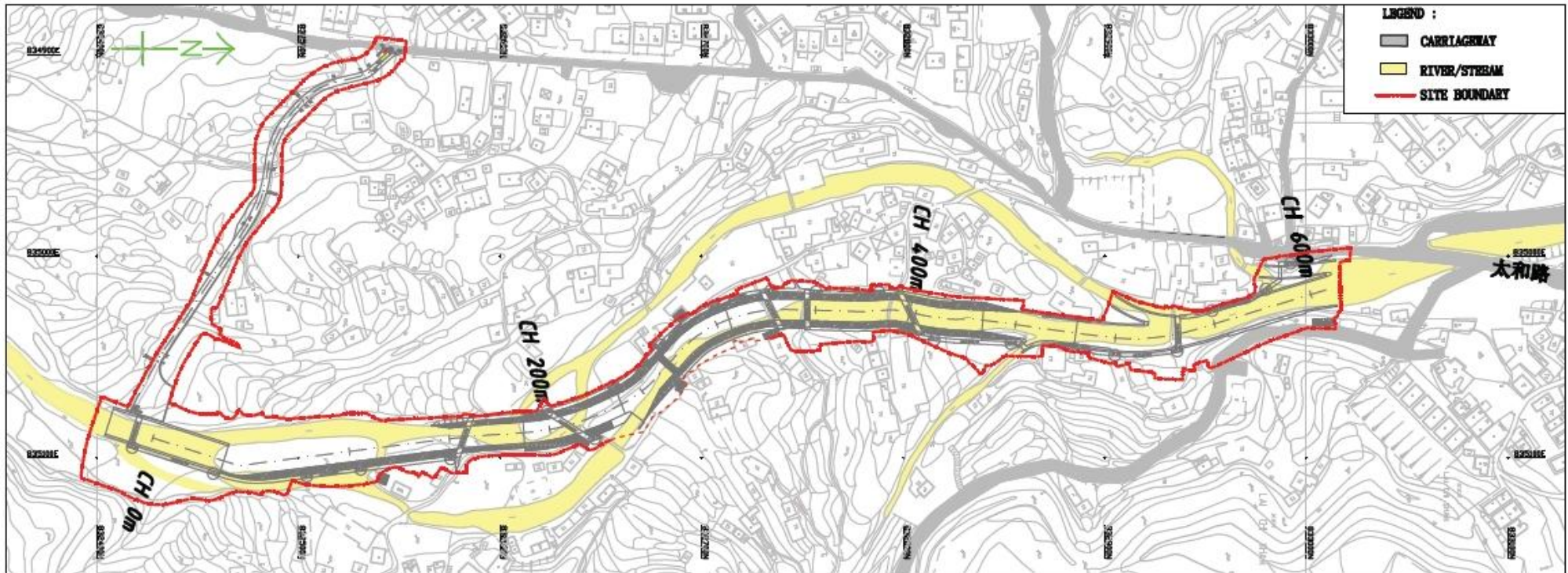
- 11.01 This is the **sixty-fourth (64th)** monthly EM&A report for the Project presenting the monitoring results and inspection findings for the reporting month from **1st to 31st December 2013**.
- 11.02 No noise complaint (which is an Action Level exceedance) was received in the Reporting Period. In the Reporting Period, a total **55** occurrences of construction noise monitoring was undertaken and all measurement results were below 75dB(A). No Notice of Exceedance (NOE) was therefore issued to notify EPD, IEC, the Contractor and ER.
- 11.03 As no piling work was conducted, no vibration monitoring was performed in the Reporting Period.
- 11.04 Weekly ecological site inspections were performed on **2nd, 9th, 16th, 23rd and 30th December 2013**. According to inspection findings, no advice and action was recommended by the ecologist.
- 11.05 In the Reporting Period, joint weekly environmental site inspections with the Contractor, ET, IEC and ER were carried out on **4th, 11th, 18th, 23rd and 30th December 2013**. In the Reporting Period, **1** observation was identified and recorded by the ET.
- 11.06 No environmental complaint, summon and prosecution was received in the Reporting Period.
- 11.07 In addition, the post-construction period for the Project is commenced on 1st January 2014, therefore the construction period for the Project is ended on 31st December 2013.

RECOMMENDATIONS

- 11.08 The construction activity of the project is ended on 31st December 2013 and the post-construction period is commenced on 1st January 2014. The Contractor was reminded that mitigation measures as stipulated in the EM&A manual should be properly maintained during the post-construction period.

Appendix A

Site Layout Plan of the Upper Tai Po River



Upper Tai Po River

Appendix B

Construction Programme

Contract No. DC/2007/06

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

Major Outstanding Works at Upper Tai Po River

Item	Description	Major Outstanding Works within River Channel of UTPR	Target Completion	% Completion	Actual Completion
1	Maintenance Access D	construction of Access Road D.	2013/7/31	30	-
2	Boulder trap	construction of dry weather flow channel & stop log.	DWF: 2013/4/30 Stoplog : 2013/5/31	DWF: 90 Stoplog : 0	(Granular infill outstanding)
3	Additional Boulder trap	construction of dry weather flow channel	DWF : 2013/4/30	100	2013/5/27
		and parition walls.	Wall : 2013/6/15	Wall : 100	2013/4/30
4	Ø 525 Inlet catch pit	construction of catchpit with stop log.	2013/4/30	100	2013/4/16
5	TB02 to TB03	construction of dwarf wall & footpath.	2013/6/15	Dwarf wall - 100 Footpath - 100	2013/6/7 2013/7/6
6	Ø 525 outlet	construction of outlet pipes and outlet structure	2013/5/15	100	2013/5/4
7	Ch.216~242	construction of footpath.	2013/4/30	100	2013/4/18
8	Ch.534~588	construction of footpath.	2013/4/30	100	2013/5/4
9	Retaining wall TR5	Greening works.	2013/5/31	100	2013/6/20
10	Previous weir	trimming down to match the I.L. of upstream base slab	2013/4/20	100	2013/4/12
11	Catch pit CT24	construction of 300mm U-channel	2013/5/30	100	2013/6/27
		Catchpit & Ø 450 outpipe		100	2013/4/25
12	All	Planting of shrubs		100	2013/3/28



Delay items

Updated on 2-8-2013

Contract No. DC/2007/06

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

Major Outstanding works list (Upper Tai Po River)

Item	Chainage	LHS/RHS	Description	Major outstanding works outside river channel	Target Completion	% completed	Actual Completion
1	Ch.100-327		Access D	Construction of Access Road D	31/7/2013	30	
2	Ch.155-197	LHS	footpath	Construction of footpath.	15/6/2013	100	6/7/2013
3	Ch.534-Ch.588	LHS	footpath		4/5/2013	100	4/5/2013
4	Ch.587	LHS	Catchpit CT31	Construction of catch pit	30/5/2013	0	Road Gully
5	Ch.592	LHS	Catchpit CT32		30/5/2013	0	Road Gully
6	Ch.605	RHS	Catchpit CT24		30/5/2013	100	25/4/2013
7	Ch.580-587	LHS	225mm U-channel	Construction of U-channel	30/5/2013	0	Delete
8	Ch.592-603	LHS	225mm U-channel		30/5/2013	0	Delete
9	Ch.597-605	RHS	300mm U-channel		30/5/2013	100	27/6/2013
10	Ch.157-249	LHS	Type II railing	Construction of Type II railing	30/6/2013	0	
11	Ch.314-345	LHS	Type II railing		30/6/2013	100	2/5/2013
12	Ch.393-446	LHS	Type II railing		30/6/2013	0	
13	Ch.448-603	LHS	Type II railing		30/6/2013	50	
14	Ch.37-145	RHS	Type II railing		30/6/2013	0	
15	Ch.151-215	RHS	Type II railing		30/6/2013	0	
16	Ch.509-543	RHS	Type II railing	30/6/2013	80		
17	Ch.-8-145	RHS	Chain link fence	Construction of Chain link fence	30/6/2013	60	
18	Ch.152	LHS & RHS	Footbrdge TB02	1. Construction of Public Lighting 2. Construction of PCCW cable ducts 3. Construction of Watermain	30/6/2013	85	
19	Ch.207	LHS & RHS	Footbrdge TB03		15/6/2013	85	
20	Ch.327	LHS & RHS	Footbrdge TB04		15/6/2013	85	
21	Ch.343	LHS & RHS	Footbrdge TB05		15/6/2013	85	
22	Ch.395	LHS & RHS	Footbrdge TB06		15/6/2013	85	
23	Ch.530	LHS & RHS	Footbrdge TB07		30/5/2013	85	
24	All		Landscaping	Planting of trees	30/6/2013	50	
25	All		Landscaping	Planting of shrubs	30/6/2013	100	20/3/2013

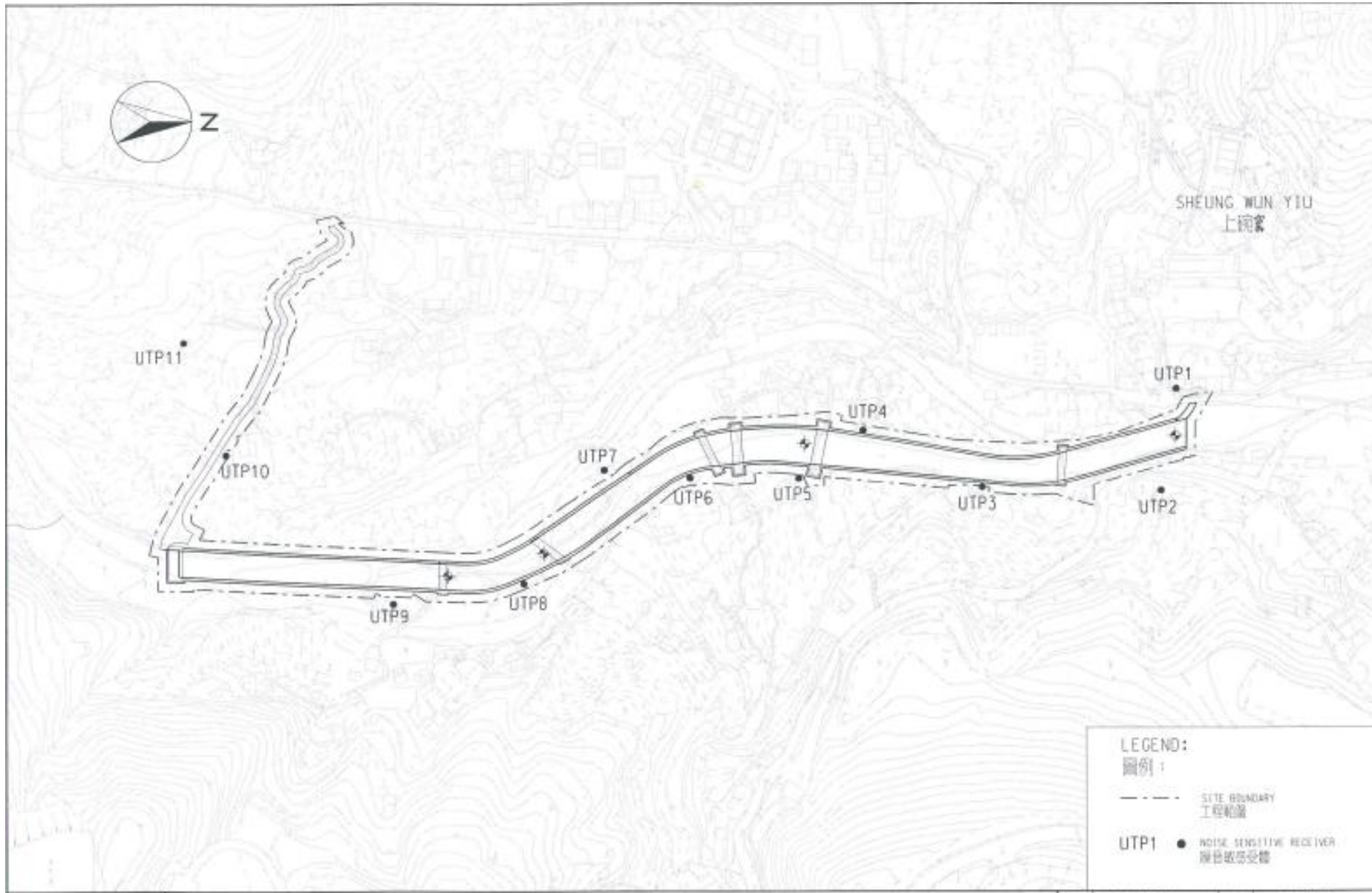
 Delay items

Updated on 2/8/2013

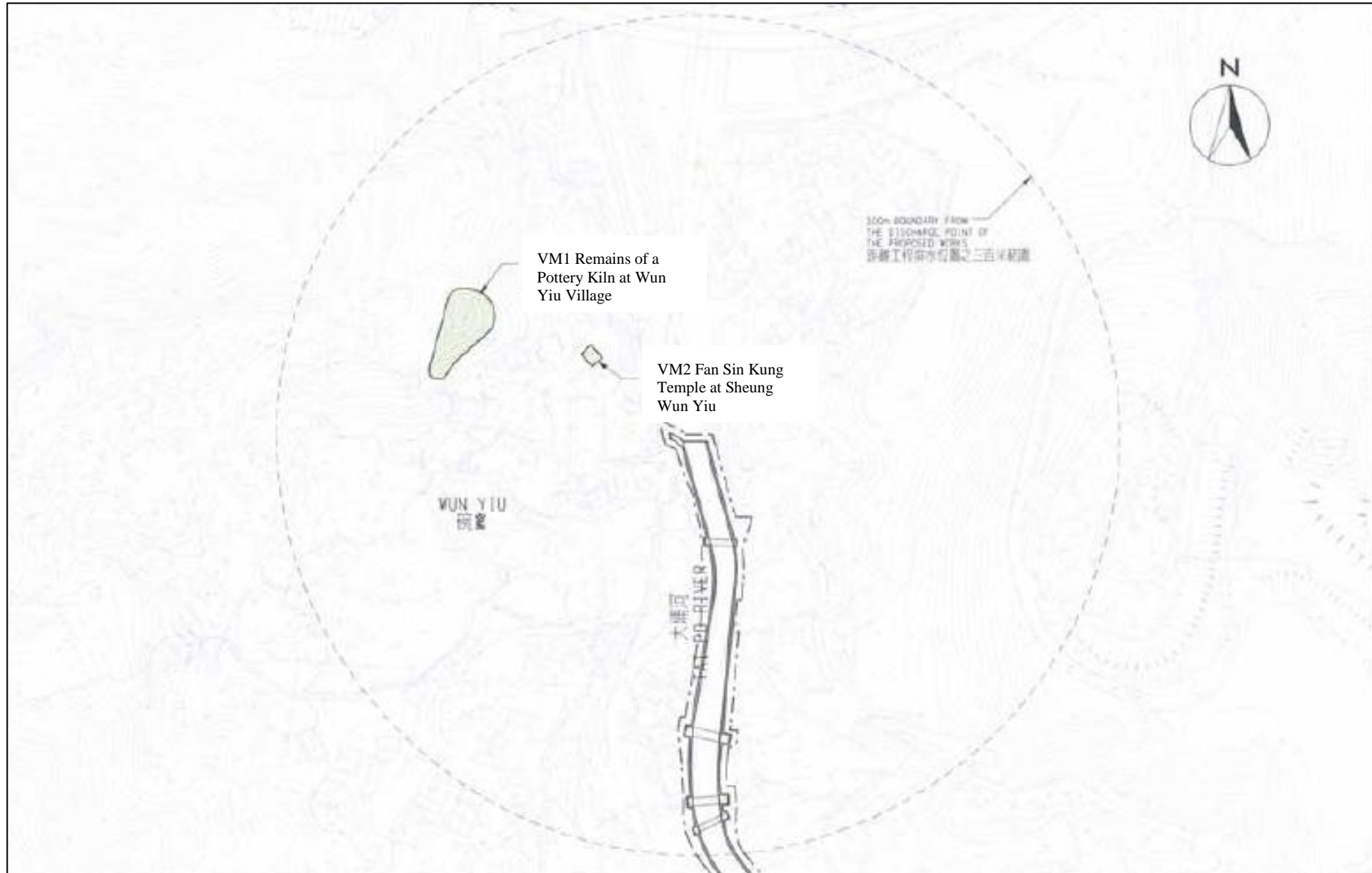
Appendix C

Environmental Monitoring Locations

Construction Noise and Vibration



Construction Noise Monitoring Location



Vibration Monitoring Location

Appendix D

Calibration certificates of the monitoring equipment

Equipment Calibration List

Items	Aspect	Description of Equipment	Date of Calibration	Date of Next Calibration
1	Noise	Bruel & Kjaer Integrating Sound Level Meter (Serial No. 2285762) AUES Equipment ID: EQ006	27 April 2013	27 April 2014
2		Bruel & Kjaer Integrating Sound Level Meter (Serial No. 2285690) AUES Equipment ID: EQ008	07 Jan 2013	07 Jan 2014
3		Rion NL-14 Sound Level Meter (Serial No. 00921191) AUES Equipment ID: EQ013	23 Mar 2013	23 Mar 2014
4		Bruel & Kjaer Integrating Sound Level Meter (Serial No. 2337676) AUES Equipment ID: EQ065	18 May 2013	18 May 2014
5		Sound Level Meter (Serial No. 01121362) AUES Equipment ID: EQ011	23 Mar 2013	23 Mar 2014
6		Sound Level Meter (Serial No. 00410221) AUES Equipment ID: EQ067	09 Mar 2013	09 Mar 2014
7				



Certificate of Calibration 校正證書

Certificate No. : C132568
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-0878)

Description / 儀器名稱 : Integrating Sound Level Meter (EQ006)
Manufacturer / 製造商 : Brüel & Kjær
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 : $(23 \pm 2)^\circ\text{C}$ Relative Humidity / 相對濕度 : $(55 \pm 20)\%$
Line Voltage / 電壓 : ---

TEST SPECIFICATIONS / 測試規範

Calibration check

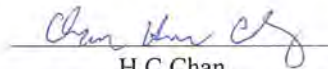
DATE OF TEST / 測試日期 : 27 April 2013

TEST RESULTS / 測試結果

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

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

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

Tested By : 
測試 H C Chan

Certified By : 
核證 K C Lee

Date of Issue : 30 April 2013
簽發日期

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

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

Certificate of Calibration

校正證書

Certificate No. : C132568
證書編號

1. 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.
2. Self-calibration using laboratory acoustic calibrator was performed before the test from 6.1.1.2 to 6.4.
3. The results presented are the mean of 3 measurements at each calibration point.
4. Test equipment :

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

5. Test procedure : MA101N.

6. Results :

- 6.1 Sound Pressure Level

- 6.1.1 Reference Sound Pressure Level

- 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 _{AFF}	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 _{AFF}	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 _{AFF}	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.

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.

本證書所載按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。

Certificate of Calibration

校正證書

Certificate No. : C132568
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 _{AFP}	A	F	94.00	1	94.0	Ref.
	L _{ASP}		S			94.0	± 0.1
	L _{AIP}		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 _{AFP}	A	F	106.0	Continuous	106.0	Ref.
	L _{AFMax}				200 ms	104.9	-1.0 ± 1.0
	L _{ASP}	S	Continuous		106.0	Ref.	
	L _{ASMax}		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 _{AFP}	A	F	94.00	31.5 Hz	55.1	-39.4 ± 1.5
					63 Hz	67.9	-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	89.8	-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.

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. : C132568
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 _{CFP}	C	F	94.00	31.5 Hz	91.4	-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)

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 _{Aeq}	A	10 sec.	4	1	1/10	110.0	100	100.0	± 0.5
								90	89.8	± 0.5
								80	79.4	± 1.0
								70	69.2	± 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.

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

Brüel & Kjær Sound & Vibration Measurement A/S

Skodsborgvej 307 • DK-2850 Nærum • Denmark • Tel.: +45 7741 2000 • Fax: +45 4580 1405
info@bksv.com • www.bksv.com

Certificate of Conformance

Ford Business Limited
Room A, 20/F, Golden King Bldg
No. 35-41 Tai Lin Pai Road, Kwai Chung
Hong Kong,
China

Customer Reference:

Service Request:
1-321863196

Date:
07-Jan-13

We hereby declare that
-2238— Integrating Sound Level Meter Serial Number: 2285690 (EQ008)
has been tested and passed all test.

The instrument has been tested according to published specifications at the date of the test.
All tests have been performed using calibrated equipment, traceable to National or International Standards
or by ratio measurements.

Certificate issued
07-Jan-13



Torben Bjørn

Vice President - Operations
For and on behalf of Brüel & Kjær HQ

Recommended date for next check: **Jan-2014**

Brüel & Kjær is certified under ISO 9001:2008, assuring that all calibration data is retained on file and is available for inspection upon request.

Note:

Although this certificate states that your instrument complied with all specifications at the time of the test, this is not a calibration certificate.

CVR nr. 23 95 84 14 • VAT. nr. DK 11948456
Danske Bank: Account no. 3100-3015081260, SWIFT DABADKKK
IBANS: (DKK) DK 75 3000 3015081260 • (EUR) DK 25 3000 3001963589
(USD) DK 26 3000 4451045504

Brüel & Kjær 



Certificate of Calibration

校正證書

Certificate No. : C131788
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-0723)

Description / 儀器名稱 : Sound Level Meter (EQ013)
Manufacturer / 製造商 : Rion
Model No. / 型號 : NL-52
Serial No. / 編號 : 00921191
Supplied By / 委託者 : Action-United Environmental Services and Consultants
Unit 1707, 17/F., Clifford Centre,
778-784 Cheung Sha Wan Road, Kowloon

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 : 23 March 2013

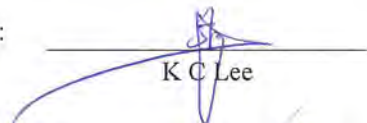
TEST RESULTS / 測試結果

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

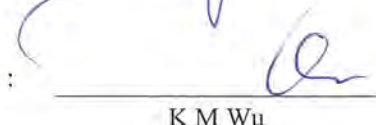
The test equipment used for calibration are traceable to National Standards via :

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

Tested By
測試


K C Lee

Certified By
核證


K M Wu

Date of Issue : 25 March 2013
簽發日期

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

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

Certificate of Calibration

校正證書

Certificate No. : C131788
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	C130019
CL281	Multifunction Acoustic Calibrator	DC110233

- Test procedure : MA101N.

- Results :

- 6.1 Sound Pressure Level

- 6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L _A	A	Fast	94.00	1	94.0	± 1.1

- 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 130	L _A	A	Fast	94.00	1	94.0 (Ref.)
				104.00		104.0
				114.00		114.0

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

- 6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L _A	A	Fast	94.00	1	94.0	Ref.
			Slow				

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. : C131788

證書編號

6.3 Frequency Weighting

6.3.1 A-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L _A	A	Fast	94.00	63 Hz	67.7	-26.2 ± 1.5
					125 Hz	77.8	-16.1 ± 1.5
					250 Hz	85.3	-8.6 ± 1.4
					500 Hz	90.7	-3.2 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	95.2	+1.2 ± 1.6
					4 kHz	95.0	+1.0 ± 1.6
					8 kHz	93.0	-1.1 (+2.1 ; -3.1)
					12.5 kHz	89.6	-4.3 (+3.0 ; -6.0)

6.3.2 C-Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L _A	C	Fast	94.00	63 Hz	93.2	-0.8 ± 1.5
					125 Hz	93.8	-0.2 ± 1.5
					250 Hz	94.0	0.0 ± 1.4
					500 Hz	94.0	0.0 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	93.8	-0.2 ± 1.6
					4 kHz	93.2	-0.8 ± 1.6
					8 kHz	91.1	-3.0 (+2.1 ; -3.1)
					12.5 kHz	87.6	-6.2 (+3.0 ; -6.0)

Remarks : - UUT Microphone Model No. : UC-59 & S/N : 04223

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	63 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)

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

Note :

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

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

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

Certificate of Calibration

校正證書

Certificate No. : C132980

證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-0878)

Description / 儀器名稱 : Integrating Sound Level Meter (EQ065)
Manufacturer / 製造商 : Brüel & Kjær
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 : $(23 \pm 2)^{\circ}\text{C}$
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 : 18 May 2013


TEST RESULTS / 測試結果

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

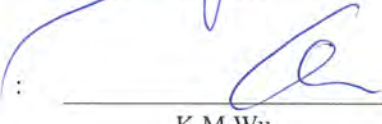
The test equipment used for calibration are traceable to National Standards via :

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

Tested By
測試

: 
K C Lee

Certified By
核證

: 
K M Wu

Date of Issue :
簽發日期

20 May 2013

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

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。

Certificate of Calibration

校正證書

Certificate No. : C132980

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	C130019
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 _{AFP}	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 _{AFP}	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 _{AFP}	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.

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。

Certificate of Calibration

校正證書

Certificate No. : C132980
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 _{AFP}	A	F	94.00	1	94.0	Ref.
	L _{ASP}		S			94.0	± 0.1
	L _{AIP}		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 _{AFP}	A	F	106.0	Continuous	106.0	Ref.
	L _{AFMax}				200 ms	105.0	-1.0 ± 1.0
	L _{ASP}	S	Continuous		106.0	Ref.	
	L _{ASMax}		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 _{AFP}	A	F	94.00	31.5 Hz	54.9	-39.4 ± 1.5
					63 Hz	67.9	-26.2 ± 1.5
					125 Hz	77.9	-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	89.8	-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.

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。

Certificate of Calibration

校正證書

Certificate No. : C132980
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 _{CFP}	C	F	94.00	31.5 Hz	91.2	-3.0 ± 1.5
					63 Hz	93.2	-0.8 ± 1.5
					125 Hz	93.8	-0.2 ± 1.0
					250 Hz	93.9	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	91.0	-3.0 (+1.5 ; -3.0)
					12.5 kHz	87.9	-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 _{Aeq}	A	10 sec.	4	1	1/10	110.0	100	99.9	± 0.5
								90	89.9	± 0.5
								80	79.8	± 1.0
								70	69.5	± 1.0

- Remarks :
- UUT Microphone Model No. : 4188 & S/N : 2793313
 - 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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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. : C131789
證書編號

ITEM TESTED / 送檢項目 (Job No. / 序引編號 : IC13-0723)

Description / 儀器名稱 : Sound Level Meter (EQ011)
Manufacturer / 製造商 : Rion
Model No. / 型號 : NL-52
Serial No. / 編號 : 01121362
Supplied By / 委託者 : Action-United Environmental Services and Consultants
Unit 1707, 17/F., Clifford Centre,
778-784 Cheung Sha Wan Road, Kowloon

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 : 23 March 2013


TEST RESULTS / 測試結果

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

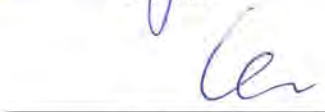
The test equipment used for calibration are traceable to National Standards via :

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

Tested By
測試


K C Lee

Certified By
核證


K M Wu

Date of Issue
簽發日期

25 March 2013

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

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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: calllab@suncreation.com Website/網址: www.suncreation.com

Certificate of Calibration

校正證書

Certificate No. : C131789
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	C130019
CL281	Multifunction Acoustic Calibrator	DC110233

- Test procedure : MA101N.

- Results :

- 6.1 Sound Pressure Level

- 6.1.1 Reference Sound Pressure Level

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L _A	A	Fast	94.00	1	94.0	± 1.1

- 6.1.2 Linearity

UUT Setting				Applied Value		UUT Reading (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)	
30 - 130	L _A	A	Fast	94.00	1	94.0 (Ref.)
				104.00		104.0
				114.00		114.0

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

- 6.2 Time Weighting

UUT Setting				Applied Value		UUT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq. (kHz)		
30 - 130	L _A	A	Fast	94.00	1	94.0	Ref.
			Slow				

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. : C131789
證書編號

6.3 Frequency Weighting

6.3.1 A-Weighting

UT Setting				Applied Value		UT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L _A	A	Fast	94.00	63 Hz	67.8	-26.2 ± 1.5
					125 Hz	77.8	-16.1 ± 1.5
					250 Hz	85.3	-8.6 ± 1.4
					500 Hz	90.8	-3.2 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	95.2	+1.2 ± 1.6
					4 kHz	95.0	+1.0 ± 1.6
					8 kHz	93.0	-1.1 (+2.1 ; -3.1)
					12.5 kHz	89.6	-4.3 (+3.0 ; -6.0)

6.3.2 C-Weighting

UT Setting				Applied Value		UT Reading (dB)	IEC 61672 Class 1 Spec. (dB)
Range (dB)	Function	Frequency Weighting	Time Weighting	Level (dB)	Freq.		
30 - 130	L _A	C	Fast	94.00	63 Hz	93.2	-0.8 ± 1.5
					125 Hz	93.8	-0.2 ± 1.5
					250 Hz	94.0	0.0 ± 1.4
					500 Hz	94.0	0.0 ± 1.4
					1 kHz	94.0	Ref.
					2 kHz	93.8	-0.2 ± 1.6
					4 kHz	93.2	-0.8 ± 1.6
					8 kHz	91.1	-3.0 (+2.1 ; -3.1)
					12.5 kHz	87.6	-6.2 (+3.0 ; -6.0)

Remarks : - UUT Microphone Model No. : UC-59 & S/N : 04596

- Mfr's Spec. : IEC 61672 Class 1

- Uncertainties of Applied Value :

94 dB	63 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)

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

Note :

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

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

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

Certificate Number:50105786

Issue Date:09/03/2013

DD/MM/YYYY

CALIBRATION CERTIFICATE

Customer Name: Science International Corporation

Description: Sound Level Meter

Model Name: NL - 3 1

Serial Number: 0 0 4 1 0 2 2 1

Calibration Date: 08/03/2013(DD/MM/YYYY)

Ambient condition: Temperature 18°C Relative Humidity 44%

We hereby certify that the above product was tested and calibrated according to the prescribed RION procedures, and that it fulfills all specification requirements, as listed on the appended sheet.

The measuring equipment and reference devices used for testing and calibrating this unit are managed under the RION traceability system and are traceable according to official Japanese standards and official standards of countries belonging to the International Committee of Weights and Measures.

RSC·RION PRIMARY STANDARDS

Model Description	Model Number	Serial Number	Cal Due Date MM/YYYY
(Acoustic) Condenser microphone	MR103	7582	6/2013

(Electric) DC Reference standards	732B	6265015	9/2014
Standard resistor	742A-1	6480018	11/2013
Standard resistor	742A-10k	6390001	6/2014
Digital multimeter	3458A	2823A13632	3/2013
Universal counter	53132A	3404A01375	3/2013

RSC WORK STANDARDS

Model Description	Model Number	Serial Number	Cal Due Date MM/YYYY
(Acoustic) Condenser microphone	UC-33P	1363	10/2013

(Electric) Sound level meter Unit	UN-04	10491087	10/2013
Sound level meter Unit	UN-04	10491053	10/2013
Digital multimeter	34401A	MY47047316	10/2013
Attenuator	984C	11072569	10/2013
Burst signal generator	KTG-11	10350007	1/2014
Frequency synthesizer	FS-1301	01CX861W	10/2013

R I O N S E R V I C E C E N T E R C O . , L T D .

Manager, Service Dept. O. Soyano

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"> 1. Notify IEC and Contractor 2. Carry out investigation. 3. Report the results of investigation to the IEC, ER and Contractor. 4. Discuss with the Contractor and formulate remedial measures 5. Increase monitoring frequency to check mitigation effectiveness. 	<ol style="list-style-type: none"> 1. Review the analyzed results submitted by the ET. 2. Review the proposed remedial measures by the Contractor and advise the ER accordingly 3. Supervise the implementation of remedial measures 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Require Contractor to propose remedial measures for the analyzed noise problem 4. Check remedial measures are properly implemented. 	<ol style="list-style-type: none"> 1. Submit noise mitigation proposals to IEC 2. Implement noise mitigation proposals
Limit Level	<ol style="list-style-type: none"> 1. Notify IEC, ER, EPD and Contractor 2. Identify source. 3. Repeat measurements to confirm findings 4. Increase monitoring frequency. 5. Carry out analysis of Contractor's working procedures to determine possible mitigation to be implemented 6. Inform IEC, ER and EPD the causes and actions taken for the exceedances 7. Assess effectiveness of Contractor's remedial actions and keep IEC, EPD and ER informed of the results 8. If exceedance stops, cease additional monitoring. 	<ol style="list-style-type: none"> 1. Discuss amongst ER, ET, and Contractor on the potential remedial actions 2. Review Contractor's remedial actions whenever necessary to assure their effectiveness and advise the ER accordingly 3. Supervise the implementation of remedial measures 	<ol style="list-style-type: none"> 1. Confirm receipt of notification of failure in writing 2. Notify Contractor 3. Require Contractor to propose remedial measures for the analyzed noise problem 4. Check remedial measures properly implemented. 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 	<ol style="list-style-type: none"> 1. Take immediate action to avoid further exceedance 2. Submit proposals for remedial actions to IEC within 3 working days of notification 3. Implement the agreed proposals 4. Resubmit proposals if problem still not under control 5. Stop the relevant portion of works as determined by the ER until the exceedance is abated

Event Action Plan for Ecology

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

Contingency Plan of Vibration of exceedance

If there be any exceed of limit level;

1. ET will notify IEC, ER and contractor at once.
2. A joint investigation will be carried out in order to identify the possible source and remedial actions required and agreed between ER, IEC, ET and the Contractor.
3. During such investigation, piling and drilling works will be suspended.

Appendix F

Monitoring Schedule in Last Reporting Period

Monitoring / Inspection Schedule during the Last Reporting Period – December 2013

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

	Monitoring / Inspection Day
	Sunday or Public Holiday

Appendix G

Meteorological Data of Reporting Period

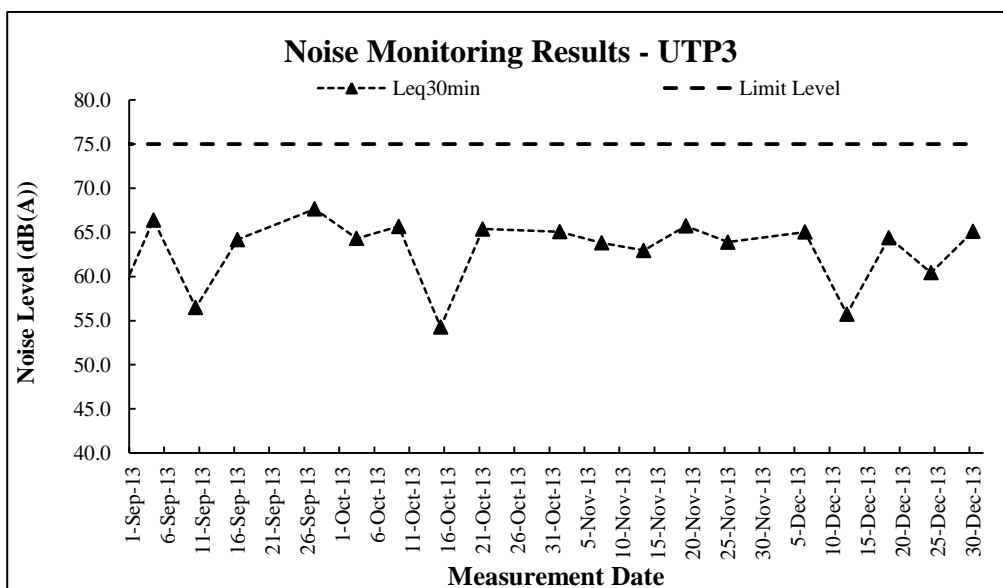
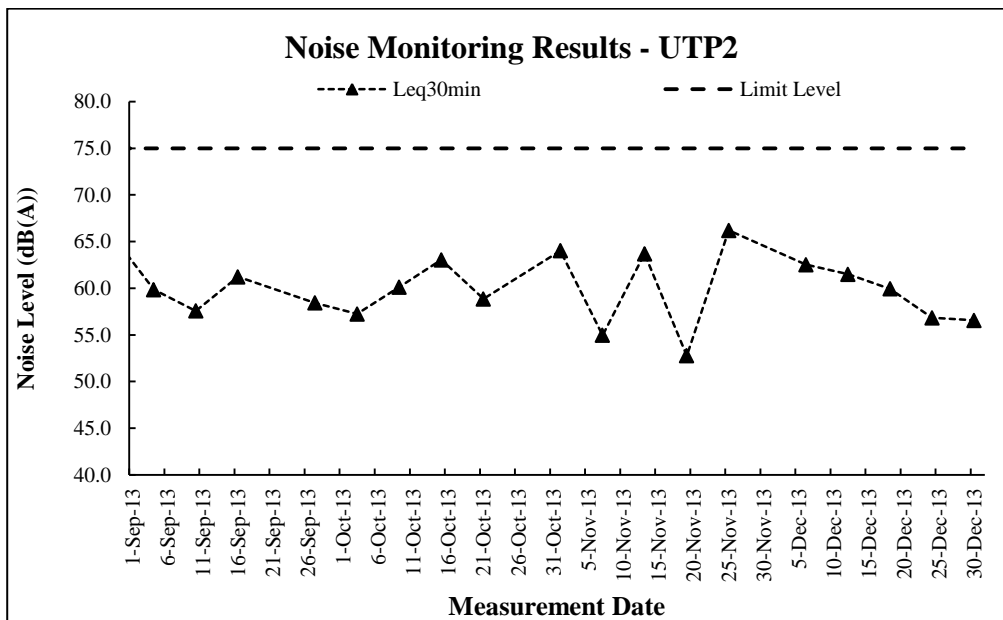
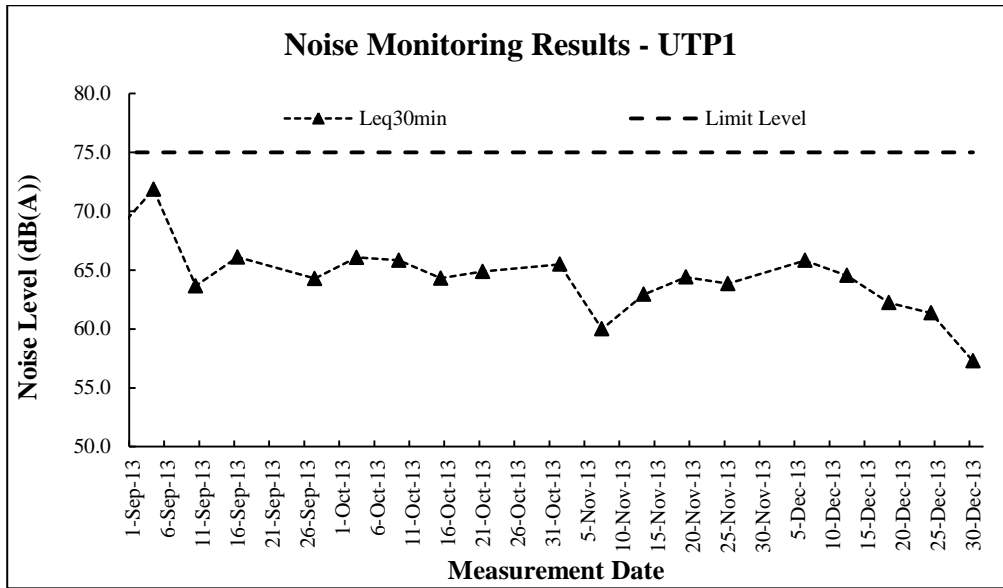
Meteorological Data in Reporting Period

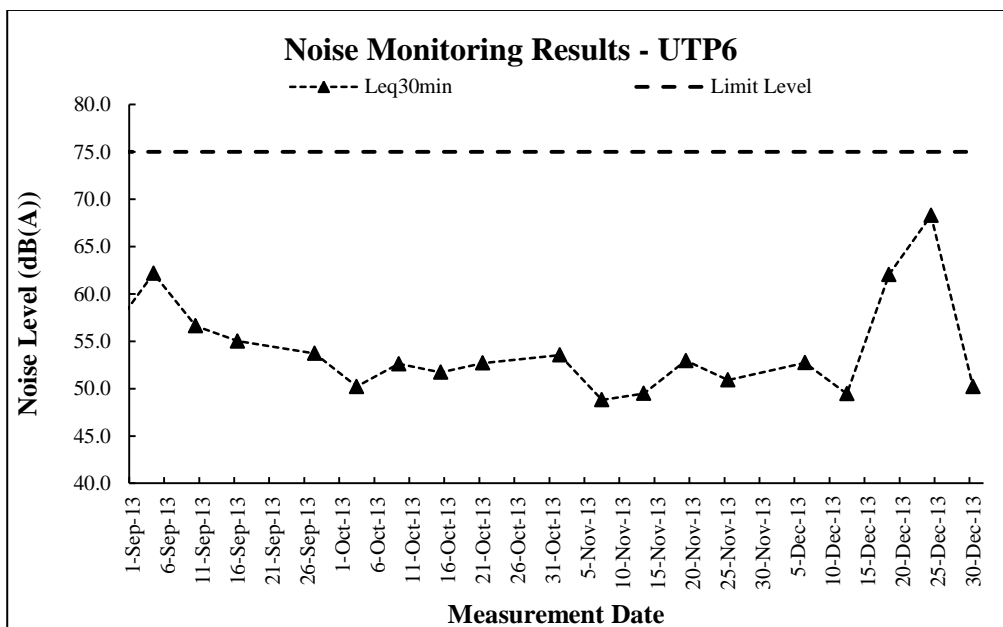
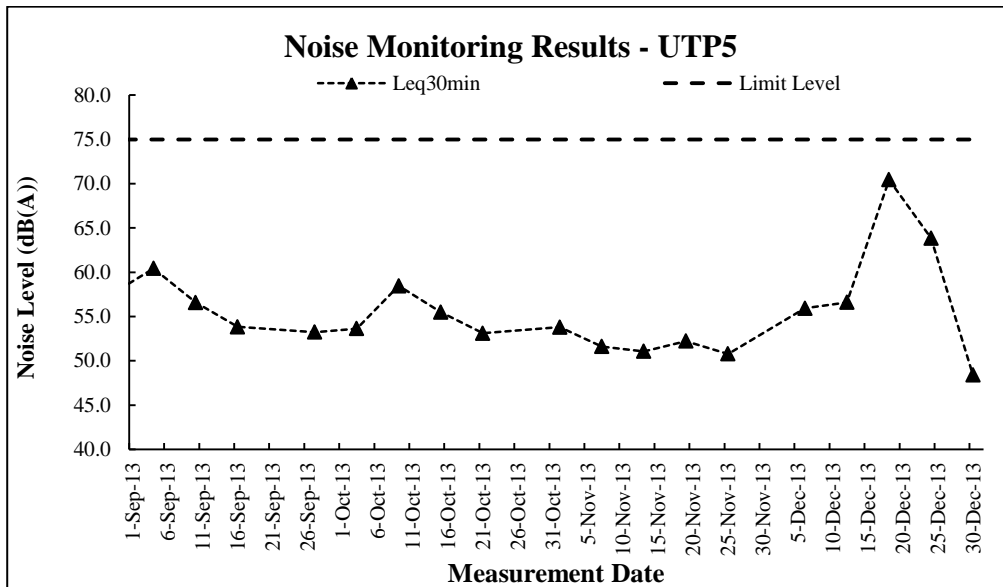
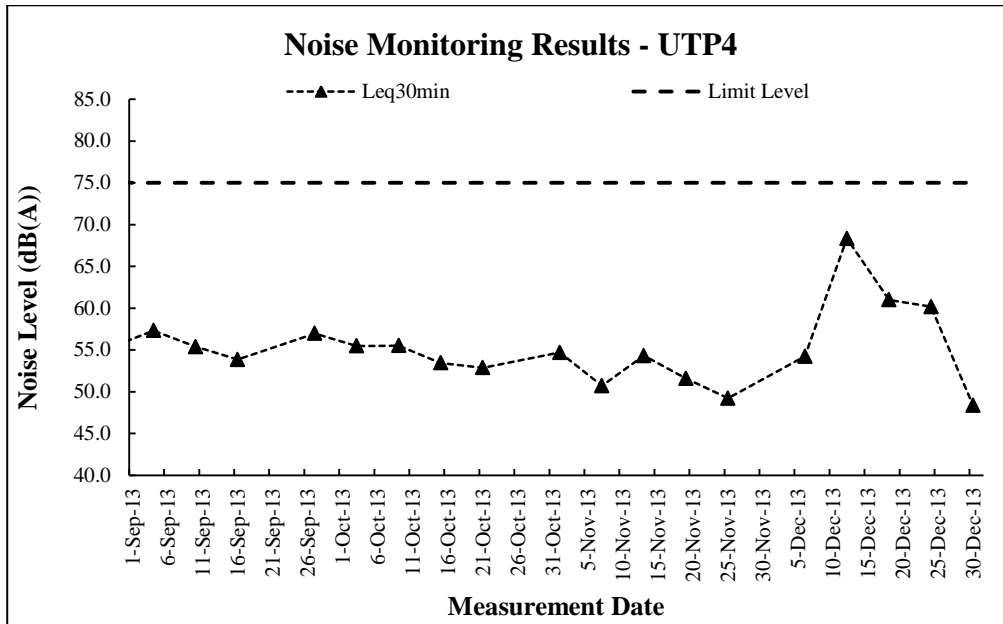
Date		Weather	Total Rainfall (mm)	Tai Po Station		Shatin Station	
				Mean Air Temp. (°C)	Mean Relative Humidity (%)	Wind Speed (km/h)	Wind Direction
1-Dec-13	Sun	Fine and very dry. Moderate north to northeasterly winds.	0	15.8	50.5	6	N/NE
2-Dec-13	Mon	Fine and dry. Moderate east to northeasterly winds.	0	16.2	48	6.1	N/NE
3-Dec-13	Tue	Fine and dry. Moderate east to northeasterly winds.	0	17.8	57.5	5.9	N/NE
4-Dec-13	Wed	Fine and dry. Moderate northeasterly winds.	0	17.9	52	9.6	NE
5-Dec-13	Thu	Fine and dry. Moderate northeasterly winds.	0	16.5	48	6.5	N/NE
6-Dec-13	Fri	Fine and dry apart from some haze. Moderate northeasterly winds.	0	16.3	47.5	8.2	NE
7-Dec-13	Sat	Fine and dry. Moderate northeasterly winds.	0	17.3	57.5	5.3	N/NE
8-Dec-13	Sun	Fine and dry. Moderate northeasterly winds.	Trace	18.3	73.5	5.5	E/NE
9-Dec-13	Mon	Cloudy, haze, very dry. Moderate north to northeasterly winds.	0	22.3	56.5	7.2	NE
10-Dec-13	Tue	Cloudy, haze, dry, sunny periods. Moderate north to northeasterly winds.	0	18.9	57.5	7.2	N/NE
11-Dec-13	Wed	Cloudy, dry, haze. Moderate east to northeasterly winds, fresh offshore.	0	17.8	64.2	9.2	N/NE
12-Dec-13	Thu	Cloudy, dry, haze. Moderate east to northeasterly winds, fresh offshore.	Trace	17	59.7	8.2	N/NE
13-Dec-13	Fri	Cloudy, dry, haze. Moderate east to northeasterly winds, fresh offshore.	Trace	17.2	75.5	5.2	N
14-Dec-13	Sat	Cloudy, dry, haze. Moderate east to northeasterly winds, fresh offshore.	13	17.9	84.7	6.8	N
15-Dec-13	Sun	Cloudy, rain. Fresh northerly winds, occasionally strong offshore and on high ground.	22.7	15.9	95.7	8.2	N
16-Dec-13	Mon	Cloudy, rain. Fresh northerly winds, occasionally strong offshore and on high ground.	24.8	13.2	92.7	9.5	N/NW
17-Dec-13	Tue	Cloudy, rain. Fresh northerly winds, occasionally strong offshore and on high ground.	27.8	11	94.7	6.6	N/NE
18-Dec-13	Wed	Fine, dry, cold. Moderate to fresh northerly winds.	0	10.4	68	13.5	N/NE
19-Dec-13	Thu	Cloudy, dry, fine. Moderate north to northeasterly winds.	0	11.4	57.2	8.7	N/NW
20-Dec-13	Fri	Cloudy, dry, fine. Moderate north to northeasterly winds.	0	12.3	63	6.6	N/NE
21-Dec-13	Sat	Fine, dry, cold. Moderate northeasterly winds.	0	13.2	57.2	7.1	N
22-Dec-13	Sun	Fine, dry, cold. Moderate northeasterly winds.	0	12.5	55	7	NE
23-Dec-13	Mon	Fine, dry, cold. Moderate northeasterly winds.	0	12.9	59.5	5.5	NE
24-Dec-13	Tue	Fine, dry, cold. Moderate northeasterly winds.	0	13.3	55	6.6	N/NE
25-Dec-13	Wed	Fine, very dry, haze, cold. Moderate north to northeasterly winds, fresh at times.	0	14.2	54.5	6.7	N/NE
26-Dec-13	Thu	Fine, very dry, haze, cold. Moderate north to northeasterly winds.	0	13.4	46	10.5	N/NE
27-Dec-13	Fri	Fine, very dry, haze, cold. Moderate north to northeasterly winds, fresh at times.	0	12	33.2	14	NE
28-Dec-13	Sat	Fine, dry, cloudy. Light to moderate east to northeasterly winds.	0	10.2	42.5	6	N/NE
29-Dec-13	Sun	Fine, very dry, haze, cold. Moderate north to northeasterly winds, fresh at times.	0	10	48.5	6.6	N/NE
30-Dec-13	Mon	Fine, dry, cloudy. Light to moderate east to northeasterly winds.	0	12.1	47	6	NE
31-Dec-13	Tue	Fine, dry, cloudy. Light to moderate east to northeasterly winds.	0	13.8	42	5	N/NE

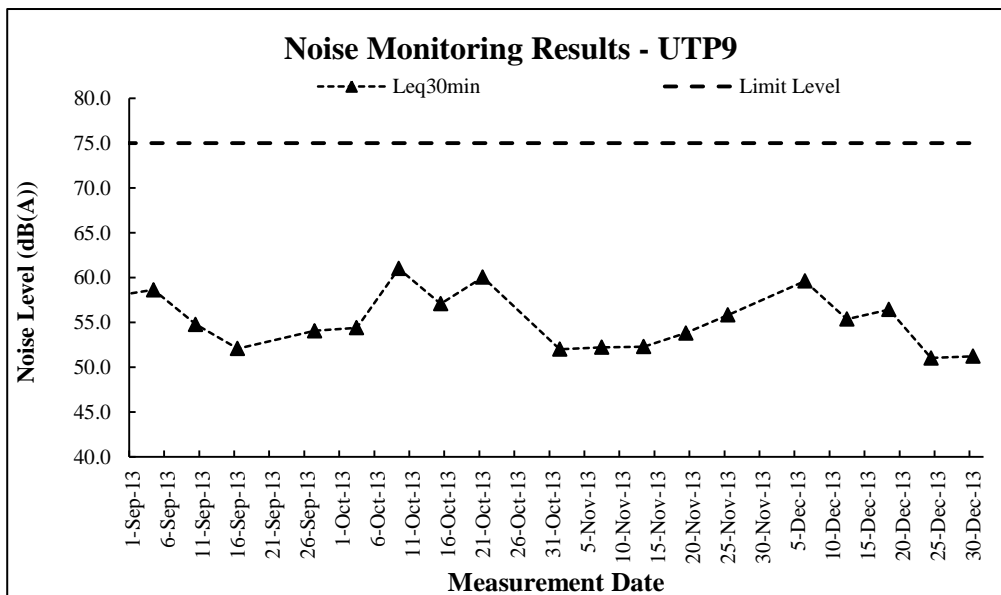
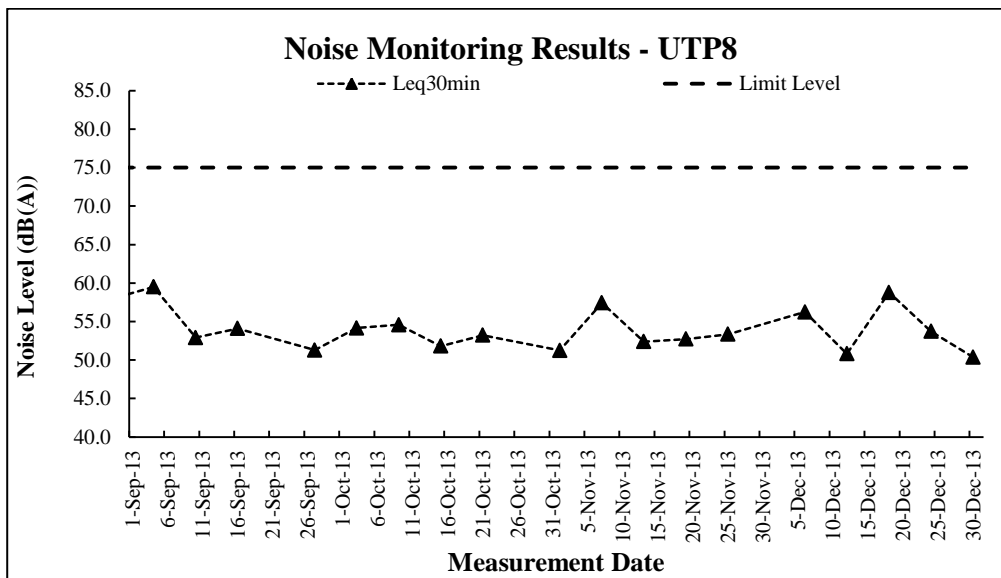
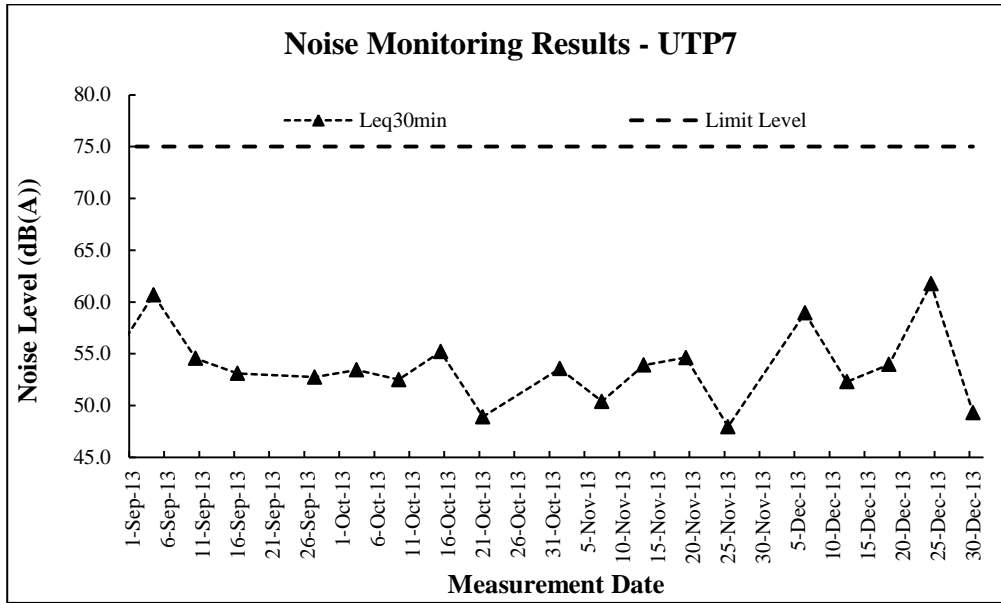
* The record was downloaded from The Hong Kong Observatory Weather Station.

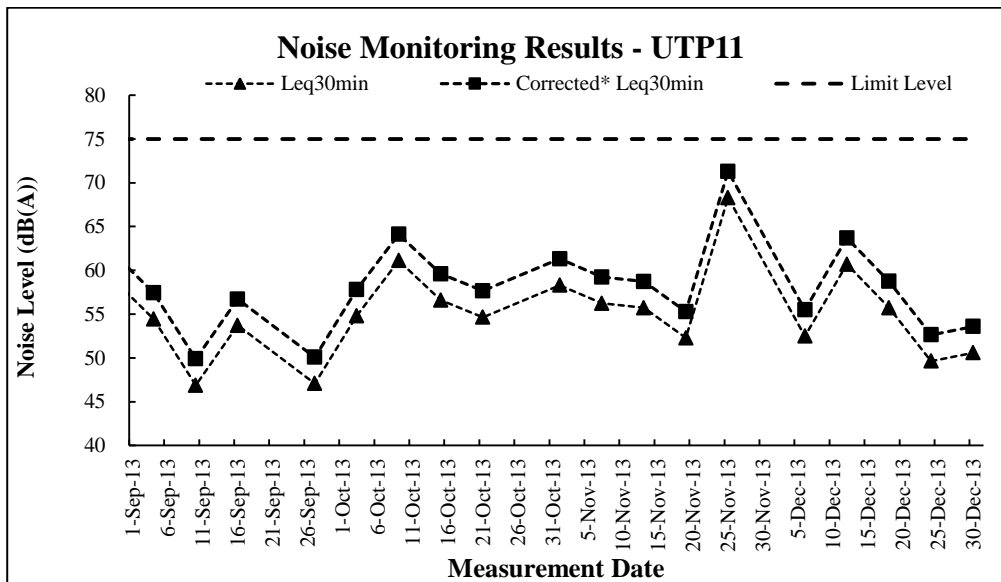
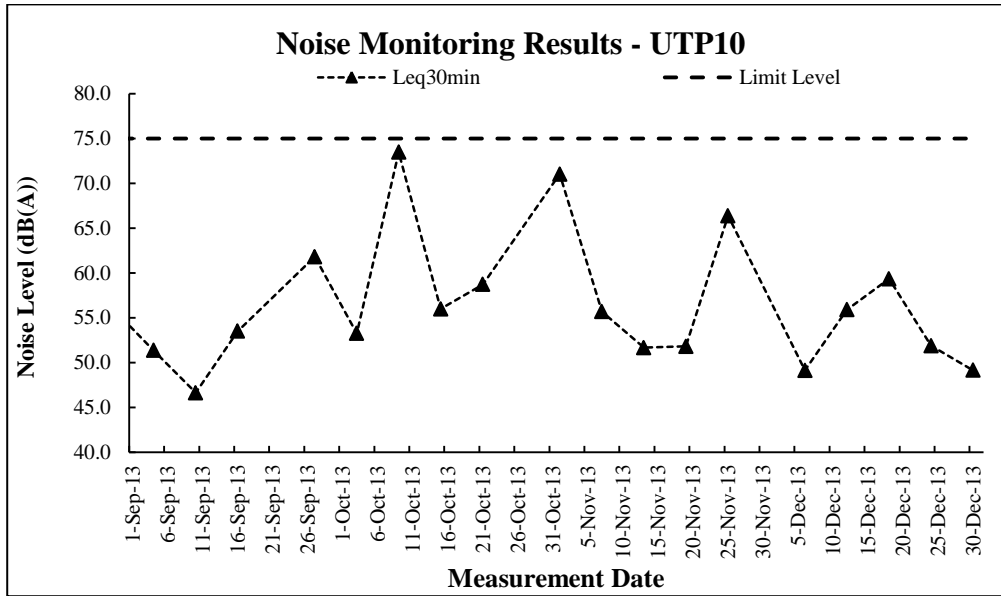
Appendix H

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 2013

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 ³)	(in '000m ³)	(in '000m ³)	(in '000m ³)	(in '000m ³)	(in '000m ³)	(in '000 kg)	(in '000kg)	(in '000kg)	(in '000kg)	(in '000m ³)
Jan	0.537	0.537	0.537	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Feb	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Mar	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Apr	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
May	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
June	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
July	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Aug	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Sept	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Oct	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Nov	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Dec	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
Total	0.537	0.537	0.537	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000

*For all the three rivers in the Contract

Appendix J

Observed Noise Source During Noise Monitoring

J1 Observed Noise Source During Noise Monitoring for UTP1

Date	Construction Activities under the Project	Other Noise Source
6-Dec-13	-	Human voice and medium road traffic noise
12-Dec-13	-	Human voice and medium road traffic noise
18-Dec-13	-	Human voice and animals sound
24-Dec-13	-	Human voice, low road traffic noise
30-Dec-13	-	Human voice, low road traffic noise and animals sound

J2 Observed Noise Source During Noise Monitoring for UTP2

Date	Construction Activities under the Project	Other Noise Source
6-Dec-13	-	Low road traffic noise
12-Dec-13	-	Human voice and animals sound
18-Dec-13	-	Human voice, animals sound and medium road traffic noise
24-Dec-13	-	Human voice, low road traffic noise and animals sound
30-Dec-13	-	Human voice and low road traffic noise and animals sound

J3 Observed Noise Source During Noise Monitoring for UTP3

Date	Construction Activities under the Project	Other Noise Source
6-Dec-13	-	Animals sound
12-Dec-13	-	Human voice and animals sound
18-Dec-13	-	Human voice and animals sound
24-Dec-13	-	Human voice and animals sound
30-Dec-13	-	Human voice and animals sound

J4 Observed Noise Source During Noise Monitoring for UTP4

Date	Construction Activities under the Project	Other Noise Source
6-Dec-13	-	Human voice
12-Dec-13	-	Human voice and animals sound
18-Dec-13	Drilling	Human voice and animals sound
24-Dec-13	-	Human voice and animals sound
30-Dec-13	-	Human voice and animals sound

J5 Observed Noise Source During Noise Monitoring for UTP5

Date	Construction Activities under the Project	Other Noise Source
6-Dec-13	-	Human voice
12-Dec-13	-	Human voice and animals sound
18-Dec-13	-	Human voice
24-Dec-13	-	Human voice and animals sound
30-Dec-13	-	Human voice and animals sound

J6 Observed Noise Source During Noise Monitoring for UTP6

Date	Construction Activities under the Project	Other Noise Source
6-Dec-13	-	Animals sound
12-Dec-13	-	Human voice
18-Dec-13	-	Human voice and animals sound
24-Dec-13	-	Human voice and animals sound
30-Dec-13	-	Human voice and animals sound

J7 Observed Noise Source During Noise Monitoring for UTP7

Date	Construction Activities under the Project	Other Noise Source
6-Dec-13	-	Human voice
12-Dec-13	-	Human voice and animal sound
18-Dec-13	-	Human voice and animals sound
24-Dec-13	-	Human voice and animals sound
30-Dec-13	-	Human voice and animals sound

J8 Observed Noise Source During Noise Monitoring for UTP8

Date	Construction Activities under the Project	Other Noise Source
6-Dec-13	-	Human voice
12-Dec-13	-	Human voice and animal sound
18-Dec-13	-	Human voice and animals sound
24-Dec-13	-	Human voice
30-Dec-13	-	Human voice and low road traffic noise and animals sound

J9 Observed Noise Source During Noise Monitoring for UTP9

Date	Construction Activities under the Project	Other Noise Source
6-Dec-13	-	Human voice
12-Dec-13	-	Human voice and animal sound
18-Dec-13	-	Human voice and animals sound
24-Dec-13	-	Human voice and animals sound
30-Dec-13	-	Human voice and low road traffic noise and animals sound

J10 Observed Noise Source During Noise Monitoring for UTP10

Date	Construction Activities under the Project	Other Noise Source
6-Dec-13	--	Human voice and low traffic noise
12-Dec-13		Human voice and backhoe
18-Dec-13	Excavation	Human voice
24-Dec-13	-	Human voice
30-Dec-13	Excavation	Human voice and low road traffic noise and animals sound

J11 Observed Noise Source During Noise Monitoring for UTP11

Date	Construction Activities under the Project	Other Noise Source
6-Dec-13	--	Animals sound
12-Dec-13		Human voice and backhoe
18-Dec-13	--	Human voice and animals sound
24-Dec-13	Excavation	Human voice
30-Dec-13	Excavation	Human voice and low road traffic noise and animals sound

Appendix K

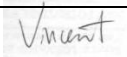

Bi-annual Ecological Report

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. 10)
Upper Tai Po River

August 2013



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Validated by: Mark Shea		August 15, 2013
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. 10) Upper Tai Po River

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TABLE

Table 5-1. Flora species recorded at the transect along the Upper Tai Po River.

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

Table 5-7 Abiotic data for Upper Tai Po River.

FIGURES

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 10 ecological impact monitoring report for the project conducted in July 2013. It contains the following subsections:
 - Summary of major points
 - Summary of the construction activities from March 13 – August 13
 - 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 25th July 2013;
- Stream habitat 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 2013 was lower than those recorded during baseline monitoring (before fish capture/relocation took place). *Parazacco spilurus* (Photo 8) and *Pseudobagrus trilineatus* (Photo 7) were 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, Hong Kong Newt (*Paramesotriton hongkongensis*), was not found within works area during both baseline and impact monitoring. Apart from fauna species, about 24 flora species was recorded within the survey transects along the affected stream courses, which was lower than those recorded during baseline monitoring. Nevertheless, some common herbs were observed generating on the embankment, which indicating that vegetation was recovering. Flora species of *Tibouchina semidecandra* and *Ipomoea pes-caprae* were planted on the gabion along the river for landscape purpose.

3 Summary of the Construction Activities

3.1 Major construction activities carried out by the contractor from March 13 – August 13.

- Construction of mass concrete
- Construction of dry weather channel
- Construction of footpath
- Construction of surface drain
- Construction of dwarf wall
- Concrete of retaining wall
- Installation of railing and erection of chain link fence
- Greening work
- Landscaping work
- Laying underground utilities

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) 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 (Photo 6) 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 (Photo 5) was estimated and recorded. Nomenclature and protection status of the species followed those documented in the AFCD website (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 (Photo 4) in the likely affected streams were surveyed. Two sampling sites within the affected stream sites were 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) 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) 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 were 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) 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) 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.

Dissolved oxygen level, pH value, conductivity, salinity were analyzed by portable water quality instrument in situ. Biochemical Oxygen Demand (BOD) of sampled stream water was analyzed by portable water quality instrument for 5 days oxygen demand in-house. Nutrient level (nitrate and ammonium) were analyzed by commercial testing kit.

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 24 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 24 flora species. Most vegetation along the stream section was cleared in order to construct temporal access road and new embankment during construction period. Despite that, the vegetation was predicted to be re-colonized along the river channel after finished the construction work. Construction works was substantially completed at the date of inspection. Some flora species such as *Tibouchina semidecandra* and *Ipomoea pes-caprae* were planted on the gabion along the river for landscape purpose and some common herbs were found generating on the embankment, which indicating that vegetation was recovering. In addition, 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 1.2m. 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, 21 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 spring 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**. 4 species of dragonfly species were recorded during the surveys in current cold and dry season. All 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. Details of recorded refers to **Table 5-5**.

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. 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 were performed at Upper Tai Po River during surveys. In total, 4 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* and *Pseudobagrus trilineatus* which have conservation interest, were 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) and *Pseudobagrus trilineatus* 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 were 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 (hkbiobiodiversity website) while *Pseudobagrus trilineatus* is a rare species in Hong Kong. Some of them were captures and released to an undisturbed upper stream habitat before construction works with most recently performed on the 1st November 2012. The locally rare fish species of Three-lined Chinese Stream Catfish was not recorded at affected stream section during night time surveys 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, Concentration of Ammonia (0.04 mg/L) in lower stream section was comparatively slightly higher than that measured at upper stream section. Currently, the level of ammonia concentration is considered as “low”. 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 concrete and stone 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 26 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 footpath
- Construction of maintenance access road
- Installation of railing and erection of chain link fence
- Laying underground utilities
- Landscaping work

10 Comments and Conclusions

Ecological impact monitoring was carried out during July 2013 and relevant biotic and abiotic data was collected according to the project specification and the EM & A Manual. Two of the three target freshwater fauna species, i.e., fish *Parazacco spilurus* and *Pseudobagrus trilineatus*, were 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 species of Hong Kong Newt were not recorded at the affected stream section and reference site 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 was observed undertaking as some introduced species was recorded along the river channel.

The water quality in the surveyed stream was found slightly polluted at lower stream section which would be due to the domestic sewage discharge from villages. No significant change in water quality was detected.

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PHOTOS

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Photo 1: General view of the works area



Photo 2: General view of the works area



Photo 3: Kick sampling



Photo 4: Stream benthos sample at reference site



Photo 5: Captured fish sample



Photo 6: Night survey

River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River
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Photo 7: Fish *Pseudobagrus trilineatus*



Photo 8: Fish *Parazacco spilurus*

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	Mar-13	Jul-13
Amaranthaceae	<i>Alternanthera philoxeroides</i>	空心蓮子草	+	+	+	+	+	+				+	+
Amaranthaceae	<i>Amaranthus viridis</i>	野莧										+	+
Araceae	<i>Alocasia odora</i>	海芋	+	+	+	+	+	+					
Araceae	<i>Colocasia esculenta</i>	芋	+	+	+	+	+	+					
Asteraceae	<i>Bidens alba</i>	白花鬼針草	+	+	+	+	+	+	++	+	+	+	+
Asteraceae	<i>Ageratum conyzoides</i>	勝紅薊	+	+	+	+	+	+	+	+		+	+
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	++	+	+	+	+	+	+	+	+	+	+
Asteraceae	<i>Synedrella nodiflora</i>	金腰箭	+	+	+	+	+	+				+	+
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊	+	+	+	+	+	+	+	+			
Asteraceae	<i>Eclipta prostrata</i>	鱧腸										+	+
Athyriaceae	<i>Callipteris esculenta</i>	菜蕨	+	+	+	+	+	+					
Bombacaceae	<i>Bombax ceiba</i>	木棉	+	+	+	+	+	+					
Caprifoliaceae	<i>Viburnum odoratissimum</i>	珊瑚樹	+	+	+	+	+						
Commelinaceae	<i>Commelina communis</i>	鴨跖草	+	+	+	+	+	+	+	+	+	+	+
Convolvulaceae	<i>Ipomoea aquatica</i>	通菜	+	+	+	+	+						
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍	+	+	+	+	+	+	+	+			
Convolvulaceae	<i>Ipomoea pes-caprae</i>	海灘牽牛										+	+
Cucurbitaceae	<i>Benincasa hispida</i>	冬瓜						+					+
Equisetaceae	<i>Equisetum debile</i>	筆管草	+	+	+	+	+						
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐	+	+	+	+	+	+					
Euphorbiaceae	<i>Glochidion zeylanicum</i>	香港算盤子	+	+	+	+	+						
Fabaceae	<i>Pueraria lobata</i>	野葛	+	+	+	+	+	+				+	+
Gramineae	<i>Panicum repens</i>	枯骨草	+	+	+	+	+	+	+	+			
Gramineae	<i>Microstegium ciliatum</i>	剛秀竹	++	+	+	+	+	+	+	+	+	+	+
Gramineae	<i>Pennisetum purpureum</i>	象草	+	+	+	+	+	+					
Gramineae	<i>Coix lacryma-jobi</i>	薏苡	+	+	+	+	+	+		+			
Gramineae	<i>Phragmites karka</i>	卡開蘆	+	+	+	+	+	+		+			
Lauraceae	<i>Cinnamomum camphora</i>	樟樹	+	+	+	+	+	+					
Lauraceae	<i>Litsea glutinosa</i>	潺槁樹	+	+	+	+	+						
Melastomataceae	<i>Melastoma sanguineum</i>	毛椴										+	+
Melastomataceae	<i>Tibouchina semidecandra</i>	巴西野牡丹										+	+
Moraceae	<i>Ficus hispida</i>	對葉榕	+	+	+	+	+	+					+
Musaceae	<i>Musa paradisiaca</i>	大蕉	+	+	+	+	+						
Myrtaceae	<i>Psidium guajava</i>	番石榴	+	+	+	+	+	+					
Myrtaceae	<i>Cleistocalyx operculatus</i>	水翁	+	+	+	+	+	+	+	+			
Polygonaceae	<i>Polygonum barbatum</i>	毛蓼	+	+	+	+	+	+				+	+
Rutaceae	<i>Clausena lansium</i>	黃皮	+	+	+	+	+	+					
Sapindaceae	<i>Dimocarpus longan</i>	龍眼	+	+	+	+	+	+					
Sapindaceae	<i>Litchi chinensis</i>	荔枝	+	+	+	+	+	+					
Solanaceae	<i>Solanum torvum</i>	水茄	+	+	+	+	+	+				+	+
Solanaceae	<i>Solanum nigrum</i>	龍葵				+	+	+	+	+		+	+
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨	+	+	+	+	+	+					
Ulmaceae	<i>Celtis sinensis</i>	朴樹	+	+	+	+	+	+				+	+
Urticaceae	<i>Boehmeria nivea</i>	苧麻	+	+	+	+	+	+	+				
Verbenaceae	<i>Lantana camara</i>	馬纓丹	+	+	+	+	+	+					
Convolvulaceae	<i>Merremia hederacea</i>	魚黃草										+	+
Mimosaceae	<i>Calliandra haematocephala</i>	紅絨球											+
Asteraceae	<i>Erechtites hieracifolius</i>	革命菜											+
Urticaceae	<i>Pouzolzia zeylanica</i>	霧水葛											+
Malvaceae	<i>Hibiscus rosa-sinensis</i>	大紅花											+

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					
			T1		T2		Reference		T1		T2	
Chinese name	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										
Fabaceae	<i>Pueraria lobata</i>	野葛										
Convolvulaceae	<i>Merremia hederacea</i>	魚黃草										
Malvaceae	<i>Hibiscus rosa-sinensis</i>	大紅花										
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 Chinese name	Impact monitoring						Impact monitoring					
			Jul-09						Jan-10					
			Reference		T1		T2		Reference		T1		T2	
Height(m)	%	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												
Fabaceae	<i>Pueraria lobata</i>	野葛												
Convolvulaceae	<i>Merremia hederacea</i>	魚黃草												
Malvaceae	<i>Hibiscus rosa-sinensis</i>	大紅花												
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 Chinese name	Impact monitoring						Impact monitoring					
			Jul-10						Jan-11					
			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	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
Fabaceae	<i>Pueraria lobata</i>	野葛												
Convolvulaceae	<i>Merremia hederacea</i>	魚黃草												
Malvaceae	<i>Hibiscus rosa-sinensis</i>	大紅花												
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	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												
Fabaceae	<i>Pueraria lobata</i>	野葛												
Convolvulaceae	<i>Merremia hederacea</i>	魚黃草												
Malvaceae	<i>Hibiscus rosa-sinensis</i>	大紅花												
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						Impact monitoring						
				Jul-12						Mar-13						
				Reference		T1		T2		Reference		T1		T2		Refer
Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)		
Asteraceae	<i>Mikania micrantha</i>		薇甘菊	0.4	10					0.4	60					0.4
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						0.3	2						0.3
Myrtaceae	<i>Cleistocalyx operculatus</i>		水翁													
Athyriaceae	<i>Callipteris esculenta</i>		菜蕨													
Gramineae	<i>Phragmites karka</i>		卡開蘆													1.2
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													
Commelinaceae	<i>Commelina communis</i>		鴨跖草	0.4	5				0.4	5						0.4
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						0.3	10						0.3
Gramineae	<i>Panicum repens</i>		枯骨草													0.6
Gramineae	<i>Coix lacryma-jobi</i>		薏苡	1.5	5				1.5	3						
Convolvulaceae	<i>Ipomoea cairica</i>		五爪金龍	0.2	5											
Cucurbitaceae	<i>Benincasa hispida</i>		冬瓜													
Fabaceae	<i>Pueraria lobata</i>		野葛						0.2	5						0.2
Convolvulaceae	<i>Merremia hederacea</i>		魚黃草						0.2	5						
Malvaceae	<i>Hibiscus rosa-sinensis</i>		大紅花													
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 5-2. 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				
			Chinese name	Jul-13			
				%	Height (m)	%	Height (m)
Asteraceae	<i>Mikania micrantha</i>		40	0.4	3		
Moraceae	<i>Ficus hispida</i>						
Ulmaceae	<i>Celtis sinensis</i>						
Gramineae	<i>Microstegium ciliatum</i>			0.6	3		
Euphorbiaceae	<i>Macaranga tanarius</i>						
Araceae	<i>Alocasia odora</i>						
Araceae	<i>Colocasia esculenta</i>		5				
Myrtaceae	<i>Cleistocalyx operculatus</i>						
Athyriaceae	<i>Callipteris esculenta</i>						
Gramineae	<i>Phragmites karka</i>		5				
Thelypteridaceae	<i>Cyclosorus parasiticus</i>						
Equisetaceae	<i>Equisetum debile</i>						
Asteraceae	<i>Ageratum conyzoides</i>						
Commelinaceae	<i>Commelina communis</i>		5				
Solanaceae	<i>Solanum nigrum</i>						
Euphorbiaceae	<i>Mallotus paniculatus</i>						
Gramineae	<i>Eleusine indica</i>			0.3	3		
Gramineae	<i>Pennisetum purpureum</i>						
Asteraceae	<i>Wedelia chinensis</i>						
Asteraceae	<i>Bidens alba</i>		10	0.3	10		
Gramineae	<i>Panicum repens</i>		5				
Gramineae	<i>Coix lacryma-jobi</i>						
Convolvulaceae	<i>Ipomoea cairica</i>						
Cucurbitaceae	<i>Benincasa hispida</i>						
Fabaceae	<i>Pueraria lobata</i>		10				
Convolvulaceae	<i>Merremia hederacea</i>						
Malvaceae	<i>Hibiscus rosa-sinensis</i>			0.6	5		
Bare Gound			20		76		100

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

FIGURE

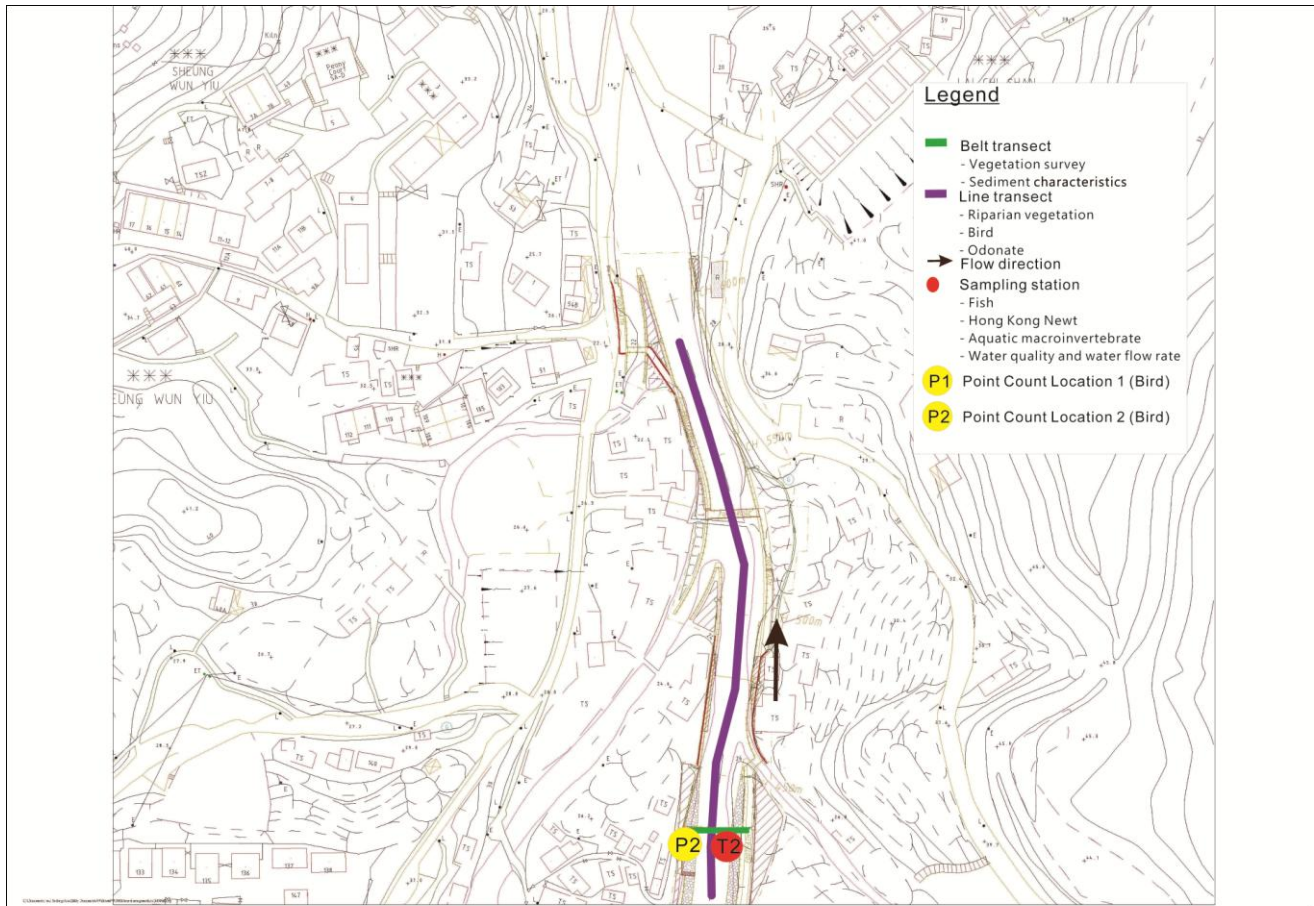


Figure 1-1. Sampling location of impact monitoring at Upper Tai Po River(Lower Section)

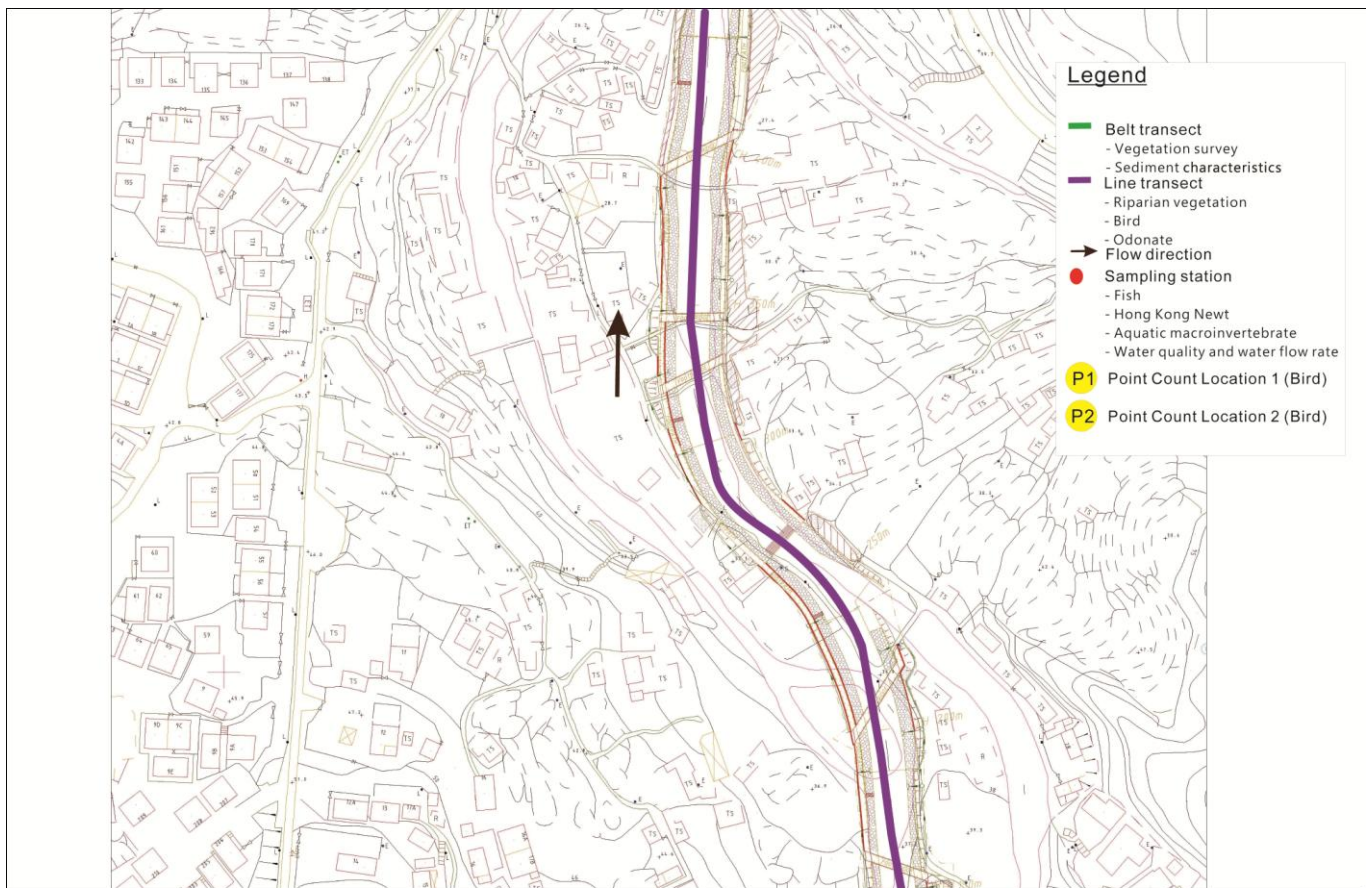


Figure 1-2. Sampling location of impact monitoring at Upper Tai Po River(Middle Section)

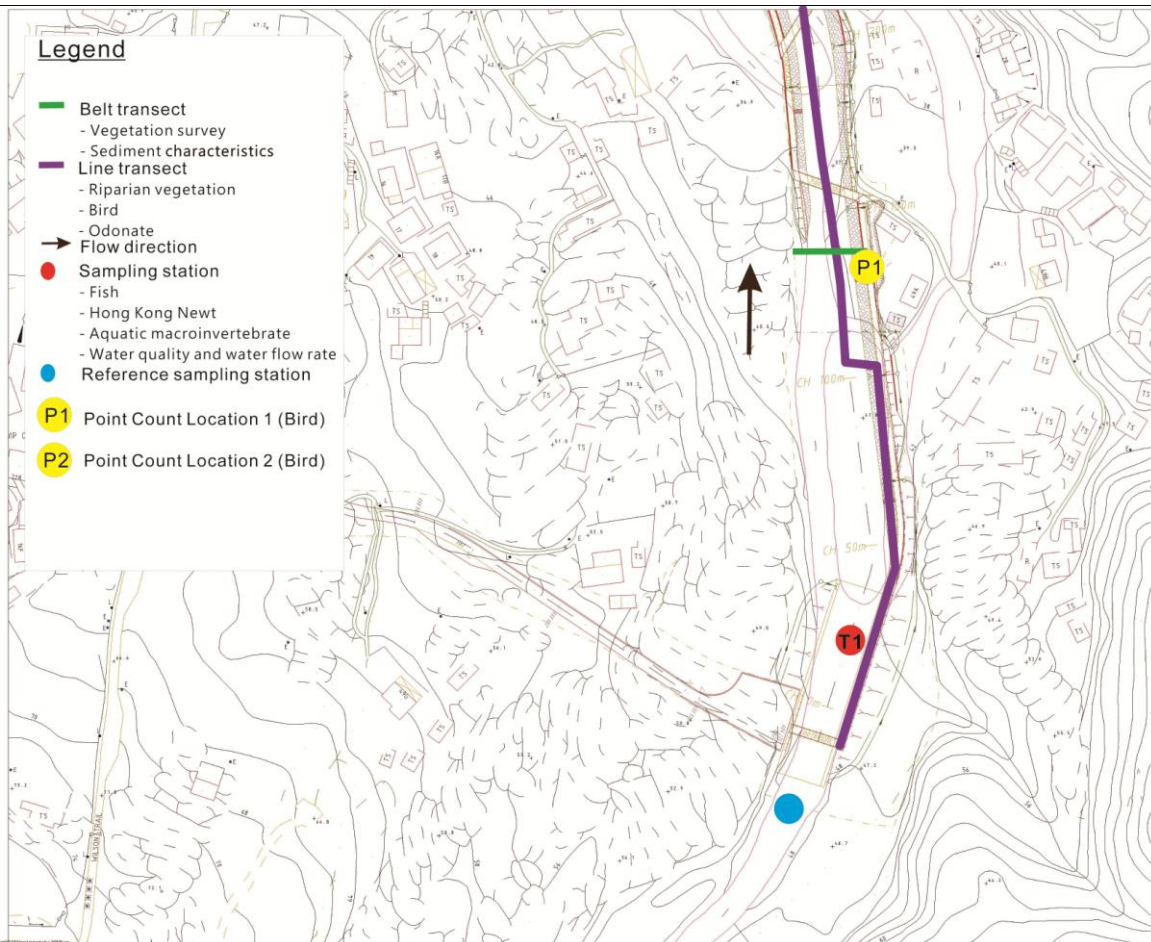


Figure 1-3. Sampling location of Impact monitoring at Upper Tai Po River(Upper Section)

Appendix II.: 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
61(E*)	EP3/N05/RN/0000671-13	09/01/2013	Upper Tai Po River	Muddy water

* : 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.