

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

ENVIRONMENTAL MONITORING AND AUDIT

MONTHLY EM&A REPORT of

UPPER TAI PO RIVER

for August 2010

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Report submission and revision:

First submission on 8th September 2010

Second submission on 14th September 2010

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Executive summary

This is the twenty-fourth 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 Tai Po River”. This report concludes the impact monitoring for the activities undertaken during the period from 1st August 2010 to 31st August 2010. Construction of retaining wall at Access Road D and emergency flood relief works were carried out in this reporting period.

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 inspections records and photos taken were kept.

Ecological impact monitoring was carried out by the Ecologist Dr. Mark Shea on 20th July 2010. Details of the findings please refer to the Appendix J. The summary of ecological site inspection findings and implementation status of environmental protection and mitigation for ecology, prepared by the Ecologist, are provided in table 6.2 and Appendix G respectively.

Environmental Team had carried out construction noise monitoring on weekly basis and no exceedance was found. Noise monitoring records for the reporting month and the data is presented in Section 4. The location plan and the graphical plots presenting the data are provided in Appendix D.

Piling works were not scheduled for this month. Therefore, no vibration monitoring was conducted by ET during the reporting month.

There was no non-compliance recorded for this reporting month.

There was no breach of action and limit levels for this month.

There was no reporting change for this month.

Due to the flooding incident in Sha Po Chai Village on 22 July 2010, emergency flood relief works such as construction of rock grille, construction of an interim bridge and construction of barrier wall to relieve the imminent flood risk posed at Sha Po Tsai Village will be major construction activities to be carried out in the upcoming month.

ET has reminded the contractor to provide environmental pollution control measures wherever necessary and to keep a good environmental management at site practice.

1.0 Introduction

This is the twenty-fourth 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”. The site layout plan is shown in Figure 2.1. The Environmental Team, Environmental Pioneers & Solutions Limited appointed by Chiu Hing Construction and Transportation Company Limited, prepares the report. The report is to be submitted to the Contractor, the Engineer and the IEC.

This report presents the results of the environmental monitoring of the project activities for Upper Tai Po River conducted during the month of August 2010. This included regular site inspections once per week for verification of implementation of the mitigation measures as recommended in the Environmental Permit (EP-223/2005/A) (EP), EM&A Manual and the Contractor’s Environmental Management Plan (EMP).

2.0 Environmental status

2.1 Project area

The location of the project site – Upper Tai Po River starting from Ta Tit Yan of Yai Mo Shan, the Upper Tai Po River 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. While the 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 Project site is indicated in **Figure 2.1**.

2.2 Construction programme

Approximately 0.6km of Upper Tai Po River will be improved to enhance the hydraulic performance of the river. The improvement works comprise the following:

- (1) Re-profiling and realignment of the Channel;
- (2) Inclusion of gabions and retaining wall for bank protection whilst providing a natural channel bed; and
- (3) Re-provisioning of footbridges and footpaths along the channel

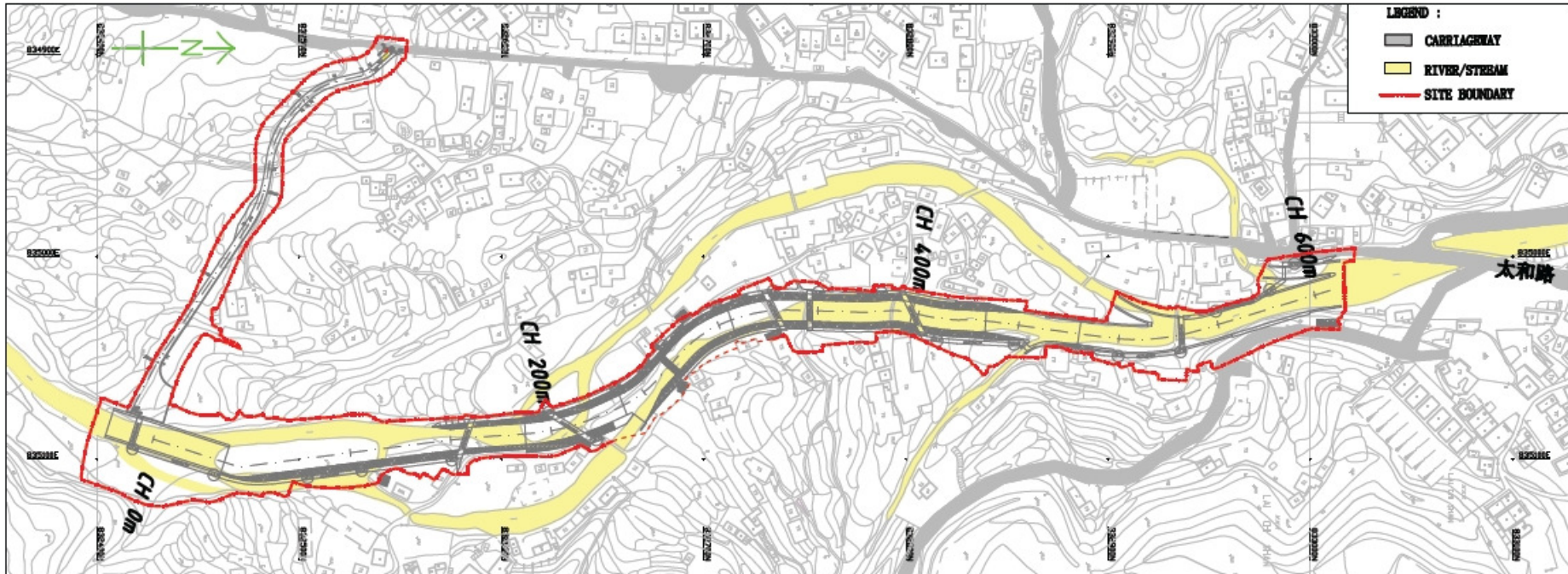
The construction of the proposed improvement works for Upper Tai Po River has been commenced on September 15th 2008 and anticipated to complete in April 2011.

2.3 Proposed construction sequences

The proposed construction sequence is shown in the following sequences:

- (1) Site clearance and preparation works
- (2) Construction of the maintenance access which involves the construction of retaining walls
- (3) River channel construction and excavation, involving the excavation works, construction of retaining walls and gabion walls
- (4) Re-provisioning of footbridges
- (5) Construction of footpaths
- (6) Landscaping works

Fig 2.1 Layout of construction area



Upper Tai Po River

2.4 Construction activities for the reporting period

- (1) Construction of retaining wall at Access Road D.
- (2) Emergency flood relief works, such as channel clearance works, removal of boulders from the stream course, repair and reinstatement of the damaged village houses, assist the villagers to clear sediments from their homes, construction of wire fences, etc.

2.5 Construction activities for the next reporting period

Construction of retaining wall at Access Road D and emergency flood relief works such as construction of rock grille, construction of an interim bridge and construction of barrier wall to relieve the imminent flood risk posed at Sha Po Tsai Village will be major construction activities to be carried out in the upcoming month.

2.6 Non-compliance with the environmental performance limits

There was no non-compliance with the environmental performance limits for this reporting month. The event and action plan for Ecology is shown in Appendix A. The action and limit level for Noise is shown in Appendix B. The reference standards for vibration are shown in Appendix C.

2.7 Summary of complaints

No formal complaint in relation to environmental issue was received in the reporting month. Totally, nine complaints had been received since the commencement of the contract. The cumulative complaint log is shown in Appendix F.

3.0 Ecological monitoring results

Ecological impact monitoring was conducted on 20th July 2010 by the Ecologist Dr. Mark Shea. Details of findings please refer to the ecological impact monitoring report as enclosed in Appendix J of this report.

4.0 Noise monitoring results

In accordance with the EM&A Manual, monitoring locations were established at 11 N.S.R. locations. The description of all 11 N.S.R. are shown in Table 4.1.

TABLE 4.1 Description of Noise Sensitive Receivers

Sensitive Receiver No.	Location and Description
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

Noise monitoring was carried out by the Environmental Team on weekly basis for this reporting month on 6th, 13th, 20th, 27th August 2010.

Measured $L_{eq(30min)}$ results ranged from 51.2dB(A) to 74.8dB(A). And therefore, no exceedance was recorded within the reporting period.

For further details of the monitoring results, graphical plots and the location plan, please refer to the Appendix D.

5.0 Vibration monitoring results

There was no vibration monitoring results for this reporting month. Vibration monitoring will be started once the piling works start in Upper Tai Po River.

6.0 Environmental issues and actions

6.1 Site inspections and key environmental issues

Site inspections were undertaken routinely to inspect the construction activities in Upper Tai Po River to ensure that appropriate environmental protection and pollution control mitigation measures are properly implemented. Implementation status of environmental protection and mitigation measures is shown in Appendix G.

Within this reporting month, site inspections were conducted on 4th, 11th, 18th and 25th August 2010. A detailed checklist of each site inspection together with comments and relevant photos have been filed and kept. The findings from inspection were summarized in Table 6.1.

Ecological inspections by the Ecologist Dr. Mark Shea were carried out on 2nd, 9th, 16th and 23rd August 2010. Details of findings were summarized in Table 6.2.

Table 6.1 Summary results of site inspections findings

Date	Findings	Identification	Advice from ET	Action taken	Closing date	Remarks
04 Aug 10	No particular observation	N/A	N/A	N/A	N/A	--
11 Aug 10	No particular observation	N/A	N/A	N/A	N/A	--
18 & 25 Aug 10	No proper protective measure was implemented for the preserved trees next to the boulder trap structure	Observation	Contractor was advised to implement protective measure, such as erection of fencing, to prevent damage from construction activities	Still outstanding. To be followed during next reporting period	Ongoing	--

The summary of ecological inspection prepared by the Ecologist, Dr. Mark Shea is shown in Table 6.2.

Table 6.2 Summary results of ecological site inspection findings					
Date	Observations	Advice from Ecologist	Action Taken	Closing Date	
02 Aug 2010	No major findings for this inspection	No Advice is required	No Action is required to be taken	N/A	
09 Aug 2010	No major findings for this inspection	No Advice is required	No Action is required to be taken	N/A	
16 Jul 2010	No major findings for this inspection	No Advice is required	No Action is required to be taken	N/A	
23 Aug 2010	No major findings for this inspection	No Advice is required	No Action is required to be taken	N/A	
31 Aug 2010	No major findings for this inspection	No Advice is required	No Action is required to be taken	N/A	

6.2 Non-compliance

There was no non-compliance recorded for the month of August 2010.

6.3 Recommendations

Contractor was recommended to implement proper protective measure to prevent damage from construction activities being carried out at the nearby of preserved trees. Tree protection zone by erection of fencing should be set and site materials should not be placed next to the trees.

6.4 Implementation status and effectiveness of the mitigation measures

Refer the previous table 6.1, contractor has implemented mitigation measures to address those problems as advised by ER, IEC and ET. Some of the measures taken by the contractor were considered as effective to minimize negative impact to the environment. Ongoing investigation will be carried out to observe performance and effectiveness of those measures. Outstanding environmental items will be inspected in the follow month.

7.0 Waste management status

It is the contractor's responsibility to ensure that all wastes produced during construction phase for the drainage improvement works are handled, stored and disposed of in accordance with good waste management practices and EPD's regulation and requirement. Waste materials generated during construction activities such as construction and demolition(C&D) material, chemical wastes and general refuse, are recommended to be audited at regular intervals to ensure that proper storage, transportation and general reuse are recommended to be audited to ensure that proper storage, transportation and disposal practices are being implemented. **Table 7.1** is the Waste Disposal recorded by the Contractor in this month.

From the report of Contractor, C&D materials generated, were all reused and therefore no inert waste was disposed from the project.

The following table showed amount of waste generation, reused and disposed from this project site in this reporting month.

Table 7.1 Summary of Waste generated and disposed in August 2010

Type of waste	Amount generated	Amount reused	Amount disposed
Inert waste	0.265 m ³	0.265 m ³	0
Non-inert waste	0	0	0
Chemical waste	0	0	0

The cumulative waste flow table is shown in Appendix H.

8.0 Status of environmental licensing and permit

This project requires different permits and licenses to be run legally. **Table 8.1** is the summary of permits/ licenses for this project.

Table 8.1 Summary of Environmental Licensing and Permit Status

Description	License / Permit No.	Date of Issue	Date of Expiry	Remarks
Environmental Permit	EP-223/2005	31 st Aug, 2005	N/A	Superseded
Amended Environmental Permit	EP-223/2005/A	18 th Nov, 2008	N/A	Issued
Construction Noise Permit	N/A	N/A	N/A	N/A
Effluent Discharge License	3678	14 th Mar, 2008	31 st Mar, 2013	Issued
Registration as a Chemical Waste Producer	5213-724-C3251-03	19 th Dec, 2007	Not applicable	Issued
Billing Account for Disposal of Construction Waste	7006101	N/A	N/A	N/A

9.0 Future key issues

Land-based construction of retaining wall at Access Road D will be carried out in the upcoming month. And, due to the flooding incident on 22nd July 2010, emergency flood relief works such as Construction of rock grille, construction of an interim bridge and construction of barrier wall to relieve the imminent flood risk posed at Sha Po Tsai Village will be also carried out.

To minimize water quality impact arising from channel clearance works, water quality mitigation measures should be implemented as far as practicable. Any muddy water, underground water or wastewater generated from construction activities should be diverted to proper treatment facility prior to discharge.

For the proposed construction activities, heavy plants and vehicles may be occupied and those would generate certain noise impacts to the sensitive receivers. To minimize noise generation, noisy activities should be well planned and scheduled to avoid parallel operation of multiple plants. Erection of noise barriers and/or movable barriers should be implemented whenever necessary.

Aforesaid construction works may generate wastes on site. Contractor is advised to assign a site area for temporary waste storage and segregation. Wastes accumulation should be prevented on site; licensed waste collection and disposal should be implemented regularly for hygiene issues.

10.0 Conclusion

Construction of retaining wall at Access Road D and emergency flood relief works such as site clearance works, removal of boulders from the stream course, assist villagers to clear sediments from their homes, construction of wire fences, etc. were carried out by the Contractor in this reporting period.

Regular site meetings and inspection audits led by the seniors for discussing environmental issues were held among project proponent, Contractor and the Environmental Team on weekly basis.

Environmental Team had carried out construction noise monitoring on weekly basis. All results obtained were within limit and therefore no exceedance was recorded in this reporting month.

Piling works were not scheduled for this month. Therefore, no vibration monitoring was conducted during the reporting month.

From the summary of ecological site inspection findings and implementation status of environmental protection and mitigation for ecology, prepared by the Ecologist Dr. Mark Shea, there is no abnormal finding observed in the reporting month. The ecologist has no further advice and no action suggested to the contractor.

Ecological impact monitoring was carried out on 20 July and the ecological impact monitoring report was attached in Appendix J.

There was no non-compliance event recorded within this reporting month.

No complaint in relation to environmental issue was recorded in this reporting month.

ET has reminded the contractor to provide environmental pollution control measures wherever necessary; and to keep a good environmental management at site practice.

The ET will continue to implement the environmental monitoring & audit programme in accordance with the EM&A Manual and Environmental Permit requirement.

Appendix A: Event and action plan for ecology

Event and action plan for ecology

In the event of non-compliance, the Event / Action plan prepared by the ecologist shall be followed. Detailed Event/ Action plan was shown in **Appendix Table 1** for reference.

It is not proposed to set population size of the three species (i.e. Three-lined Chinese Stream Catfish, Predaceous and the Hong Kong Newt) or other faunal species for the Action Level and Limit Level in the revised EM&A manual in considering the following reasons:

- I. The schedule capture surveys would let to decrease in the populations of the target species; and
- II. The planned drainage works would also temporally de-fauna the stream habitat.

It is considered logical and appropriate to audit non-compliance events in relation with ecological mitigation measures, which were specified in the EP and the PS of the project.

APPENDIX TABLE 1 Event / Action plan table for Ecology

Event	Action			
	ET	ER	IEC	Contractor
Non-conformity on one occasion	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	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	1. Ensure Remedial measures are properly implemented	1. Amend working methods 2. Rectify damage and undertake any necessary replacement
Repeated Non conformity	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	1. Check monitoring 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	1. Ensure Remedial measures are properly implemented	1. Amend working methods 2. Rectify damage and undertake any necessary replacement

Appendix B: Action and limit level for construction noise

The Action and Limit levels for construction noise are defined in **Appendix Table 2**

Appendix Table 2: Action and Limit Levels for Construction Noise

Time Period	Action	Limit
0700 – 1900 hrs on normal weekdays	When one documented complaint is received	75 dB(A)*
0700 – 2300hrs on holidays; and 1900 – 2300 hrs on all other days		Subject to the control of Noise Control Ordinance
2300 – 0700 hrs of next day		Subject to the control of Noise Control Ordinance

*Limit level set in accordance with Particular Specification Section 26

Appendix C: Reference standards for vibration

Guidance regarding vibration limits is provided by the following British Standards (or their equivalent ISO standards):

BS 7385 - Measurement and evaluation of vibration in buildings. Part 2: Guide to damage levels from ground borne vibration.

BS 7385 suggests vibration levels, below 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.

Appendix Table 3: 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.

The vibration magnitudes and frequencies refer to Peak Particle Velocities (PPV) occurring in any single direction, measured on the ground level of the building concerned.

Appendix D: Noise monitoring results, graphical plots and location plan

Location	Leq 30min	L ₁₀ 30min	L ₉₀ 30min	Date	Time Duration	Major Construction Noise	Other Noise source	Weather	Location description
UTP 1	63.4	66.8	59.2	6-Aug-10	10:54-11:24	The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities	Background noise from traffic	Sunny	Façade
UTP 2	60.4	63.3	57.2	6-Aug-10	11:28-11:58	Excavation & Boulder Breaking	Background noise from traffic	Sunny	Façade
UTP 3	66.8	67.2	64.7	6-Aug-10	15:45-16:15	Excavation & Boulder Breaking	N/A	Sunny	Façade
UTP 4	58.4	60.2	47.6	6-Aug-10	15:11-15:41	Excavation & Boulder Breaking	N/A	Sunny	Façade
UTP 5	68.4	70.2	58.2	6-Aug-10	14:38-15:08	Boulder Breaking	N/A	Sunny	Façade
UTP 6	72.3	75.8	64.7	6-Aug-10	14:05-14:35	Boulder Breaking	N/A	Sunny	Façade
UTP 7	60.4	62.2	58.3	6-Aug-10	13:32-14:02	Excavation & Boulder Movement	N/A	Sunny	Façade
UTP 8	58.8	61.0	56.0	6-Aug-10	13:00-13:30	Excavation & Boulder Movement	N/A	Sunny	Façade
UTP 9	60.8	63.4	56.2	6-Aug-10	10:03-10:33	Excavation & Boulder Movement	N/A	Sunny	Façade
UTP 10	54.7	55.3	51.8	6-Aug-10	09:26-09:56	Boulder Movement	N/A	Sunny	Façade
UTP 11	54.2	54.8	52.7	6-Aug-10	08:52-09:22	Noise from Site Lorries	N/A	Sunny	*Freefield

Note* An Additional of 3dB(A) had been added to the measurement result due to Free Field Correction

Location	Leq 30min	L ₁₀ 30min	L ₉₀ 30min	Date	Time Duration	Major Construction Noise	Other Noise source	Weather	Location description
UTP 1	60.4	65.2	54.1	13-Aug-10	13:33-14:03	The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities	Background noise from traffic	Cloudy	Façade
UTP 2	58.3	61.0	50.3	13-Aug-10	13:00-13:30	Boulder Movement	Background noise from traffic	Cloudy	Façade
UTP 3	63.4	66.8	60.1	13-Aug-10	14:10-14:40	Boulder Movement	N/A	Cloudy	Façade
UTP 4	56.3	57.2	46.8	13-Aug-10	15:18-15:48	Boulder Breaking	N/A	Cloudy	Façade
UTP 5	73.4	78.4	68.8	13-Aug-10	14:45-15:15	Boulder Breaking	N/A	Cloudy	Façade
UTP 6	74.8	80.1	67.3	13-Aug-10	15:50-16:20	Boulder Breaking	N/A	Cloudy	Façade
UTP 7	68.4	72.2	59.6	13-Aug-10	11:17-11:47	Concrete Breaking, Boulder Movement and Boulder Breaking	N/A	Cloudy	Façade
UTP 8	70.3	74.7	59.4	13-Aug-10	10:45-11:15	Concrete Breaking and Operation of Power Generator	N/A	Cloudy	Façade
UTP 9	63.4	65.4	56.1	13-Aug-10	10:11-10:41	Boulder Movement and Concrete Breaking	N/A	Cloudy	Façade
UTP 10	51.2	52.4	46.3	13-Aug-10	09:34-10:04	The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities	N/A	Cloudy	Façade
UTP 11	56.4	56.3	54.0	13-Aug-10	09:00-09:30	The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities	N/A	Cloudy	*Freefield

Note* An Additional of 3dB(A) had been added to the measurement result due to Free Field Correction

Location	Leq 30min	L ₁₀ 30min	L ₉₀ 30min	Date	Time Duration	Major Construction Noise	Other Noise source	Weather	Location description
UTP 1	62.2	67.3	51.2	20-Aug-10	13:36-14:06	The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities	Background noise from traffic	Summy	Façade
UTP 2	56.8	61.2	50.3	20-Aug-10	13:00-13:30	Operation Noise from Excavator	Background noise from traffic	Summy	Façade
UTP 3	63.2	64.6	61.8	20-Aug-10	14:10-14:40	Operation Noise from Excavator	N/A	Summy	Façade
UTP 4	53.4	55.0	43.2	20-Aug-10	14:43-15:13	The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities	N/A	Summy	Façade
UTP 5	64.2	68.4	49.3	20-Aug-10	15:17-15:47	Operation Noise from Excavator	N/A	Summy	Façade
UTP 6	56.5	55.0	52.3	20-Aug-10	15:49-16:19	The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities	N/A	Summy	Façade
UTP 7	63.3	66.1	57.2	20-Aug-10	11:04-11:34	Concrete Breaking	N/A	Summy	Façade
UTP 8	71.4	76.6	55.1	20-Aug-10	10:30-11:00	Concrete Breaking and Noise from Power Generator	N/A	Summy	Façade
UTP 9	63.4	70.2	52.2	20-Aug-10	09:55-10:25	Boulder Movement and Boulder Breaking	N/A	Summy	Façade
UTP 10	52.2	53.0	41.2	20-Aug-10	09:18-09:48	The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities	N/A	Summy	Façade
UTP 11	54.7	57.3	44.0	20-Aug-10	08:45-09:15	Transportation Noise from Site Lorries	N/A	Summy	*Freefield

Note* An Additional of 3dB(A) had been added to the measurement result due to Free Field Correction

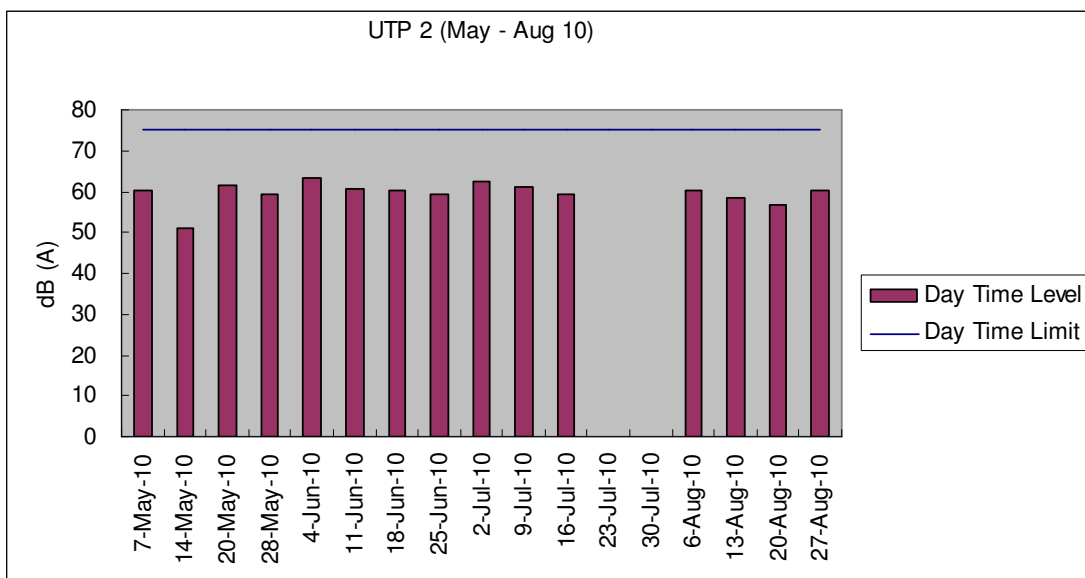
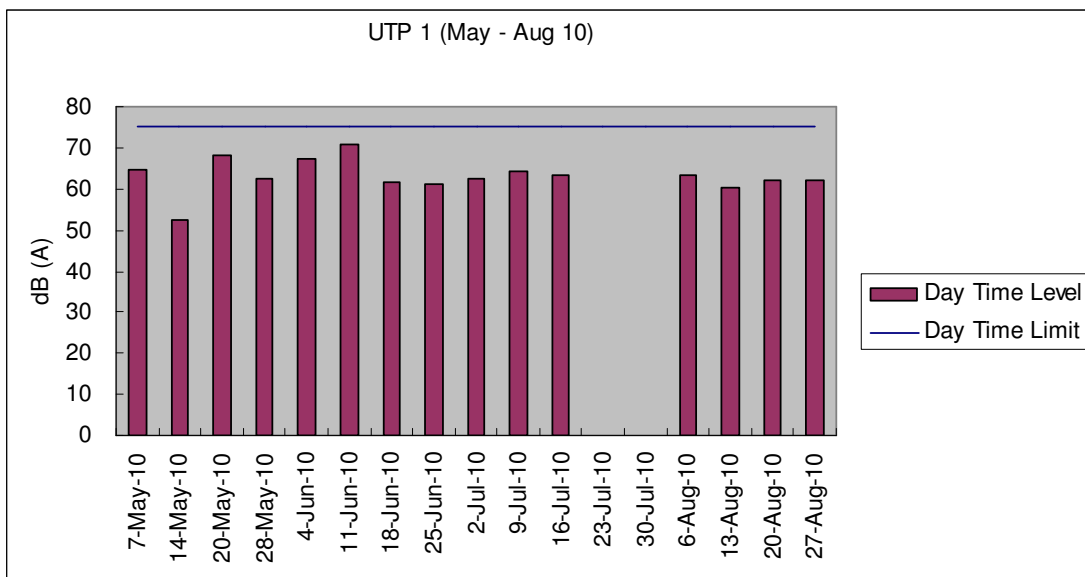
Location	Leq 30min	L ₁₀ 30min	L ₉₀ 30min	Date	Time Duration	Major Construction Noise	Other Noise source	Weather	Location description
UTP 1	62.2	65.5	53.4	27-Aug-10	11:26-11:56	The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities	Background noise from traffic	Sunny	Façade
UTP 2	60.3	63.4	52.7	27-Aug-10	10:50-11:20	Boulder Breaking	Background noise from traffic	Sunny	Façade
UTP 3	62.6	63.0	60.8	27-Aug-10	15:44-16:14	Boulder Breaking	N/A	Sunny	Façade
UTP 4	57.2	58.0	47.0	27-Aug-10	15:09-15:39	The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities	N/A	Sunny	Façade
UTP 5	64.4	68.3	50.4	27-Aug-10	14:37-15:07	Boulder Breaking	N/A	Sunny	Façade
UTP 6	61.4	63.8	52.3	27-Aug-10	14:05-14:35	Boulder Breaking	N/A	Sunny	Façade
UTP 7	73.4	78.6	66.2	27-Aug-10	13:32-14:02	Boulder Breaking and Boulder Movement	N/A	Sunny	Façade
UTP 8	70.7	77.2	64.1	27-Aug-10	13:00-13:30	Boulder Breaking and Boulder Movement	N/A	Sunny	Façade
UTP 9	58.8	60.2	48.4	27-Aug-10	10:08-10:38	Boulder Movement	N/A	Sunny	Façade
UTP 10	51.8	51.6	41.8	27-Aug-10	09:30-10:00	The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities	N/A	Sunny	Façade
UTP 11	54.3	51.3	43.4	27-Aug-10	08:57-09:27	The measured noise level was dominated by the background noise in the immediate vicinity of the monitoring location due to its large distance from the construction activities	N/A	Sunny	*Freefield

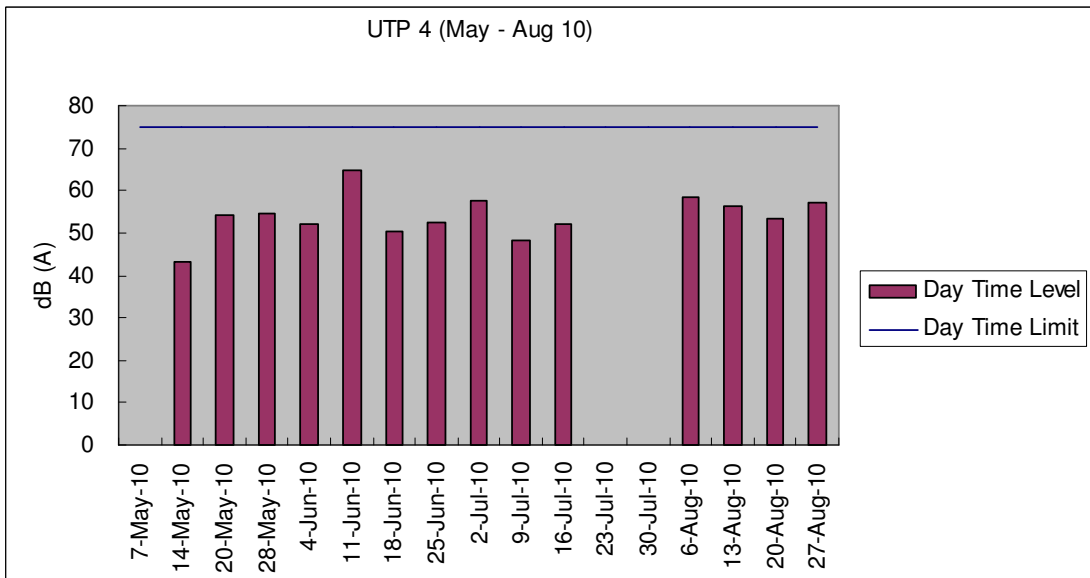
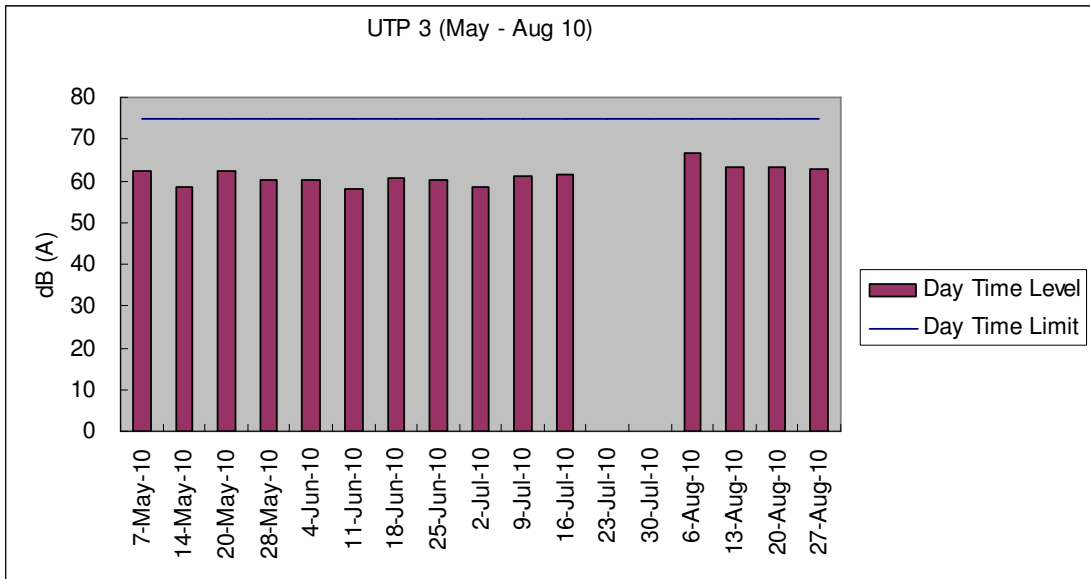
Note* An Additional of 3dB(A) had been added to the measurement result due to Free Field Correction

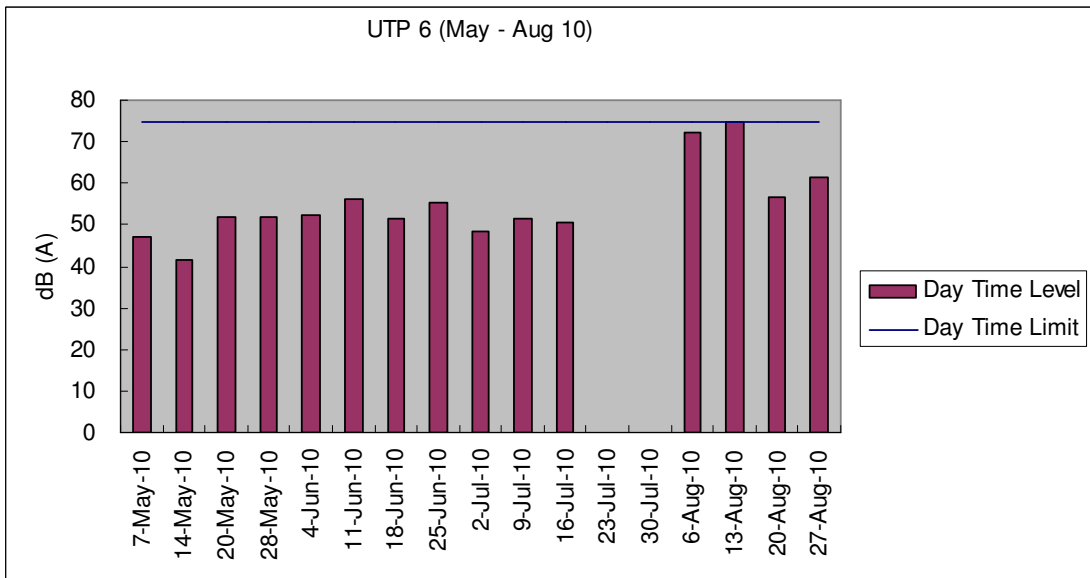
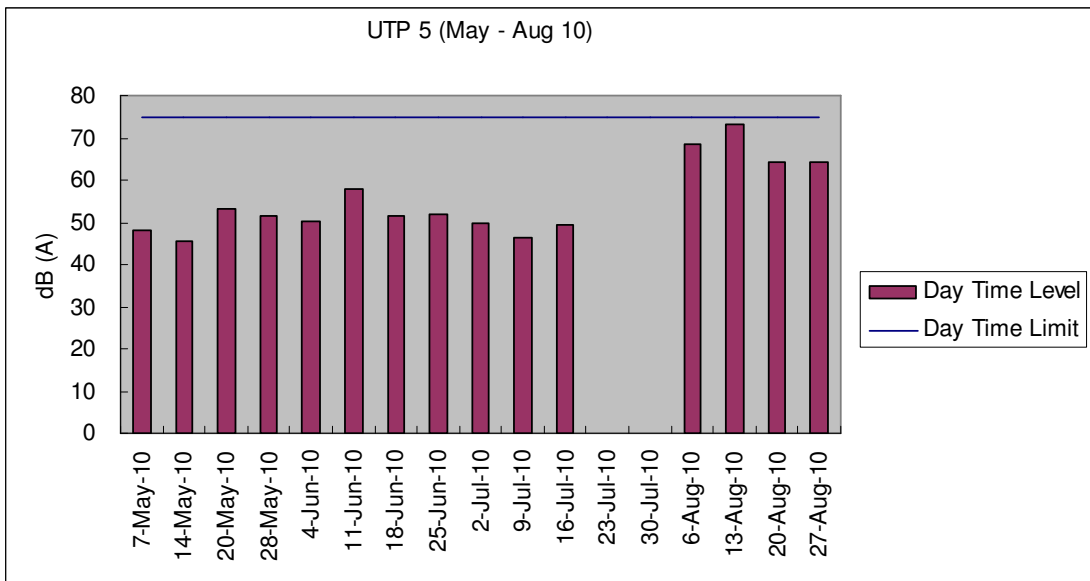
Graphical plot for noise measurements

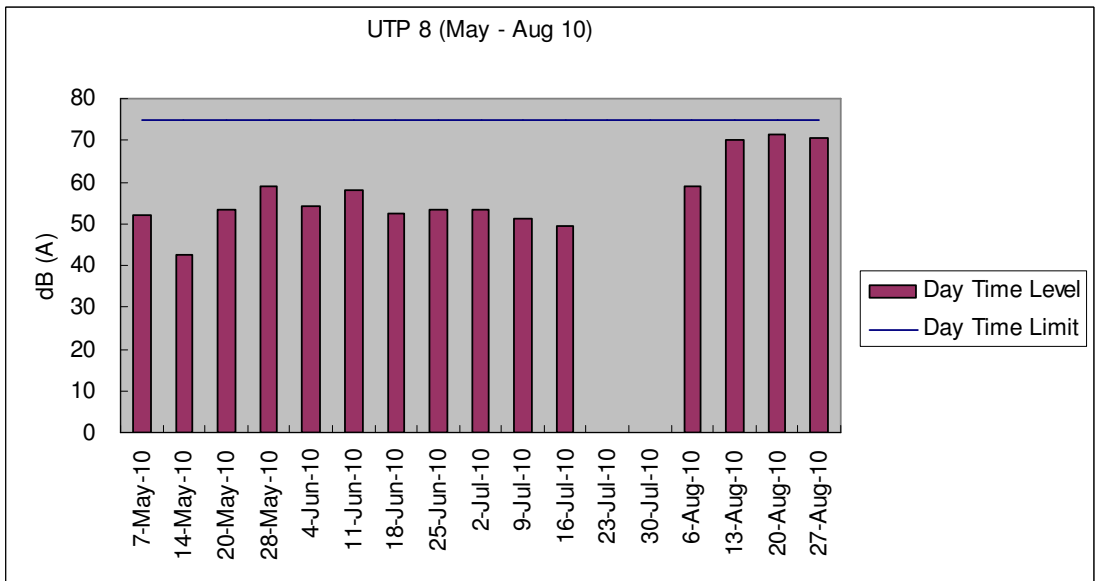
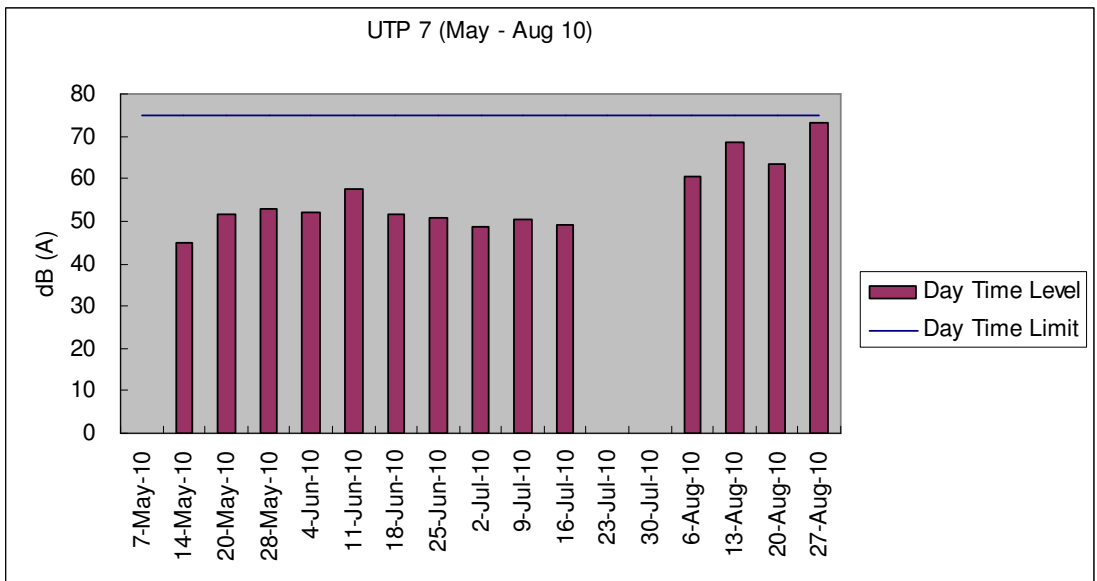
The followings were the graphical plots for the 11 monitoring locations. Each plot showed the date of measurement taken, day time limit of 75 dB(A) as well as the measured daytime level for each location. The graphs contain the data recorded from May 2010 to August 2010.

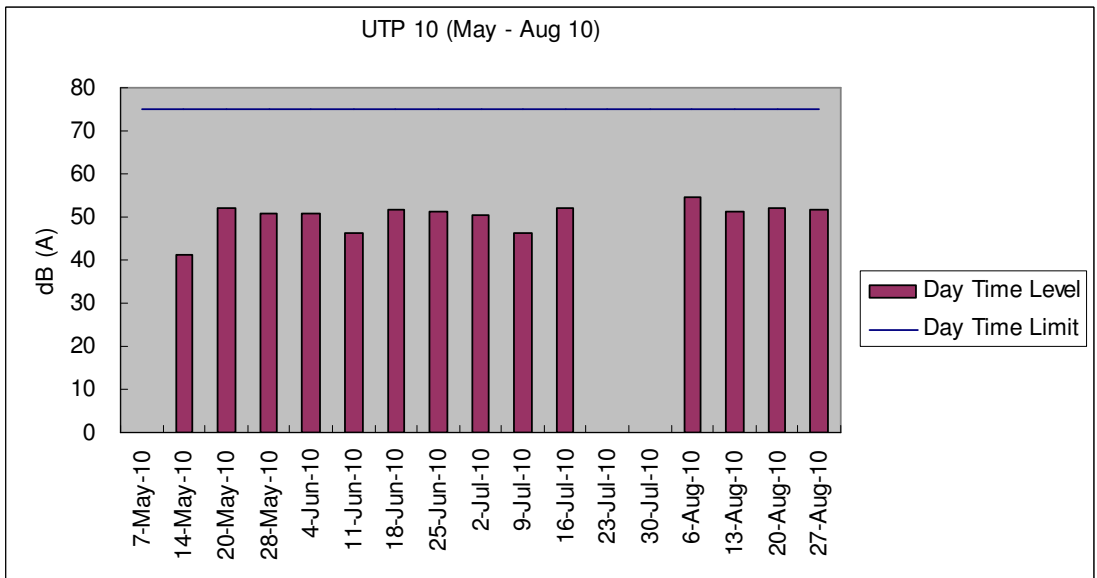
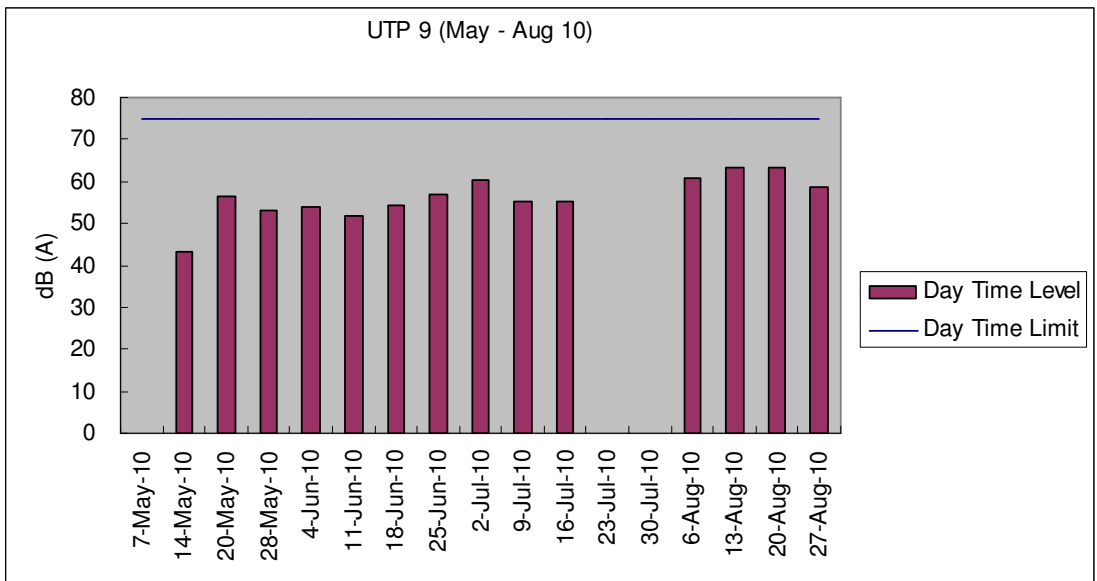
Noise monitoring at monitoring stations UTP4, 7, 9, 10 and 11 on 7th May 2010 were cancelled due to the rainy weather, while noise monitoring originally proposed to be carried out 23rd and 30th July 2010 were cancelled due to the effect of flooding incident at UTPR.

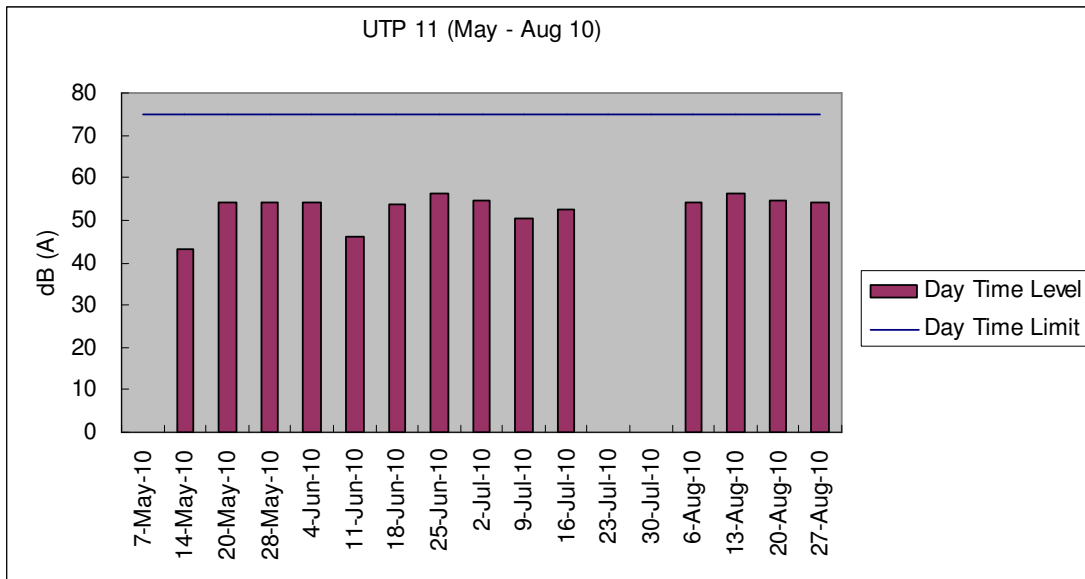


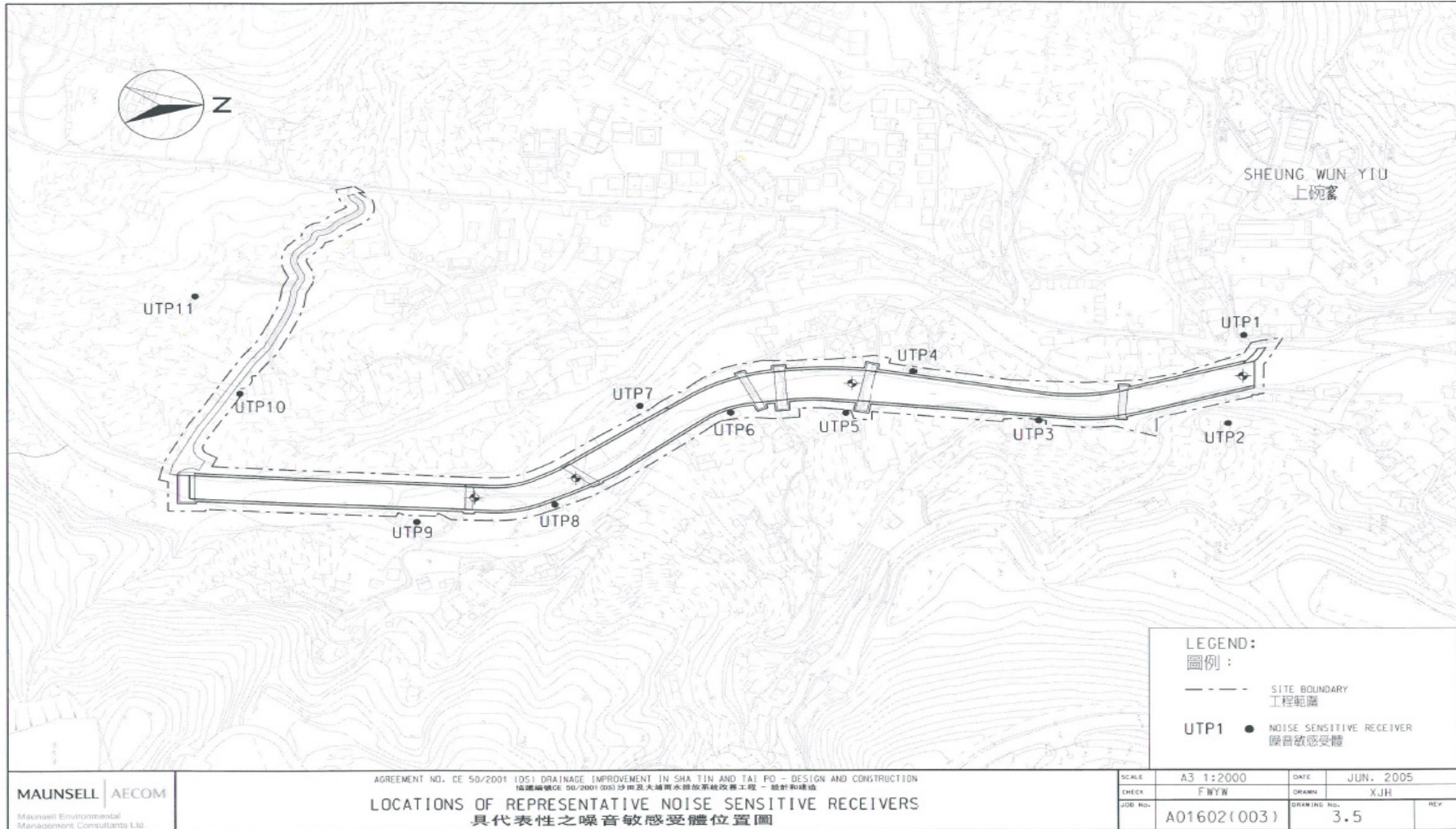












Appendix E: Monitoring schedule for the present and next reporting period

Master Schedule of EM&A works in August 2010

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
01/08	02/08	03/08	04/08	05/08	06/08	07/08
	Ecological site inspection		Site inspection at afternoon		Noise monitoring	
08/08	09/08	10/08	11/08	12/08	13/08	14/08
	Ecological site inspection		Site inspection at afternoon		Noise monitoring	
15/08	16/08	17/08	18/08	19/08	20/08	21/08
	Ecological site inspection		Site inspection at afternoon		Noise monitoring	
22/08	23/08	24/08	25/08	26/08	27/08	28/08
	Ecological site inspection		Site inspection and SSEMC at morning		Noise monitoring	
29/08	30/08	31/08				
		Ecological site inspection				

Master Schedule of EM&A works in September 2010

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
			01/09	02/09	03/09	04/09
			Site inspection at afternoon		Noise monitoring	
05/09	06/09	07/09	08/09	09/09	10/09	11/09
	Ecological site inspection		Site inspection at afternoon		Noise monitoring	
12/09	13/09	14/09	15/09	16/09	17/09	18/09
	Ecological site inspection		Site inspection at afternoon		Noise monitoring	
19/09	20/09	21/09	22/09	23/09	24/09	25/09
	Ecological site inspection		Site inspection and SSEMC at morning		Noise monitoring	
26/09	28/09	29/09	30/09			
	Ecological site inspection		Site inspection at afternoon			

Appendix F: Cumulative complaint log

Environmental Parameters	Cumulative no. Brought forward	No. of complaint August 2010	Overall Total
Air/Dust	1	0	1
Noise	2	0	2
Water	6	0	6
House Keeping Hygiene	0	0	0
Chemical waste	0	0	0
Total	9	0	9

Appendix G: Implementation status of environmental protection and mitigation measures

Implementation status of environmental protection and mitigation

Environmental Aspect	Protection / Mitigation Measures	Implementation status	Follow-up action
Construction Noise	No percussive piling shall be carried out	Implemented	Not required
	-Use well maintained construction plant	Implemented	Not required
	-Shut down plants between work periods	Implemented	Not required
	-Install silencers on construction equipment	Implemented	Not required
	-Locate mobile plant far away from NSRs	Implemented	Not required
	-Quiet plants should be used	Implemented	Not required
	-2m high temporary noise barriers, as stipulated in EP condition 2.9, shall be installed	Implemented	Not required
Fugitive Dust Emission	-Implement regular watering and vehicle washing facilities	Implemented	Not required
	-Cover excavated or stockpile of dusty material by impervious sheeting or sprayed with water	Implemented	Not required
	-Use tarpaulin to cover dusty materials on vehicles	Implemented	Not required
Water Quality	Excavation works within the Tai Po River within the Project shall be carried out in stages and excavation area for each stage shall be limited to section of half width of the channel and less than 100m long at any one time in order to maintain water flow within the river during construction stage	Implemented	Not required
	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	Implemented	Not required
	Large boulders removed from the Tai Po River within the Project during excavation shall be re-instated upon completion of works A section of 150m long natural riverbank on the western side of the river channel (Ch0 –Ch150) shall be retained	Implemented	Not required
	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	Implemented	Not required

	Provide silt trap and oil interceptor to remove the oil, lubricants, grease, silt, grit and debris from the wastewater before pumped to the public storm water drainage system	Implemented	Not required
	Provide site toilet facilities	Implemented	Not required
Waste Management	Reuse excavated material as far as possible	Implemented	Not required
	Recycle scrap metals or abandoned equipment	Implemented	Not required
	Adopt a trip ticket system for the disposal of C&D materials	Implemented	Not required
	All general refuse should be segregated and stored in enclosed bins or compaction units	Implemented	Not required
Vibration	Percussive piling is to be replaced by bore-hole piling to minimize vibration impacts to the two identified Declared monuments	Not applicable at this stage	Not required
	Carrying out of vibration monitoring to ensure that vibration associated with the construction phase do not exceed the threshold limit otherwise contractor have to review the work method and construction activities have to be slow down or rescheduled to reduce the impacts	Not applicable at this stage	Not required
	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 equipments immediately	Not Applicable at this stage	Not required

Implementation status of environmental protection and mitigation for ecology,
 prepared by the Ecologist, Dr. Mark Shea.

Environmental Aspect	Protection / Mitigation Measures	Implementation status	Follow-up action
Ecology	Large boulders will be returned to the riverbed following the excavation works.	Not applicable	Not required
	Construction works from Ch. 0.0m – Ch. 150m would be along one side of the river only	Not applicable	Not required
	Approximately 150m of the existing natural riverbank on the western side of the river would be retained.	Implemented	Not required
	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.	Implemented	Not required
	Flows to the area downstream shall be maintained at all times during the construction phase	Implemented	Not required
	Capture survey shall be conducted within the Tai Po River before commencement of works. The captured target species shall be relocated to areas of the watercourse upstream of the watercourse upstream of the Tai Po River	Capture surveys had been conducted at the beginning of the Contract, during the wet season July/August 2008, 4 th November 2008 and 27 th , 28 th October 2009	Not required
	Temporary noise barriers should be constructed to control noise impacts to habitats and associated wildlife within and adjacent to the proposed works area	Implemented	Not required
	Excavation works shall be carried out by land based plant within enclosed dry section of river channel.	Implemented	Not required
	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.	Not applicable	Not required
Operation phase activities in the improved drainage channel would be limited to periodic channel maintenance such as de-silting.	Not applicable	Not required	

Appendix H: Cumulative waste flow tableCumulative waste flow table showing amount of wastes generated, reused and disposed since 15th September 2008

Type of waste	Inert Waste			Non-Inert Waste			Chemical Waste		
	Amount generated	Amount reused	Amount disposed	Amount generated	Amount reused	Amount disposed*	Amount generated	Amount reused	Amount disposed*
Year 2008 to 2009	36.9m ³	0	36.9m ³	2 tonnes	0	2 tonnes	20kg	0	20kg
January 2010	0	0	0	0	0	0	0	0	0
February 2010	205m ³	205m ³	0	0	0	0	0	0	0
March 2010	125m ³	125m ³	0	0	0	0	0	0	0
April 2010	354m ³	354m ³	0	0	0	0	0	0	0
May 2010	13m ³	13m ³	0	0	0	0	0	0	0
June 2010	10m ³	10m ³	0	0.02 tonnes	0	0.02 tonnes	0	0	0
July 2010	10m ³	10m ³	0	0	0	0	0	0	0
August 2010	265m ³	265m ³	0	0	0	0	0	0	0
Total	1018.9m³	982m³	36.9m³	2.02 tonnes	0	2.02 tonnes	20kg	0	20kg

Remark*: Chemical wastes and general wastes generated from the project sites including Upper Tai Po River, Lam Tsuen River and She Shan River were centralized for disposal.

Appendix I: Construction programme

Appendix J: Ecological Impact Monitoring Report (July 2010)

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. 4)
Upper Tai Po River

July 2010



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. 4) Upper Tai Po River

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FIGURES

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

TABLE

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

Table 5-2. Flora species recorded from belt transect survey at the Upper Tai Po River

Table 5-3 Avifauna recorded along survey transects and at two selected point count locations at Upper Tai Po River.

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

Table 5-5 Aquatic Macro invertebrates recorded at Upper Tai Po River.

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

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

PHOTOS

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.
- 1.4 This is the number 4 ecological impact monitoring report for the project conducted in July 2010. It contents the following subsections:
 - Summary of major points
 - Summary of the construction activities for the month
 - 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 19th July 2010;
- Stream habitat at most sections of Upper Tai Po River (Photo 1) was changed due to drainage works; and
- 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 1 environmental assistant from Chiu Hing Construction & Transportation Co. Ltd).
- The number of target stream fauna (i.e., fish, *Parazacco spilurus*) recorded in July 2010 was lower than those recorded during baseline monitoring (before fish capture/relocation took place). Low fish population of *Parazacco spilurus* was partially due to habitat loss caused by drainage works and partially due to the fact that the target stream fauna have not restored to normal level after previous capture/relocation operations. The other target species including fish (*Pseudobagrus trilineatus*) and Hong Kong Newt (*Paramesotriton hongkongensis*) were not found within works area during both baseline and impact monitoring.

3 Summary of The Construction Activities

3.1 Major construction activities carried out by the contractor during this reporting period include:

- Site clearance;
- Haul road formation;
- Excavation and installation of gabion wall;
- Excavation and installation of retaining wall;
- Drainage diversion works;
- Placement of toe stones and substrates
- Footbridge construction.
- Box Culvert construction
- Construction of retaining wall
- Construction of fencing

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. 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.

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 (Photo 2), hand nets and direct observation methods. Active searching at night (photo 3) for *Pseudobagrus trilineatus* has also been carried out. Sampling was conducted at two proposed sampling locations, i.e. upper and lower sections of the river and covered major type of stream habitats, e.g. stream pool and riffle. The number of the captured or observed fish was estimated and recorded. Nomenclature and protection status of the species followed those documented in the AFCD website (www.hkbiddiversity.net) and Virginia et al (2004).

4.3 Aquatic Macro-invertebrates

Macro-invertebrates in the likely affected streams was surveyed. Two sampling sites within the affected stream sites was designed to collect necessary macroinvertebrate fauna for ecological impact monitoring

information. Three replicates was taken at each sampling point and pool together for further sample process. Kick sampling (photo 4) and hand netting was the main survey methodologies for stream organisms. Dissection microscope, digital camera was used to aid identification and enumeration. Numerical abundance, species identity was recorded. Nomenclature and protection status of the species will follow those documented in the AFCD website (www.hkiddiversity.net) and other literatures such as Dudgeon (1999)

4.4 Adult Odonate Survey

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

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.hkbiodiversity.net) and Hong Kong Herbarium (2004).

4.6 Abiotic Data Collection

Water quality monitoring

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

Sediment Characteristics

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

Water flow

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

5 Monitoring Results

5.1 Vegetation

Vegetation growing along the affected stream was surveyed at Upper Tai Po River. About 39 flora species were recorded within the survey transects along the affected stream courses. Most recorded floras were common wetland species. Most vegetation along the stream section was cleared in order to construct temporary access road and new embankment. Generally, the height of the dominated riparian grass and herb species were in a range from 0.5m to 4m. No rare or protected flora species were 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, 19 species of birds were recorded during bird surveys. 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**. In total, 6 species of dragonfly species were recorded during the surveys in current wet season. The recorded species was common and abundant in Hong Kong (Keith, 2003). Sampling location was shown on **Figure 1-1 to 1-3**.

5.2.3 Hong Kong Newt

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

5.2.4 Aquatic Macro-invertebrates

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

The stream benthos fauna collected was mainly comprised of insects, mollusks and as well as fish. The mollusk fauna of the stream was dominated by snail species of *Sinotaia quadrata* at the lower river channel. Most area of the affected upper stream section was covered with geo-textile sheet. No benthos was collected at the upper stream section. Apparently, stream benthic fauna was temporally de-faunated as a result of engineering works. 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, 9 species freshwater fish were recorded. Exotic fish such as *Gambusia affinis* and *Xiphophorus hellerii* was commonly recorded in lower river section. The pelagic fish, *Parazacco spilurus* which have conservation interest, was

restricted in the upper section of the surveyed river outside the works boundary where the water was unpolluted. Small number of *Parazacco spilurus* were recorded within the works area at upper stream section. It may be partially due to habitat loss caused by drainage works and partially due to the fact that the target stream fauna have not restored to normal level after previous capture/relocation operations. Generally, most of the recorded fish fauna are common species in Hong Kong. *Parazacco spilurus* is a common freshwater fish species in Hong Kong but it was listed as vulnerable in China Red Data Book (hkbiodiversity website) and some of them were captures and released to an undisturbed upper stream habitat before construction works on 28th October 2009. The locally rare fish species of Three-lined Chinese Stream Catfish was not recorded at affected stream section during day and night time surveys during both baseline and impact monitoring periods Details of recorded of fish fauna refers to **Table 5-6**. Sampling location was shown on **Figure 1-1 to 1-3**.

5.3 Abiotic data

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

Generally, the water quality was found polluted at lower stream section mainly due to the domestic sewage discharge from villages. Concentration of nitrate and Ammonia were high (0.5 mg/L and 0.20 mg/L respectively) in lower stream section as shown in Table 4-7. DO was generally higher at upper stream section. Salinity was low, and it was indicated that the stream was not affected by tidal effect.

The stream substratum was comprised of over 80% stones or rocks at most of the stream sections with moderate water flow (up to 0.2m/second at pool and 0.6m/second at riffle). Water margin of the lower stream sections was grown with various plants. This type of stream provides preferred habitats for stream fauna including fish and invertebrates. The stream bank along the stream was covered with geo-textile sheet to prevent the site run off as part of erosion control measures undertaken. Most vegetation was cleared and it would be planted or recolonised in late stage of the construction period.

6 Audit/review of monitoring results

Total population was decreased for the concerned Fish (*Parazacco spilurus*) population in the current monitoring period than those recorded in baseline ecology report. Reduced fish population including *Parazacco spilurus* was partially due to habitat loss caused by drainage works. The seasonality and the removal of fish from the previous capture/relocation exercise on 4th November 2008 and 28th October 2009 were also partially causing the reduction fish population. Therefore, the total population for the concerned Fish was decreased.

7 Remedial measures adopted to restore the adverse condition

None

8 Record of complaints and remedial measures

There were some 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 include:

- (1) Construction of retaining wall
- (2) Construction of fencing

10 Comments and Conclusions

Ecological impact monitoring was carried out during July 2010 and relevant biotic and abiotic data was collected according to the project specification and the EM & A Manual. One of the three target freshwater fauna species, i.e., fish *Parazacco spilurus*, was recorded at upper stream section outside the works boundary. The reduced population of the fish was partially due to habitat loss caused by drainage works and partially due to the fact that the target stream fauna have not restored to normal level after previous capture/relocation operations conducted on 4th November 2008 and 28th October 2009. The fish was commonly seen in more upper stream courses which would be the source for late re-colonization of the newly built river channel. The locally rare fish species of Three-lined Chinese Stream Catfish and the Hong Kong Newt were not recorded at the affected stream section during day and night time surveys conducted for both baseline and impact monitoring.

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

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

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PHOTOS

River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River
Ecological Impact Monitoring Report



Photo 1: General view of the works area



Photo 2: Fish survey



Photo 3: Night survey



Photo 4: Stream benthos sampling

TABLE

Contract No. DC/2007/06

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

Ecological Impact Monitoring Programme

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

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	Chinese name	Impact monitoring					
			Reference		Jul-10		T2	
			Height(cm)	%	Height(cm)	%	Height(cm)	%
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
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐	5	5				
Araceae	<i>Alocasia odora</i>	海芋					2	10
Araceae	<i>Colocasia esculenta</i>	芋						
Myrtaceae	<i>Cleistocalyx operculatus</i>	水翁	0.4	10				
Athyriaceae	<i>Callipteris esculenta</i>	菜蕨	0.8	6				
Gramineae	<i>Phragmites karka</i>	卡開蘆	1.5	10				
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>	鴨躑草			0.5	20		
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						
Bare Gound				9		15		65

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

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

Common Name	Species name	Chinese name	Status	Common-ness	Baseline survey			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			
					Oct-07			Jan-09			Jul-09			Jan-10			Jul-10			
					Abundance			Abundance			Abundance			Abundance			Abundance			
T	PC1	PC2	T	PC1	PC2	T	PC1	PC2	T	PC1	PC2	T	PC1	PC2	T	PC1	PC2			
Black Kite	<i>Milvus lineatus</i>	鷹	R	C	+															
Black -crown Night Heron	<i>Nycticorax nycticorax</i>	夜鷺	R	U														+		
Black-necked Starling	<i>Sturnus nigricollis</i>	黑領椋鳥	R	C	+	1	1						+					+		
Chinese Bulbul	<i>Pycnonotus sinensis</i>	白頭鵲	R	C	+	3	2	++	5	6	++	4	7	+++	7	6	+++	6	3	
Chinese Pond Heron	<i>Ardeola bacchus</i>	池鷺	R	C	+			++	6	3	+	2	3	++	3	3	++	2	2	
Common Kingfisher	<i>Alcedo atthis</i>	普通翠鳥	R	C	+													+		
Common Koel	<i>Eudynamis scolopacea</i>	噪鳥	R	C	+											2				
Common Sandpiper	<i>Actitis hypoleucos</i>	磯鶯	WV&PM	C	+															
Common Tailorbird	<i>Orthotomus sutorius</i>	長尾縫葉鶯	R	C	+		1	+	1	1	+		1	++		10	+	1		
Crested Myna	<i>Acridotheres cristatellus</i>	八哥	R	C		1												+		
Domestic pigeon	<i>Columba sp.</i>	鴿				3												+		
Great Coucal	<i>Centropus sinensis</i>	褐翅鴉鵂	R	C	+	1												+		
Grey Wagtail	<i>Motacilla cinerea</i>	灰鶺鴒	WV	C																
Japanese White Eye	<i>Zosterops japonica</i>	暗綠繡眼鳥	R	C		2		++	2	3	+	1	4	+++	4	6	++	3	2	
Little Egret	<i>Egretta garzetta</i>	小白鷺	R	C	+			+	1		+		1	+		1	+	1	1	
Rufous-backed Shrike	<i>Lanius schach</i>	棕背伯勞	R	C										+	1			+	1	
Magpie	<i>Pica pica</i>	喜鵲	R	C		1														
Magpie Robin	<i>Copsychus saularis</i>	鵲鴝	R	C	+	1	1				+	1	3	+	2	1	+	2	2	
Olive Backed pipit	<i>Anthus hodgsoni</i>	樹鶯	WV	C	+			+	1	3										
Crested bulbul	<i>Pycnonotus jocosus</i>	紅耳鵲	R	C	+	2		+++	6	7	++	2	6	+++	4	5	++	3	2	
Spotted Dove	<i>Streptopelia chinensis</i>	珠頸斑鳩	R	C	+		2	+	1		+	1	3	+	1	2	+	1	1	
Spotted Munia	<i>Lonchura punctulata</i>	斑文鳥	R	U																
Tree Sparrow	<i>Passer montanus</i>	麻雀	R	C	+	3	2							+				+	4	3
Violet Whistling Thrush	<i>Myiophonus caeruleus</i>	紫嘯鶇	R	C	+															
White Wagtail	<i>Motacilla alba</i>	白鶺鴒	WV	C	+		1							++	2	3	+	1	1	
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	白胸苦惡鳥	R	C	+									+		1	+		1	
Yellow Bellid Prinia	<i>Prinia flaviventris</i>	灰頭鷓鴣	R	C	+															
Yellow Wagtail	<i>Motacilla flava</i>	黃鶺鴒	WV&PM	U		1														
Little Swift	<i>Apus affinis</i>	小白腰雨燕	R, SpM	C																
Green Sandpiper	<i>Tringa ochropus</i>	白腰草鶯	WV	U																
Barn Swallow	<i>Hirundo rustica</i>	家燕	PM	C																
Great Tit	<i>Parus major (commixtus)</i>	大山雀	R	C										+	2	1	+	1		
Blue Magpie	<i>Urocissa erythrorhyncha</i>	紅咀藍鶇	R	C										+		2				
Scarlet Minivet	<i>Pericrocotus flammeus</i>	赤紅山椒鳥	R	C										+						
Scarlet-backed Flowerpecker	<i>Dicaeum cruentatum</i>	朱背啄花鳥	R	C										+						
Number of birds									23	23		11	28		26	43		27	19	
No. of species									8	8	6	8	6	8	18	9	13	19	13	11

Note: R – Resident; WV – Winter visitor; PM – Passage migrant; C – Common; U – Uncommon

SpM – Spring migrant; T – transect count; PC1 – Point count location 1; PC2 – Point count location 2

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

Species	Common name	Chinese name	Status	Commonness	Baseline survey				Impact monitoring		
					Oct-07	Jan-09	Jul-09	Jan-10	Jul-10		
<i>Orthetrum chrysis</i>	Red-faced Skimmer	華麗灰蜻	NP	VC		+		+		+	
<i>Crocothemis servilia servilia</i>	Crimson Darter	紅蜻	NP	VC				+		+	
<i>Copera marginipes</i>	Yellow Featherlegs	黃夾扇蠅	NP	VC							
<i>Prodasineura autumnalis</i>	Black Threadtail	烏齒原蠅	NP	VC							
<i>Trithemis festiva</i>	Indigo Dropwing	藍褐蜻	NP	VC							
<i>Neurobasis chinensis</i>	Chinese Greenwing	華艷色蠅	NP	C						+	
<i>Rhinocypha perforata</i>	Common Blue Jewel	三斑鼻蠅	NP	VC						+	
<i>Pantala flavescens</i>	Wandering Glider	黃蜻	NP	VC			+		+	+	
<i>Orthetrum glaucum</i>	Common blue skimmer	黑尾灰蜻	NP	VC			+		+		
<i>Trithemis Aurora</i>	Crimson dropwing	曉靑	NP	VC			+			+	

Note: NP – Not protected in Hong Kong

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

“+” – Species exists in the survey site

“++” – Species common in the survey site

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

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

Species	Chinese name	Sampling point	Baseline survey		Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring		
			Oct-07		Jan-09			Jul-09			Jan-10			Jul-10		
			T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2
Invertebrates																
<i>Pomacea canaliculata</i>	蘋果螺	NP VC				+		+		++		+		+		++
<i>Melanoides tuberculata</i>	瘤擬黑螺	NP VC				+		+	+	+		+		+		++
<i>Radix plicatulus</i>	羅白螺	NP VC		++		+				+		+	+		+	+
<i>Biomphalaria sp.</i>	--	NP VC		+		+				+		+	+		+	+
<i>Brodia hainanensis</i>	--	NP VC	++	+	++				++			++	+		++	+
<i>Sinotia quadrata</i>	田螺	NP VC					++		+	++			++			+++
<i>Indobaetis sp.</i>	--	NP VC	+		+				+			+	+		+	+
<i>Baetis sp.</i>	--	NP VC	+		+				+			+	+		+	+
<i>Chironomus sp.</i>	蠓幼虫	NP VC	+	+	+				+			+		+	+	+
<i>Mnais sp.</i>	--	NP VC		+	+				+			+	+		+	+
<i>Orithetrum sp.</i>	--	NP VC	+	+	+				+			+	+		+	+
<i>Perla sp.</i>	--	NP VC										+				+
<i>Aulocodes sp.</i>	--	NP VC										+				+
<i>Tipulidae spp.</i>	--	NP VC										+				+
<i>Arctopora sp.</i>	--	NP VC														+
<i>Anisocentropus sp.</i>	--	NP VC														+
Crustacea																
<i>Macrobrachium hainanense</i>	海南沼蝦	NP VC			+				+			+	+		+	+
<i>Caridina contonensis</i>	廣東米蝦	NP VC			+				+			+	++		+	++
<i>Cryptopotamon anacoluthon</i>	鯁刺溪蟹	NP C			+				+			+			+	+
Fish																
<i>Gambusia affinis</i>	食蚊魚	NP VC	+	+		+			+	+		+	++		+	++
<i>Poecilia reticulata</i>	孔雀花魚將	NP VC	+	+		+			+			+	+++		+	+++
<i>Schistura fasciolata</i>	橫紋南鰍	NP C			+				+	+		+	+		+	+
<i>Rhinogobius spp.</i>	鰕虎魚	NP C			+		+		+		+	++		+	++	

Note: NP – Not protected in Hong Kong
 “VC” – Very Common; “UC” – Uncommon; “C” - Common
 “+” – Species exists in the survey site
 “++” – Species common in the survey site
 “+++” – Species abundance in the survey site
 - Reference point was the sampling location outside the works area used to compare the with the data within works area.

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

Species	Status	Baseline survey																	
		Oct-07						Jan-09			Jul-09			Jan-10			Jul-10		
		T1	T2	Reference	T1	T2	Reference	Reference	T1	T2	Reference	Reference	T1	T2	Reference	Reference	T1	T2	
	Common ness																		
<i>Xiphophorus helleri</i>	NP	++	+	+															
<i>Puntius semifasciolatus</i>	NP	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Poecilia reticulata</i>	NP	++	+			++													
<i>Pseudogastromyzon myersi</i>	NP	+	+																
<i>Gambusia affinis</i>	NP	+	++			+													
<i>Xiphophorus variatus</i>	NP	+																	
<i>Parazacco spilurus</i>	V and NP	++	+																
<i>Rhinogobius spp.</i>	NP	+	+																
<i>Schistura fasciolata</i>	NP	+	+																
<i>Oreochromis niloticus</i>	NP	+																	
<i>Misgurnus anguillicaudatus</i>	NP		+																
<i>Cyprinus carpio var. viridiviolaceus</i>																			
	2x2m fish number	70	60	15	8	25	10	20	100	10	10	2	8	10	10	7	100		

Note: NP – Not protected in Hong Kong

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

“+” – Species exists in the survey site

“++” – Species common in the survey site

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

V – Listed as vulnerable in China Fish Red Data Book

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

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

Stream	Oct-07 (baseline)		Jan-09		Jul-09		Jan-10		Jul-10	
	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
Replicate										
DO (mg/L)	8.2	9	4		6.3	6	9.4	8.8	9	6.5
pH	6.9	7.18	6.86		7.28	6.96	8.2	8.5	7.3	7.2
Nitrate (mg N/L)	0.39	0.1	1.3		0.07	1.32	0.12	0.71	0.1	0.5
Ammonia (mg/L)	PO4-P (μ g P/L): <100		PO4-P (μ g P/L): <100		0.01		<0.01		0.2	
Salinity (ppt)	<0.1	<0.1	0.1		0	0	0	0	0	0
Conductivity (mS/cm)	40	40	190		34	118	42	72	49	43
BOD (mg/L)	<2	<2	12		<2	<2	<2	2	<2	2
Water flow at pool	0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.2	
Water flow at riffle	0.2-0.5		0.2-0.5		0.2-0.5		0.2-0.5		0.2-0.5	
Sand (%)	15	15			15	25	15	25	15	25
Stone (%)	80	80			80	70	80	70	80	70
Mud (%)	5	5			5	5	5	5	5	5
Concrete(%)	0	0	0		0	0	0	0	0	0

FIGURE

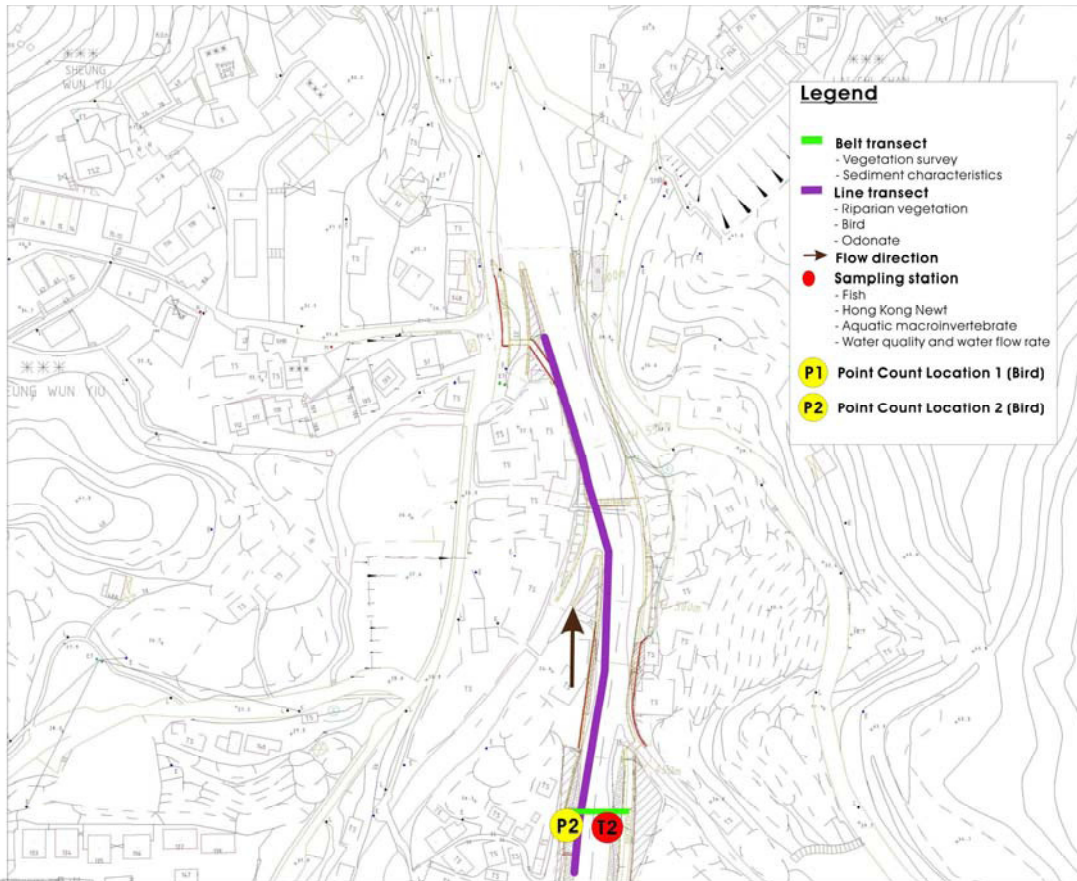


Figure 1-1. Sampling location of impact monitoring at Upper Tai Po River(Lower Section)

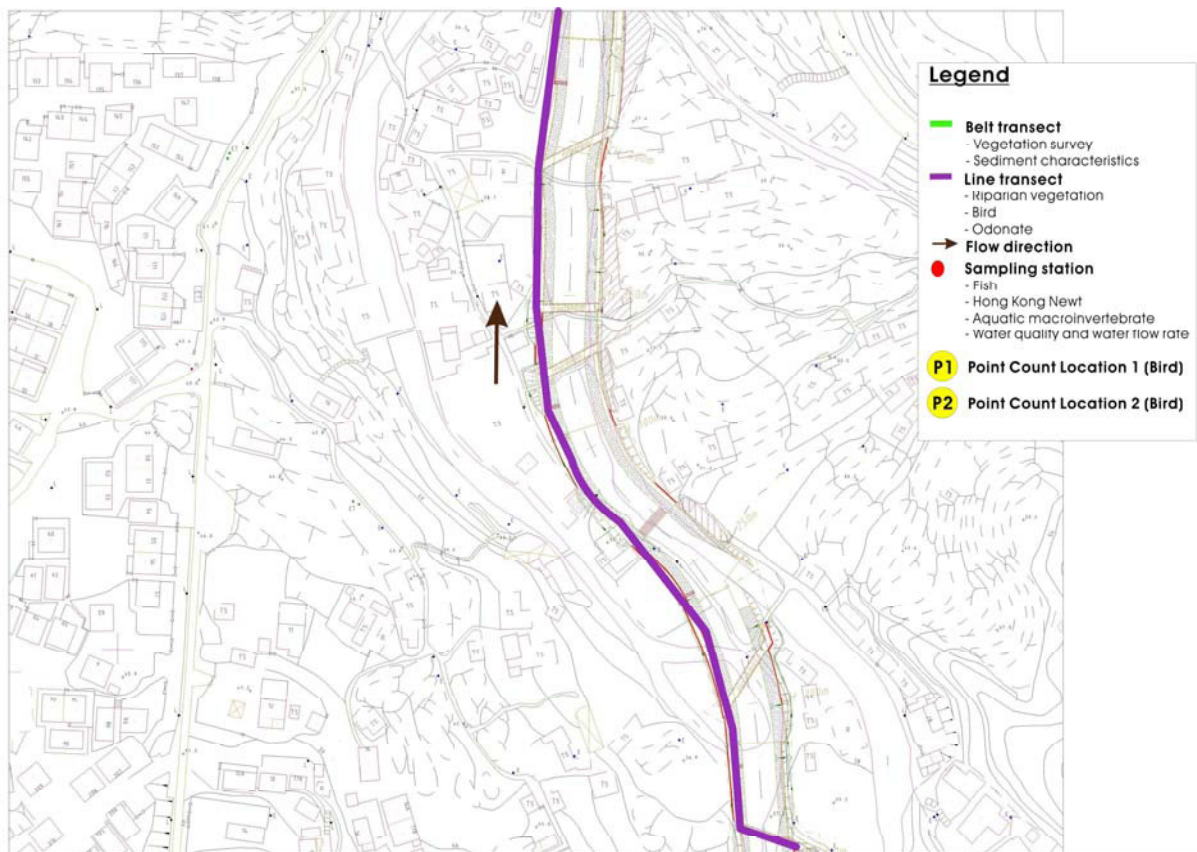


Figure 1-2. Sampling location of impact monitoring at Upper Tai Po River(Middle Section)

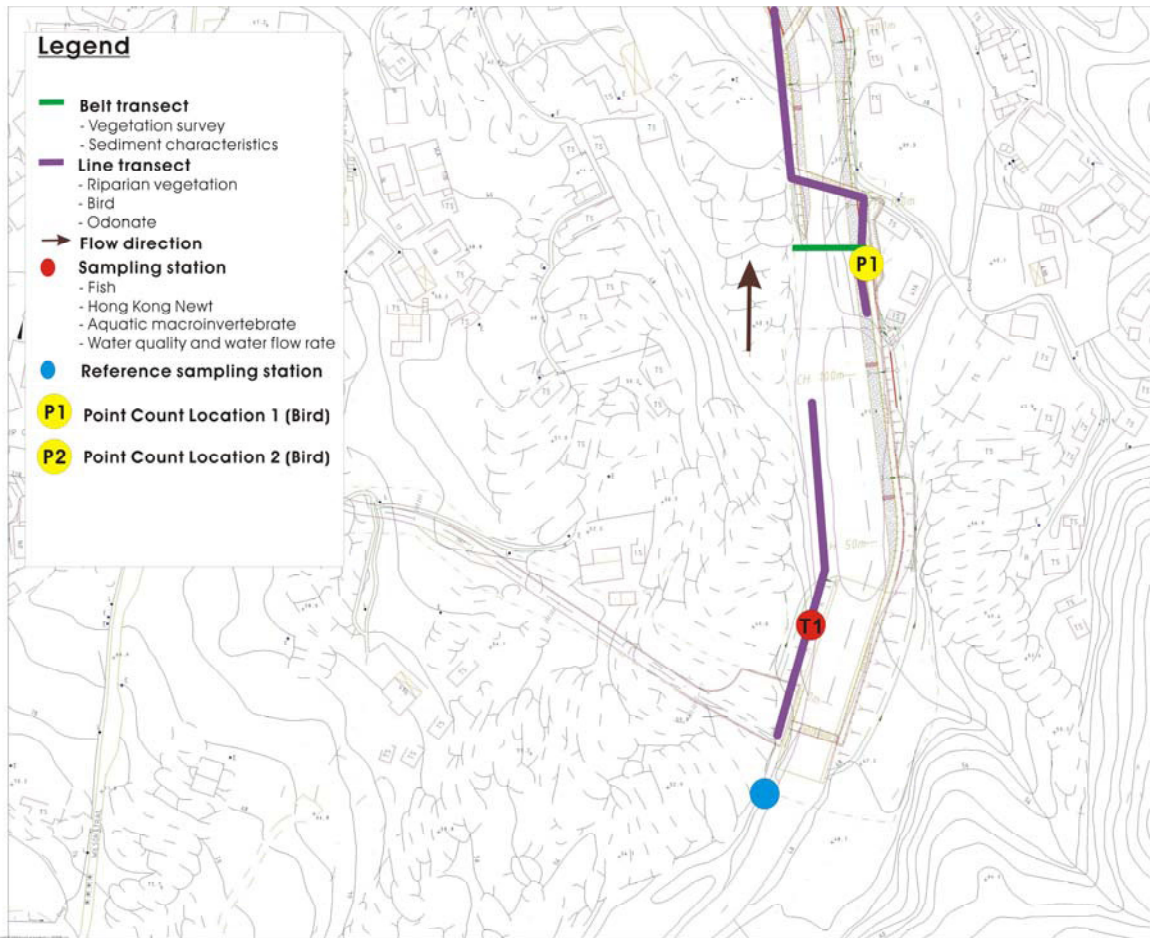


Figure 1-3. Sampling location of Impact monitoring at Upper Tai Po River(Upper Section)

Appendix I.: Summary of Total Accumulative Complaint Received

Case No.	EPD Complaint Reference	Date Received	Incident Location	Media/ Nature
9(E*)	EP/3/N05/RN/24567-08	05/11/2008	UTPR	Muddy Water
10(E*)	EP/3/N05/RN/24849-08	10/11/2008	UTPR	Muddy Water
12(E*)	EP/3/N05/RN/26619-08	28/11/2008	UTPR, Wilson Trial	Muddy Water
15(P#*)	NA	27/11/2008	UTPR Wilson Drive	Dust Generation
21(E*)	ICC#1-174345035	24/3/2009	UTPR near Sha Po Tsai Village	Noise
25(E*)	ICC#1-219109670	06/02/2010	Tai Po River	Noise generation at night
27(E*)	EP3/N05/RN/00004775-10	12/03/2010	Tai Po River	Muddy Water
28(#)	NA	07/04/2010	Tai Po River	Noise generation
30(E*)	NCF-N05/RN/00007763-10	21/04/2010	Tai Po River	Muddy Water
31(E*)	EP3/N05/RN/00009177-10	07/05/2010	Tai Po River	Muddy Water

: direct complaint from public to Chiu Hing

* : transferred from EPD / DSD N.B.: UTPR: Upper Tai Po River

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

Date of Inspection	Situation Requiring Follow-up Action(s) (Area / Location)	Follow-up Action(s) Taken (Date of Action(s) Taken)
27 Jan 2010 (No. 121)	Battery should be properly stored (Tai Po River, Area L)	The battery has been placed in indoor area.
03 Mar 2010 (No. 126)	1. Contaminated Soil should be properly disposed. (Upper Tai Po River, Area L) 2. Existing drainage channel should not be blocked. (Upper Tai Po River, Area L)	1. Geotextilies were placed on the riverband entirely to avoid muddy water contamination. 2. Contaminated Soil had been disposed properly.
10 Mar 2010 (No. 127)	Stagnant Water observed (Tai Po River, Area N)	The stagnant water has been covered with sand.
17 Mar 2010 (No. 128)	Dust mitigation measures should be provided. (Tai Po river, Area P)	Watering the haul road to minimize the effect of dust.
24 Mar 2010 (No. 129)	1. Measures should be taken along the channel to avoid erosion and muddy water.(Tai Po River, Area P) 2. Transplanted tree should be well maintained. (Tai Po River, Area P)	1. Geotextilies were placed on the riverband entirely to avoid muddy water contamination. 2. Watering to the transplanted trees has been conducted twice a week.
31 Apr 2010 (No. 130)	1. Regular water should be conducted for newly transplanted trees.(Tai Po River, Area L) 2. Temporary stockpiling should be properly covered to avoid erosion.(Tai Po River, Area L)	1. Temporary stockpiling has been covered properly to avoided erosion. 2. Watering to the transplanted trees has been conducted twice a week.
07 Apr 2010 (No. 131)	Stagnant Water observed (Tai Po River, Area N)	Stagnant water has been covered with sand.
14 Apr 2010 (No.132)	Excessive weed growth should be cleared to maintain water flow in the water course.(Tai Po River, Area P)	The excessive weed has been removed.
21 Apr 2010 (No. 133)	Excessive weed growth should be cleared to maintain water flow in the watercourse. (Tai Po River, Area P)	The excessive weed has been cleared.
12 May 2010 (No. 136)	1. Bared soil surface adjacent to river should be well compacted or protected with hydro-seeding. (Tai Po River, Area N) 2. Stagnant water and silt should be cleared from the pit. (Tai Po River, Area N)	1. Hydro-seeding has been applied on the bared soil surface area. 2. Stagnant water and waste has been cleared.
19 May 2010	1. Waste and debris should be removed. (Tai	1. Waste and debris has

(No. 137)	Po River, Area L) 2. Sedimentation tank should be removed, covered or turned over to avoid stagnant water. (Tai Po River, Area L)	been removed. 2. Sedimentation tank has been turned over.
26 May 2010 (No. 138)	1. Chemical should be stored properly. (Tai Po River, Area N) 2. Stagnant water and silt should be covered with soil. (Tai Po River, Area N)	1. Chemical has been stored properly 2. Silt and stagnant water has been covered with soil.
02 Jun 2010 (No. 139)	Chemical waste should be properly disposed. (Upper Tai Po River, Area N)	Chemical has been stored properly
09 Jun 2010 (No. 140)	Stagnant water should be minimized as far as possible to avoid breeding of mosquito. (Tai Po River, Area N)	Stagnant water has been removed.
30 Jun 2010 (No. 143)	Chemical waste should be properly disposed. (Upper Tai Po River, Area N)	Chemical has been stored properly
14 Jul 2010 (No. 145)	1. Measures for preventing oil leakage should be provided. (Upper Tai Po River, Area L) 2. Oil stain should be removed properly. (Upper Tai Po River, Area L)	1. Oil leakage preventing measure has been applied. 2. Oil Stain has been removed.