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**AGREEMENT NO. CE 65/2013 (EP)  
POST-CONSTRUCTION ECOLOGICAL  
MONITORING OF RIVER IMPROVEMENT  
WORKS IN UPPER LAM TSUEN RIVER  
SHE SHAN RIVER AND UPPER TAI PO  
RIVER – INVESTIGATION**

**POST-CONSTRUCTION ECOLOGICAL  
MONITORING REPORT (No. 34)**

Prepared By:

**ALLIED ENVIRONMENTAL CONSULTANTS LTD.**

For:

**Drainage Services Department**

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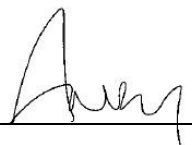
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**Agreement No. CE65/2013(EP)  
Post-Construction Ecological Monitoring of River  
Improvement Work in Upper Lam Tsuen River, She Shan  
River and Upper Tai Po River – Investigation**

**Post-Construction Ecological Monitoring Report (No. 34)  
Upper Lam Tsuen River**

**October 2016**



Prepared by: Mike pang

November 14, 2016

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November 14, 2016

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Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River – Investigation Agreement No. CE65/2013(EP)

## Post-Construction Ecological Monitoring Report (No. 34)

### Upper Lam Tsuen River

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## 1 Introduction

- 1.1 Agreement No. CE65/2013(EP) Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River – Investigation required a post-construction ecological monitoring programme when the project completed. The collected data are mainly used to assess ecological recovery process and effectiveness of ecological migration proposed and enforced during the construction period.
- 1.2 The scope of the ecological monitoring was detailed in EM & A Manual of the project. In brief, the survey aimed to collect data on abiotic factors such as water quality, substratum characteristics, water flow as well as flora and fauna.
- 1.3 China Hong Kong Ecology Consultants Ltd. was committed by Allied Environmental Consultants Ltd (AEC) to undertake the ecological monitoring tasks for the project for December 2014.
- 1.4 This is the number 34 post-construction ecological monitoring report for the project conducted **on 19<sup>th</sup> of October 2016**. It contains the following subsections:
- Summary of major points
  - Monitoring Methods and Results
  - Summary and Comments

## 2 Summary of Major Points

- Field ecological monitoring was undertaken **on 17<sup>th</sup> of October 2016**;
- Fauna and flora along the drainage project sections is in a process of re-establishing or restoration; Plants on river bed was experiencing seasonal changes in abundance and phonological appearance;
- The species richness of odonata was lower than the record of last month;
- Bird diversity and abundance was in natural fluctuation;
- Abundance of a target river fauna (i.e. *Paramesotriton hongkongensis* adult was recorded in the potential habitats along the Lam Tsuen River ); and
- Fish abundance was similar to last month with slight increase.

## 3 Monitoring Methodology

### 3.1 Riparian Vegetation

Riparian vegetation, including aquatic and emergent, was sampled using line transects along the affected river channel and riparian habitat. Species, relative abundance and average heights were recorded. Vegetation surveys were conducted at four selected belt transects with two located at the lower portion (T3 and T4) of the river channel and another two at the upper section (T1 and T2) of the river respectively (**Figure 1**). The belt transects was run across the river channel in order to collect quantitative data of the vegetation, e.g.,

species inventory, height, percentage cover. Qualitative data of plants was collected by recording plant species, relative abundance along line transect. Nomenclature and protection status of the species followed those documented in Lai *et al.* (2004) and Hong Kong Herbarium (2015).

### 3.2 Avifauna

Avifauna survey was conducted during post construction monitoring period. Special attention was given to the river channel and corridor area which birds used as feeding and foraging habitat. Avifauna surveys were undertaken in the early morning plus species recorded in the rest of the day when conducting other taxonomic groups (benthic, fish, insect) monitoring. Numerical abundance was recorded at fixed count points within a radius of 30-50m according to landscape feature and visual penetration extent. The duration of the point count of birds was standardized for 10 minutes at each location in order to collect comparable data. Transect count along accessible section of river channel were used in order to collect qualitative data. Binoculars and digital camera were the main items of equipment used. Nomenclature and protection status of the species follows the AFCD website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net)) and Carey *et al.* (2001).

The point count was conducted at four locations with two located at the lower portion of the river channel (T3&T4) and the other two located at the upper section of the river (T1&T2). The point count and survey transect locations for the bird survey and sampling sites for surveys of other faunal groups and flora were presented in **Figure 1**.

### 3.3 Adult Odonata Survey

Adult Odonata survey was conducted along transects (**Figure 1**). Binoculars, digital camera and hand net were utilized to aid identification. Numerical abundance, species identity and other notable behavior were recorded. Nomenclature and protection status of the species followed those documented in the AFCD website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net)), Wilson *et al.* (2004) and Tam *et al.* (2011). Adult Odonata survey was conducted along line transects in parallel with river channel within the works area where access was permitted.

### 3.4 Aquatic Macro-invertebrates

Macro-invertebrates in the river channel were surveyed. Sampling was conducted at five sampling locations including two sites located at the lower portion (T3 and T4) of the river channel and another two sites at the upper section (T1 and T2) of the river, as well as the reference site. Those sampling sites covered major type of river habitats, e.g. river pool and riffle (**Figure 1**) Five replicates were taken at each sampling point and pool together for further sample sorting and identification. Kick sampling and hand netting were the survey methodologies for river organisms. Dissection microscope and digital camera were used to aid identification and enumeration. Numerical abundance and species identity were recorded. Nomenclature and protection status of the species has followed those documented in the AFCD website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net)) and other literatures such as Dudgeon (1994).

### 3.5 Fish and Newt

Fish community and *Paramesotriton hongkongensis* at the specified river channel was monitored by live trapping, hand netting and direct observation methods.

Sampling was conducted at five sampling locations including two sites located at the lower portion (T3 and T4) of the river channel and another two sites at the upper section (T1 and T2) of the river, as well as reference site. Those sampling sites covered major type of river habitats, e.g. river pool and riffle (**Figure 1**). The number of the observed fish and newt was estimated and recorded. Nomenclature and protection status of the species followed those documented in the AFCD website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net)) and Lee *et al.* (2004).

### 3.6 Abiotic Data Collection

#### 3.6.1 Water Quality Monitoring

Dissolved oxygen level, pH value, conductivity, salinity, BOD and nutrient level (nitrate and ammonium) were measured and analyzed by conventional methods in situ or in laboratory. The instruments for measuring dissolved oxygen level, pH value, conductivity, salinity were model: DO-5510, AZ8685, AZ8361 and AZ8374 respectively. All the instruments were calibrated every monitoring month according to the operation manuals in order to obtain the precise result. BOD test took 5 days to complete within darkness incubator with stable temperature at 20°C and was performed using model: DO-5510 for measuring dissolved oxygen. Nutrient levels including nitrate and ammonia were performed in laboratory by applying the In-house method SOP056 (FIA) and SOP057 (FIA) respectively.

#### 3.6.2 Sediment Characteristics

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

#### 3.6.3 Water Flow

Water flow rates in river channel were measured by recording the time taken for a floating object (e.g. floating ball) to cover a measured distance.

The sampling locations for surveys were presented in **Figure 1**.

## 4 Monitoring Results

### 4.1 Vegetation

Vegetation has generally covered the gabion and river bed along Lam Tsuen River (Photos 1-3). In total, 75 flora species were recorded within the survey

transects along the river course. Some of the vegetation at river bed has been washed out by flooding, especially vegetation in lower section of the river. The recorded floras were generally in good health, and the height of the dominated riparian grass and herb species were in a range from 0.2m to 1.5m as observed along survey transect. Dominant flora species were shown in the **Table 4.1** marked with relative abundance sign “+++”. Results of vegetation survey and belt transect survey were presented in **Table 4.1** and **Table 4.2**. **Figure 1** shows the transect line for the flora surveys.

## 4.2 Fauna

### 4.2.1 Avifauna

An avifauna survey was undertaken along survey transects and at four selected point count locations. In total, 19 species of birds were recorded during the bird survey and 5 of the total were wetland dependent species including *Ardeola bacchus*, *Egretta garzetta* (Photo 4), *Alcedo atthis*, *Motacilla alba* and *Motacilla cinerea*. They were commonly observed foraging in the river channel. *Pycnonotus jocosus* was a dominated species along the river. All the birds in Hong Kong are under protection of Wild Animals Protection Ordinance (Cap. 170). Among the recorded species, *Ardeola bacchus* and *Egretta garzetta* are both classified as Regional Concern by Fellowes *et al.* (2002). *Centropus sinensis* was observed in the river, which is considered as Vulnerable in China Red Data Book. *Eurystomus orientalis* (Photo 5), an uncommon passage migrant, was recorded from the plantation area adjacent to Lam Tsuen River. Apart from mentioned species above, the others recorded in Lam Tsuen River were common species in Hong Kong. Transect and Point Count locations were shown on **Figure 1**. Result of bird survey was presented in the **Table 4.3**.

### 4.2.2 Adult Odonata Survey

Odonata survey was performed, and a list of recorded odonata species at Upper Lam Tsuen River is shown in **Table 4.4**. In total, 10 odonata species were recorded during the survey and the recorded species was common species and widely distributed in Hong Kong (Photos 6-8). The result obtained this month is similar to previous surveys conducted in approximate period of last year. Species richness in this month was lower than the record of last month. Most of the odonata species in Hong Kong has the peak emergence from spring to late summer. The decrease in abundance of odonata was due to seasonality. It is expected that number of odonata will be decreasing and keep in low abundance in the following months during dry season (Wilson *et al.*, 2004 & Tam *et al.*, 2011). Sampling location was shown in **Figure 1**.

### 4.2.3 Aquatic Macro-invertebrates

Upper Lam Tsuen River was flowing with constant water during survey (Photo 9). The river benthic fauna collected was mainly comprised of insects, molluscs and crustaceans. *Pomacea canaliculata* was found abundant along the river. Details of recorded of river benthic fauna refers to **Table 4.5**. Sampling location was shown on **Figure 1**.



#### 4.2.4 Hong Kong Newt

Surveys of Hong Kong Newt were conducted (Photo 9) at Upper Lam Tsuen River. Adult *Paramesotriton hongkongensis* (Photo 10) were observed at the Lam Tsuen River where the habitat consisted of riparian vegetation during the survey. It is assumed that Hong Kong Newt would stay in river habitat during breeding period from September to March (Dudgeon, 2003). Riparian vegetation grown along the channel especially along water margin could provide shelter and breeding habitat for Hong Kong Newt. Hong Kong Newt is listed in Wild Animals Protection Ordinance (Cap. 170) and classified as “Near Threatened” under IUCN Red List Status and as “Potential Global Concern” by Fellowes *et al.* (2002). Record of Hong Kong Newts can be referred to **Table 4.6**.

#### 4.2.5 River Fish Fauna

Fish surveys were performed at Upper Lam Tsuen River during field monitoring. In total, 17 species of freshwater fish, including species recorded from reference site, were recorded. *Oreochromis niloticus*, *Zacco platypus* and *Rhinogobius* spp were the dominated species in the river. *Acrossocheilus parallens* is a rare freshwater fish that only recorded in few of reservoir catchments and streams in Hong Kong (Lee *et al.*, 2004) and listed as Global Concern by Fellowes (2002). It was observed along the surveyed river with pool. Except *Acrossocheilus parallens*, *Parazacco spilurus* is classified as Vulnerable in China Red Data Book and observed along the river with low abundance. Fish counting at 2 x 2 meter area were performed and number of fish individuals was similar to the record of last month with slight increase. Details of recorded of fish fauna refers to **Table 4.6**. Sampling location was shown on **Figure 1**.

### 4.3 **Abiotic Data**

Data on water quality and major river hydrological feature (water flow and substratum) of the river were collected and are presented in the **Table 4.7**.

Generally, the water was not polluted and nutrient levels were generally low. Results of water test were presented in the **Table 4.7**.

The river substratum was comprised of over 75-93% stones or rocks in most of the river sections with moderate water flow (up to 0.2m/second at pool and 0.5m/second at riffle).

## 5 **Summary and Commentary**

Post construction ecological monitoring was carried out October 2016 and relevant biotic and abiotic data was collected according to project specification and EM & A Manual. Benthic fauna was temporally de-faunated in river sections due to river bed engineering works during construction period between 2008 and early 2013 and is under recovery process after that period. Adult amphibian *Paramesotriton hongkongensis* was recorded at river channel

where the river margin covered with riparian vegetation. *Acrossocheilus parallens*, a rare freshwater fish species in Hong Kong, was observed at a few locations in the river channel with pool. Except *Acrossocheilus parallens*, *Parazacco spilurus* recorded in the river is also considered with conservation interest and observed along the river with low abundance.

Aquatic and riparian vegetation along river channel was re-established. Vegetation has generally covered the gabion and covered the river bed along Upper Lam Tsuen River.

The water quality of the surveyed river was not polluted although the river receives low concentration of nutrients from the nearby agriculture lands and resident houses.

## 6 REFERENCES

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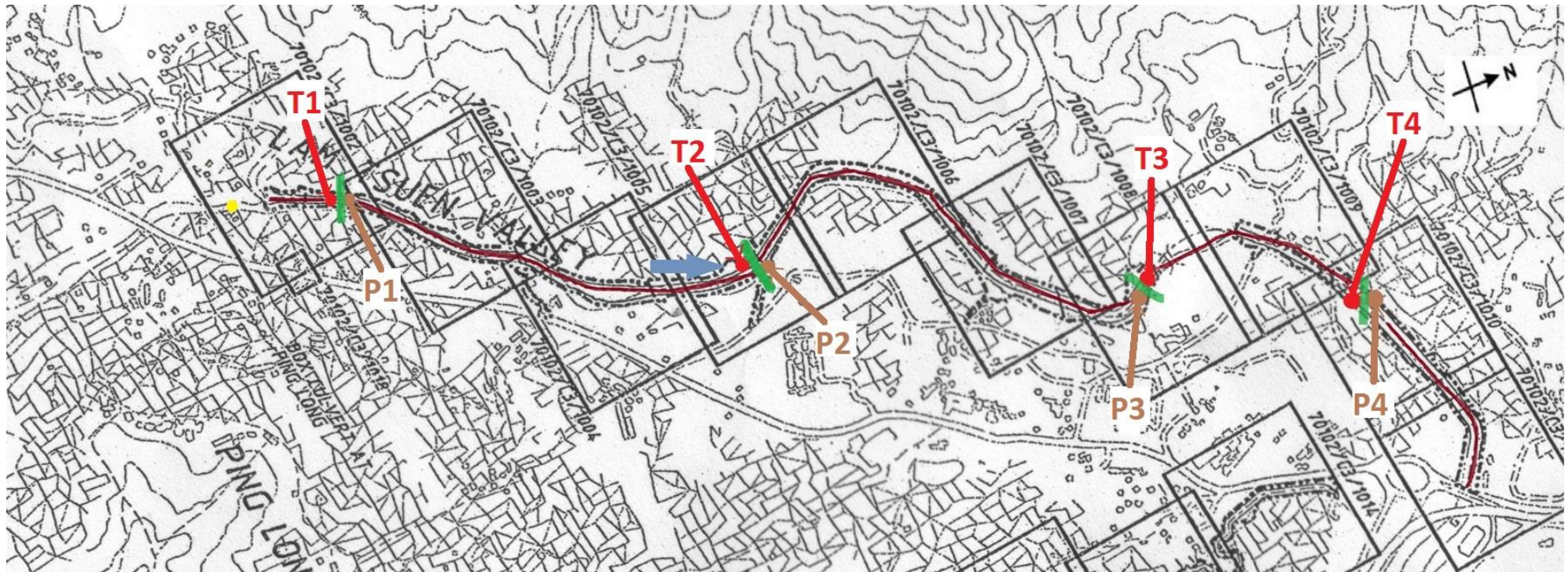
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**FIGURES**



**Legend**

- |  |  |  |
|--|--|--|
| <ul style="list-style-type: none"> <li><span style="color: green;">—</span> Belt transect</li> <li>-Vegetation</li> <li>-Sediment characteristics</li> </ul> | <ul style="list-style-type: none"> <li><span style="color: red;">●</span> Sampling station</li> <li>-Fish</li> <li>-Aquatic macroinvertebrate</li> <li>-Water quality and flow rate</li> </ul> | <ul style="list-style-type: none"> <li><span style="color: brown;">●</span> Point count location</li> <li>-Avifauna</li> </ul>                                     |
| <ul style="list-style-type: none"> <li><span style="color: yellow;">●</span> Reference sample</li> </ul>   |  | <ul style="list-style-type: none"> <li><span style="color: red;">—</span> Line transect</li> <li>-Avifauna</li> <li>-Adult Odonate</li> <li>-Vegetation</li> </ul> |

Figure1. Sampling Location of Ecological Survey and Monitoring at Upper Lam Tsuen River, Tai Po.

**PHOTOS**



Photo 1: General view of the river (Lower section)



Photo 2: General view of the river (Middle section)



Photo 3: General view of the river (Upper section)



Photo 4: Avifauna – *Egretta garzetta*



Photo 5: Avifauna – *Eurystomus orientalis*



Photo 6: Odonata – *Neurobasis chinensis*

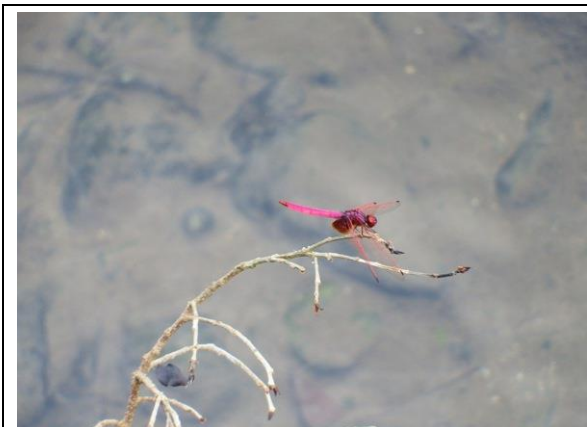


Photo 7: Odonata – *Trithemis aurora*



Photo 8: Odonata – *Rhinocypha perforata perforata*



Photo 9: Kick sampling



Photo 10: Hong Kong Newt

**TABLE**







Table 4.2. Flora species recorded from belt transect survey at the Upper Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Family	Species	Chinese name	Baseline monitoring								Impact monitoring				Impact monitoring				Impact monitoring									
			Stream		Jul-08				Aug-08				Jan-09				Jan-09				Jul-09							
			Transect	P1	P4	P1	P4	P1	P4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4							
	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%				
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹	0.4	40			0.4	40			0.4	30	0.5	5	1.5	5	1	15										
Fabaceae	<i>Pueraria lobata</i>	野葛	0.5	30			0.5	30							0.2	5			0.5	50			0.5	20				
Poaceae	<i>Pennisetum purpureum</i>	象草	3	20			3	20																				
Araceae	<i>Alocasia odora</i>	海芋	1	10			1	10			0.5	2					0.3	<1										
Caesalpiniaceae	<i>Cassia alata</i>	翅莢決明			1.2	10			1.2	10																		
Magnoliaceae	<i>Michelia alba</i>	白蘭			6	10			6	10																		
Poaceae	<i>Brachiaria mutica</i>	巴拉草			1.2	70			1.2	70	1.5	30							0.5	20			1.2	5	1	40		
Moraceae	<i>Ficus hispida</i>	對葉榕									1.5	5							1.5	5	4	5						
Asteraceae	<i>Mikania micrantha</i>	微甘菊									0.4	20					0.5	1	0.5	5	0.3	15	0.5	30				
Musaceae	<i>Musa paradisiaca</i>	大蕉												3	5								1.5	5				
Ulmaceae	<i>Celtis sinensis</i>	朴樹			6	10			6	10							4	10						6	50			
Araceae	<i>Pistia stratiotes L.</i>	大漂																										
Urticaceae	<i>Boehmeria nivea</i>	苧麻																										
Asteraceae	<i>Bidens alba</i>	白花鬼針草										0.5	5															
Poaceae	<i>Coix lacryma-jobi</i>	薏苡																										
Solanaceae	<i>Solanum nigrum</i>	龍葵																										
Cyperaceae	<i>Cyperus flabelliformis</i>	風車草																										
Poaceae	<i>Miscanthus floridulus</i>	五節芒																					1.2	2				
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐										3	5															
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊															0.2	10										
Commelinaceae	<i>Commelina diffusa</i>	節節草															0.2	<1										
Asteraceae	<i>Erechtites hieracifolia</i>	革命菜															0.5	<1										
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																										
Convolvulaceae	<i>Pharbitis nil</i>	牽牛																										
Verbenaceae	<i>Lantana camara</i>	馬纓丹																										
Mimosaceae	<i>Leucaena leucocephala</i>	銀合歡																										
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜																										
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																										
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																										
Amaranthaceae	<i>Celosia argentea</i>	青葙																										
Bare Gound											13		85		85		64		20		80		38		10			

P1 – Point count location 1; P4 – Point count location 4

Table 4.2. Flora species recorded from belt transect survey at the Upper Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Family	Species	Chinese name	Impact monitoring								Impact monitoring								Impact monitoring								Impact monitoring												
			Jan-10				Jul-10				Jul-10				Jan-11				Jul-11																				
			T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4																	
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																			0.8	5																	
Fabaceae	<i>Pueraria lobata</i>	野葛		0.5	5				0.5	2			0.5	5												0.3	10												
Poaceae	<i>Pennisetum purpureum</i>	象草							2	5								1.2	10								1.2	2		2.5	10								
Araceae	<i>Alocasia odora</i>	海芋							1	5					1	10																							
Caesalpiniaceae	<i>Cassia alata</i>	翅莢決明																																					
Magnoliaceae	<i>Michelia alba</i>	白蘭																																					
Poaceae	<i>Brachiaria mutica</i>	巴拉草	0.8	40	0.9	50	1	15			0.8	20	0.9	30	1	60	1.5	30	0.8	5			1	30	1	15	0.8	10	1	5									
Moraceae	<i>Ficus hispida</i>	對葉榕					4	5	0.5	30					4	5							4	5															
Asteraceae	<i>Mikania micrantha</i>	微甘菊		0.5	30	0.3	25					0.5	20	0.3	5				0.4	10	0.5	5	0.3	5	0.4	8	0.4	5	0.5	3				0.4	2				
Musaceae	<i>Musa paradisiaca</i>	大蕉						0.5	2																														
Ulmaceae	<i>Celtis sinensis</i>	朴樹																																					
Araceae	<i>Pistia stratiotes L.</i>	大漂		0.05	5				2																														
Urticaceae	<i>Boehmeria nivea</i>	苧麻				0.3	5																																
Asteraceae	<i>Bidens alba</i>	白花鬼針草	0.4	50			0.3	5			0.4	20			0.5	10			0.4	10	0.4	20	0.5	5			0.4	2	0.4	5	0.5	2	0.5	10					
Poaceae	<i>Coix lacryma-jobi</i>	薏苡					1.5	2																															
Solanaceae	<i>Solanum nigrum</i>	龍葵																																					
Cyperaceae	<i>Cyperus flabelliformis</i>	風車草						1	30																1	5													
Poaceae	<i>Miscanthus floridulus</i>	五節芒																																					
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐																																					
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊																							0.5	5													
Commelinaceae	<i>Commelina diffusa</i>	節節草											0.5	20									0.4	10							0.4	10							
Asteraceae	<i>Erechtites hieracifolia</i>	革命菜																																					
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																							0.5	5													
Convolvulaceae	<i>Pharbitis nil</i>	牽牛													0.5	10																							
Verbenaceae	<i>Lantana camara</i>	馬纓丹																																					
Mimosaceae	<i>Leucaena leucocephala</i>	銀合歡																																					
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜																																					
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																																					
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																																					
Amaranthaceae	<i>Celosia argentea</i>	青葙																																					
Bare Gound				50		10		43		24		60		45		20		30		75		65		45		54		73		85		65						88	

P1 – Point count location 1; P4 – Point count location 4

Table 4.2. Flora species recorded from belt transect survey at the Upper Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Family	Species	Chinese name	Impact monitoring								Impact monitoring								Impact monitoring								Impact monitoring							
			Jan-12				Jul-12				Aug-13				Dec-13																			
			T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4																
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																																
Fabaceae	<i>Pueraria lobata</i>	野葛	0.3	10						0.3	5							0.3	15	0.3	5					0.3	10							
Poaceae	<i>Pennisetum purpureum</i>	象草		2.5	5	2.5	5				2	5																						
Araceae	<i>Alocasia odora</i>	海芋																																
Caesalpiniaceae	<i>Cassia alata</i>	翅莢決明																																
Magnoliaceae	<i>Michelia alba</i>	白蘭																																
Poaceae	<i>Brachiaria mutica</i>	巴拉草	0.8	10	1	2	1.5	60		0.8	10	1	5	1.5	20			0.8	5	0.8	5	1	10	1	15	0.8	10	0.8	10					
Moraceae	<i>Ficus hispida</i>	對葉榕																																
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.4	5	0.5	3			0.4	2	0.4	5	0.5	3	0.5	15	0.4	1	0.5	25	0.5	10	0.5	10	0.4	3	0.5	10	0.5	5	0.5	10	0.4	10
Musaceae	<i>Musa paradisiaca</i>	大蕉																																
Ulmaceae	<i>Celtis sinensis</i>	朴樹																																
Araceae	<i>Pistia stratiotes L.</i>	大漂																																
Urticaceae	<i>Boehmeria nivea</i>	苧麻																				0.8	2											
Asteraceae	<i>Bidens alba</i>	白花鬼針草	0.4	2	0.4	5	0.5	2	0.5	10	0.4	5	0.4	5	0.5	5	0.5	2	0.4	5	0.4	20	0.5	10	0.5	2	0.4	5			0.5	10		
Poaceae	<i>Coix lacryma-jobi</i>	薏苡																																
Solanaceae	<i>Solanum nigrum</i>	龍葵																																
Cyperaceae	<i>Cyperus flabelliformis</i>	風車草																																
Poaceae	<i>Miscanthus floridulus</i>	五節芒																																
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐																																
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊																																
Commelinaceae	<i>Commelina diffusa</i>	節節草		0.3	3	0.4	5							0.4	2	0.3	5													0.3	5			
Asteraceae	<i>Erechites hieracifolia</i>	革命菜																																
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																																
Convolvulaceae	<i>Pharbitis nil</i>	牽牛																																
Verbenaceae	<i>Lantana camara</i>	馬纓丹																																
Mimosaceae	<i>Leucaena leucocephala</i>	銀合歡																						1.2	5									
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜																																
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																																
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																																
Amaranthaceae	<i>Celosia argentea</i>	青葙																														1	2	
Bare Gound				73		82		28		88		75		82		58		92		50		55		68		70		75		85		73		75

P1 – Point count location 1; P4 – Point count location 4



Table 4.2. Flora species recorded from belt transect survey at the Upper Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Family	Species	Chinese name	Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring							
			May-14				Jun-14				Jul-14				Aug-14																			
			T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4																
			Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%				
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹	0.3	2							0.3	2							0.5	4							0.7	5						
Fabaceae	<i>Pueraria lobata</i>	野葛			0.3	5	0.3	5					0.3	5	0.3	5					0.3	5	0.3	5			0.3	5	0.3	5				
Poaceae	<i>Pennisetum purpureum</i>	象草																																
Araceae	<i>Alocasia odora</i>	海芋																																
Caesalpiniaceae	<i>Cassia alata</i>	翅英決明																																
Magnoliaceae	<i>Michelia alba</i>	白蘭																																
Poaceae	<i>Brachiaria mutica</i>	巴拉草	0.5	5	0.6	6	0.6	6	0.5	5	0.6	8	0.6	6	0.6	10	0.8	10	0.8	6	0.6	10	0.8	12	0.8	8								
Moraceae	<i>Ficus hispida</i>	對葉榕																																
Asteraceae	<i>Mikania micrantha</i>	薇甘菊			0.3	5	0.3	15	0.3	5			0.3	6	0.3	15	0.3	8			0.3	6	0.3	15	0.3	8			0.3	6	0.3	15		
Musaceae	<i>Musa paradisiaca</i>	大蕉																																
Ulmaceae	<i>Celtis sinensis</i>	朴樹																																
Araceae	<i>Pistia stratiotes L.</i>	大漂																																
Urticaceae	<i>Boehmeria nivea</i>	苧麻																																
Asteraceae	<i>Bidens alba</i>	白花鬼針草	0.5	20	0.5	10	0.7	15	0.6	10	0.5	20	0.5	10	0.7	15	0.6	10	0.5	20	0.5	12	0.7	18	0.6	10	0.5	20	0.6	12	0.7	15		
Poaceae	<i>Coix lacryma-jobi</i>	薏苡																																
Solanaceae	<i>Solanum nigrum</i>	龍葵																																
Cyperaceae	<i>Cyperus flabelliformis</i>	風車草																																
Poaceae	<i>Miscanthus floridulus</i>	五節芒																																
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐																																
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊																																
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.2	8			0.3	3			0.2	8			0.3	3			0.2	8			0.3	3			0.3	10			0.3	5		
Asteraceae	<i>Erechtites hieracifolia</i>	革命菜																																
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																																
Convolvulaceae	<i>Pharbitis nil</i>	牽牛																																
Verbenaceae	<i>Lantana camara</i>	馬纓丹																																
Mimosaceae	<i>Leucaena leucocephala</i>	銀合歡																																
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜			0.2	2	0.2	2	0.2	1			0.2	2	0.2	2	0.2	1			0.3	1	0.3	1	0.3	1			0.3	1	0.3	1		
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																																
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																																
Amaranthaceae	<i>Celosia argentea</i>	青葙																																
Bare Gound			65		77		60		73		65		74		60		70		58		71		58		70		55		69		59			

P1 – Point count location 1; P4 – Point count location 4





Table 4.2. Flora species recorded from belt transect survey at the Upper Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Family	Species	Chinese name	Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring												
			Feb-15				Mar-15				Apr-15				May-15																								
			T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4																					
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																																					
Fabaceae	<i>Pueraria lobata</i>	野葛					0.6	10							0.6	10																							
Poaceae	<i>Pennisetum purpureum</i>	象草				3	15							3	15							3	15																
Araceae	<i>Alocasia odora</i>	海芋					1.8	1							1.8	1																							
Caesalpiniaceae	<i>Cassia alata</i>	翅莢決明																																					
Magnoliaceae	<i>Michelia alba</i>	白蘭																																					
Poaceae	<i>Brachiaria mutica</i>	巴拉草	1	20	1	20	1.3	20	1	10	1	20	1.2	20	1.4	20	1	10	1.1	20	1.2	20	1.4	20	1	10	0.9	15	1	18	0.8	20	1	10					
Moraceae	<i>Ficus hispida</i>	對葉榕																																					
Asteraceae	<i>Mikania micrantha</i>	微甘菊	0.4	10	0.4	15	0.3	5	0.3	20	0.4	10	0.4	15	0.3	5	0.3	20	0.4	10	0.4	15	0.3	5	0.3	20	0.3	5	0.4	10	0.3	5	0.3	10					
Musaceae	<i>Musa paradisiaca</i>	大蕉																																					
Ulmaceae	<i>Celtis sinensis</i>	朴樹																																					
Araceae	<i>Pistia stratiotes</i> L.	大漂																																					
Urticaceae	<i>Boehmeria nivea</i>	苧麻																																					
Asteraceae	<i>Bidens alba</i>	白花鬼針草	1	10	0.7	15	1	15			1	10	0.7	15	1	15																							
Poaceae	<i>Coix lacryma-jobi</i>	薏苡																																					
Solanaceae	<i>Solanum nigrum</i>	龍葵																																					
Cyperaceae	<i>Cyperus flabelliformis</i>	風車草																																					
Poaceae	<i>Miscanthus floridulus</i>	五節芒																																					
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐																																					
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊																																					
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.5	10	0.5	20			0.3	20	0.5	10	0.4	20			0.3	20	0.5	10	0.4	20			0.3	20	0.5	5	0.4	10			0.3	10					
Asteraceae	<i>Erechtites hieracifolia</i>	革命菜																																					
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																																					
Convolvulaceae	<i>Pharbitis nil</i>	牽牛																																					
Verbenaceae	<i>Lantana camara</i>	馬纓丹																																					
Mimosaceae	<i>Leucaena leucocephala</i>	銀合歡																																					
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜				0.3	10			0.2	15			0.3	10			0.2	15			0.3	10			0.2	15												
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香	2	30	2	10	2	5	2	5	2	30	2	10	2	5	2	5	2	30	2	10	2	5	2	5	1.2	10	1.1	5	1.4	5	1.3	5					
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																																					
Amaranthaceae	<i>Celosia argentea</i>	青葙																																					
Bare Gound				20		20		30		19		20		20		30		19		20		20		30		19		60		47		40		59					

P1 – Point count location 1; P4 – Point count location 4

Table 4.2. Flora species recorded from belt transect survey at the Upper Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Family	Species	Chinese name	Post construction monitoring								Post construction monitoring								Post construction monitoring							
			Stream		Jun-15		Jul-15		Aug-15		Stream		Jun-15		Jul-15		Aug-15		Stream		Jun-15		Jul-15		Aug-15	
			Transect	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																								
Fabaceae	<i>Pueraria lobata</i>	野葛							0.3	5	0.5	10					0.4	5	0.5	10					0.4	5
Poaceae	<i>Pennisetum purpureum</i>	象草					2	15																		
Araceae	<i>Alocasia odora</i>	海芋							0.8	1																
Caesalpiniaceae	<i>Cassia alata</i>	翅英決明																								
Magnoliaceae	<i>Michelia alba</i>	白蘭																								
Poaceae	<i>Brachiaria mutica</i>	巴拉草	0.9	15	1	18	0.8	20	1	10	0.9	30	1.5	30	0.5	70	1	15	1	30	1.5	30	0.8	70	1	15
Moraceae	<i>Ficus hispida</i>	對葉榕																								
Asteraceae	<i>Mikania micrantha</i>	微甘菊	0.3	5	0.4	10	0.3	5	0.3	10	0.3	5	0.2	5	0.3	5	0.4	5	0.3	5	0.2	5	0.3	5	0.4	5
Musaceae	<i>Musa paradisiaca</i>	大蕉																								
Ulmaceae	<i>Celtis sinensis</i>	朴樹																								
Araceae	<i>Pistia stratiotes L.</i>	大漂																								
Urticaceae	<i>Boehmeria nivea</i>	苧麻																								
Asteraceae	<i>Bidens alba</i>	白花鬼針草	0.8	5	0.7	10	0.8	15						0.3	5								0.4	5		
Poaceae	<i>Coix lacryma-jobi</i>	薏苡																								
Solanaceae	<i>Solanum nigrum</i>	龍葵																								
Cyperaceae	<i>Cyperus flabelliformis</i>	風車草												0.6	2								0.6	2		
Poaceae	<i>Miscanthus floridulus</i>	五節芒																								
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐																								
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊								0.3	20	0.2	10						0.4	20	0.2	10				
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.5	5	0.4	10			0.3	10	0.3	20	0.2	20	0.2	5	0.4	20	0.3	20	0.2	20	0.2	5	0.4	20
Asteraceae	<i>Erechtites hieracifolia</i>	革命菜																								
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																								
Convolvulaceae	<i>Pharbitis nil</i>	牽牛																								
Verbenaceae	<i>Lantana camara</i>	馬纓丹																								
Mimosaceae	<i>Leucaena leucocephala</i>	銀合歡																								
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜																								
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香	1.2	10	1.1	5	1.4	5	1.3	5																
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草												0.5	5	2	5						0.8	5	2	5
Amaranthaceae	<i>Celosia argentea</i>	青葙																								
Bare Gound				60		47		40		59		15		35		13		55		15		35		13		55

P1 – Point count location 1; P4 – Point count location 4

(Continous) Table 4.2. Flora species recorded from belt transect survey at the Upper Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Family	Species	Chinese name	Post construction monitoring																															
			Stream				Sep-15				Oct-15				Nov-15				Dec-15															
			T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4									
Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%											
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																																
Fabaceae	<i>Pueraria lobata</i>	野葛	0.5	10				0.4	5	0.5	10					0.4	5	0.5	10					0.4	5									
Poaceae	<i>Pennisetum purpureum</i>	象草																																
Araceae	<i>Alocasia odora</i>	海芋																																
Caesalpinaceae	<i>Cassia alata</i>	翅荚决明																																
Magnoliaceae	<i>Michelia alba</i>	白蘭																																
Poaceae	<i>Brachiaria mutica</i>	巴拉草	1.1	30	1.5	35	1	70	1.2	15	0.7	5	1.5	30	1	60	1.2	15	0.7	5	1.5	35	1	60	1.2	20								
Moraceae	<i>Ficus hispida</i>	對葉榕																																
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.3	5	0.2	5	0.3	5	0.4	5	0.3	5	0.2	5	0.3	5	0.4	5	0.3	5	0.2	5	0.3	5	0.4	5								
Musaceae	<i>Musa paradisiaca</i>	大蕉																																
Ulmaceae	<i>Celtis sinensis</i>	朴樹																																
Araceae	<i>Pistia stratiotes L.</i>	大漂																																
Urticaceae	<i>Boehmeria nivea</i>	苧麻																																
Asteraceae	<i>Bidens alba</i>	白花鬼針草					0.4	5					0.4	10					0.4	10					0.4	10								
Poaceae	<i>Coix lacryma-jobi</i>	薏苡								1	5													1	5									
Solanaceae	<i>Solanum nigrum</i>	龍葵																																
Cyperaceae	<i>Cyperus flabelliformis</i>	風車草					0.6	2																										
Poaceae	<i>Miscanthus floridulus</i>	五節芒								1	10														1	10								
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐																																
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊	0.4	20	0.2	10				0.4	5													0.4	5									
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.3	20	0.2	20	0.2	5	0.4	20	0.3	10	0.2	20	0.2	5	0.4	20	0.3	10	0.2	20	0.2	5	0.4	25								
Asteraceae	<i>Erechtites hieracifolia</i>	革命菜																																
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																																
Convolvulaceae	<i>Pharbitis nil</i>	牽牛																																
Verbenaceae	<i>Lantana camara</i>	馬纓丹																																
Mimosaceae	<i>Leucaena leucocephala</i>	銀合歡																																
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜																									0.2	10						
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																																
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草					0.8	5	2	5				1.5	10	2	5				1.5	10	2	5			1.5	10	2	5				
Amaranthaceae	<i>Celosia argentea</i>	青葙												0.4	5					0.4	5							0.4	5					
Acanthaceae	<i>Dicliptera chinensis</i>	狗肝菜								0.3	20								0.3	20							0.3	20						
Bare Gound				15		30		13		55		30		45		20		55		30		40		20		45		30		40		20		35

P1 – Point count location 1; P4 – Point count location 4



(Continous) Table 4.2. Flora species recorded from belt transect survey at the Upper Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Family	Species	Chinese name	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring							
			Jun-16				Jul-16				Aug-16				Sep-16				Oct-16							
			T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4				
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																								
Fabaceae	<i>Pueraria lobata</i>	野葛	0.5	5																						
Poaceae	<i>Pennisetum purpureum</i>	象草																								
Araceae	<i>Alocasia odora</i>	海芋																								
Caesalpiniaceae	<i>Cassia alata</i>	翅英決明																								
Magnoliaceae	<i>Michelia alba</i>	白蘭																								
Poaceae	<i>Brachiaria mutica</i>	巴拉草	0.4	7	0.4	20	0.4	25	0.4	5	0.4	7	0.4	15	0.4	20	0.4	5	0.4	7	0.4	15	0.4	20	0.4	5
Moraceae	<i>Ficus hispida</i>	對葉榕																								
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.3	5	0.2	5	0.3	5	0.4	5	0.3	5	0.2	5	0.3	5	0.3	5	0.4	5	0.3	5	0.4	5	0.4	10
Musaceae	<i>Musa paradisiaca</i>	大蕉																								
Ulmaceae	<i>Celtis sinensis</i>	朴樹																								
Araceae	<i>Pistia stratiotes L.</i>	大漂																								
Urticaceae	<i>Boehmeria nivea</i>	苧麻																								
Asteraceae	<i>Bidens alba</i>	白花鬼針草				0.4	5						0.4	5							0.3	5		0.4	5	
Poaceae	<i>Coix lacryma-jobi</i>	薏苡	1	5							1	5											1	5		
Solanaceae	<i>Solanum nigrum</i>	龍葵																								
Cyperaceae	<i>Cyperus flabelliformis</i>	風車草																								
Poaceae	<i>Miscanthus floridulus</i>	五節芒	1	7							1	7											1	7		
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐																								
Asteraceae	<i>Wedelia chinensis</i>	蟬蟻菊	0.4	5							0.4	5											0.4	5		
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.3	7	0.2	15	0.2	5	0.4	15	0.3	7	0.2	10	0.2	5	0.4	10	0.3	10	0.2	15	0.2	10	0.4	15
Asteraceae	<i>Erechtites hieracifolia</i>	革命菜																								
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																								
Convolvulaceae	<i>Pharbitis nil</i>	牽牛																								
Verbenaceae	<i>Lantana camara</i>	馬纓丹																								
Mimosaceae	<i>Leucaena leucocephala</i>	銀合歡																								
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜				0.2	5						0.2	5											0.2	
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																								
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草				1.5	10						1.5	10											1.5	
Amaranthaceae	<i>Celosia argentea</i>	青葙				0.4	5						0.4	5											0.4	
Acanthaceae	<i>Dicliptera chinensis</i>	狗肝菜	0.3	5							0.3	5											0.3	5		
Bare Gound				54		60		60		65		54		70		65		70		51		65		60		65

P1 – Point count location 1; P4 – Point count location 4















Table 4.4. Odonate species recorded at the Upper Lam Tsuen River

Species name	Common name	Chinese name	Status	Commonness	Post construction monitoring						Post construction monitoring								
					Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	
<i>Acisoma panorpoides panorpoides</i>	Asian Pintail	錐腹蜻	NP	VC													+		
<i>Brachythemis contaminata</i>	Asian Amberwing	黃翅蜻	NP	VC															
<i>Ceriagrion auranticum ryukyuanum</i>	Orange-tailed Sprite	琉球橘黃蟌	NP	VC	+	+	+	+		+			+	+	+	+	+	+	+
<i>Coeliccia cyanomelas</i>	Blue Forest Damselfly	黃紋長腹蟌	NP	VC															
<i>Copera marginipes</i>	Yellow Featherlegs	黃狹扇蟌	NP	VC	+	+	+						+	+	+	+	+	+	+
<i>Crocothemis servilia servilia</i>	Crimson Darter	紅蜻	NP	VC	+		+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Euphaea decorata</i>	Black-banded Gossamerwing	方帶幽蟌	NP	VC														+	
<i>Ictinogomphus pertinax</i>	Common Flangetail	霸王葉春蜓	NP	C											+	+	+	+	+
<i>Ischnura senegalensis</i>	Common Blue Jewel	褐斑異痣蟌	NP	VC															
<i>Mnais lacteola</i>	Indochinese Copperwing	煙翅綠色蟌	P, LC	C															
<i>Nannophya pygmaea</i>	Scarlet Dwarf	侏紅小蜻	P, LC	C															
<i>Neurobasis chinensis</i>	Chinese Greenwing	華麗色蟌	NP	VC	+	+	+	+	+			+	+	+	+	+	+	+	+
<i>Neurothemis fulvia</i>	Russet Percher	網脈蜻	NP	VC	+	+	+						+		+	+	+	+	+
<i>Neurothemis tullia tullia</i>	Pied Percher	截斑脈蜻	NP	C	+														
<i>Orthetrum chrysis</i>	Red-faced Skimmer	華麗灰蜻	NP	VC														+	+
<i>Orthetrum glaucum</i>	Common blue skimmer	黑尾灰蜻	NP	VC	+									+					
<i>Orthetrum luzonicum</i>	Marsh Skimmer	呂宋灰蜻	NP	VC													+	+	+
<i>Orthetrum pruinosum neglectum</i>	Common Red Skimmer	赤褐灰蜻	NP	VC	+	+	+							+	+	+	+	+	+
<i>Orthetrum sabina sabina</i>	Green Skimmer	狹腹灰蜻	NP	VC	+														
<i>Pantala flavescens</i>	Wandering Glider	黃蜻	NP	VC			+	+	+			+	+	+	+	+	+	+	+
<i>Paracercion calamorum duyeri</i>	Dusky Lilysquatter	葦尾蟌	P, LC	C															
<i>Prodasineura autumnalis</i>	Black Threadtail	烏齒原蟌	NP	VC	+	+	+						+	+	+	+	+	+	+
<i>Pseudagrion rubriceps rubriceps</i>	Orange-faced Sprite	丹頂斑蟌	NP	UC	+	+	+	+						+	+	+	+	+	+
<i>Rhinocypha perforata perforata</i>	Common Blue Jewel	三斑鼻蟌	NP	VC	+	+	+	+								+	+	+	+
<i>Rhyothemis variegata arria</i>	Variiegated Flutterer	斑麗翅蜻	NP	C	+	+	+	+											
<i>Trithemis aurora</i>	Crimson Dropwing	曉褐蜻	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Trithemis festiva</i>	Indigo Dropwing	慶褐蜻	NP	VC	+	+	+	+						+	+	+	+	+	+
<i>Zygonyx iris insignis</i>	Emerald Cascader	彩虹蜻	P,PGC	VC															
No. of species					15	11	13	9	4	3	2	4	9	11	13	14	15	13	

Note: NP – Not protected in Hong Kong; P-Protection in Hong Kong

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

“+” – Species exists in the study area

“++” – Species common in the study area

“+++” – Species abundant/dominant in study area

Commonness and status were decided according to AFCD biodiversity website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net))LC- Local Concern - Fellowes *et al* (2002)PGC - Potential Global Concern - Fellowes *et al* (2002)

Table 4.4. Odonate species recorded at the Upper Lam Tsuen River

Species name	Common name	Chinese name	Status	Commonness	Post construction monitoring												
					Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16
<i>Acisoma panorpoides panorpoides</i>	Asian Pintail	錐腹蜻	NP	VC													
<i>Brachythemis contaminata</i>	Asian Amberwing	黃翅蜻	NP	VC													
<i>Ceriagrion auranticum ryukyuanum</i>	Orange-tailed Sprite	琉球橘黃蟓	NP	VC							+	+	+	+	+	+	+
<i>Coeliccia cyanomelas</i>	Blue Forest Damselfly	黃紋長腹蟓	NP	VC													
<i>Copera marginipes</i>	Yellow Featherlegs	黃狹扇蟓	NP	VC								+	+	+	+	+	
<i>Crocothemis servilia servilia</i>	Crimson Darter	紅蜻	NP	VC	+	+							+	+	+	+	+
<i>Euphaea decorata</i>	Black-banded Gossamerwing	方帶幽蟓	NP	VC									+	+	+		
<i>Ictinogomphus pertinax</i>	Common Flangetail	霸王葉春蜓	NP	C	+								+	+	+	+	+
<i>Ischnura senegalensis</i>	Common Blue Jewel	褐斑異痣蟓	NP	VC													
<i>Mnais lacteola</i>	Indochinese Copperwing	煙翅綠色蟓	P, LC	C													
<i>Nannophya pygmaea</i>	Scarlet Dwarf	侏紅小蜻	P, LC	C													
<i>Neurobasis chinensis</i>	Chinese Greenwing	華麗色蟓	NP	VC	+	+					+	+	+	+	+	+	+
<i>Neurothemis fulvia</i>	Russet Percher	網脈蜻	NP	VC									+	+	+	+	+
<i>Neurothemis tullia tullia</i>	Pied Percher	截斑脈蜻	NP	C									+	+	+	+	+
<i>Orthetrum chrysis</i>	Red-faced Skimmer	華麗灰蜻	NP	VC	+	+				+	+	+	+	+	+	+	+
<i>Orthetrum glaucum</i>	Common blue skimmer	黑尾灰蜻	NP	VC													
<i>Orthetrum luzonicum</i>	Marsh Skimmer	呂宋灰蜻	NP	VC	+									+	+	+	+
<i>Orthetrum pruinosum neglectum</i>	Common Red Skimmer	赤褐灰蜻	NP	VC				+			+	+					
<i>Orthetrum sabina sabina</i>	Green Skimmer	狹腹灰蜻	NP	VC		+											
<i>Pantala flavescens</i>	Wandering Glider	黃蜻	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Paracercion calamorum duyeri</i>	Dusky Lilysquatter	葦尾蟓	P, LC	C													
<i>Prodasineura autumnalis</i>	Black Threadtail	烏齒原蟓	NP	VC													
<i>Pseudagrion rubriceps rubriceps</i>	Orange-faced Sprite	丹頂斑蟓	NP	UC													
<i>Rhinocypha perforata perforata</i>	Common Blue Jewel	三斑鼻蟓	NP	VC	+								+	+	+	+	+
<i>Rhyothemis variegata arria</i>	Variiegated Flutterer	斑麗翅蜻	NP	C													
<i>Trithemis aurora</i>	Crimson Dropwing	曉褐蜻	NP	VC	+	+					+	+	+	+	+	+	+
<i>Trithemis festiva</i>	Indigo Dropwing	慶褐蜻	NP	VC	+	+	+	+		+	+	+	+	+	+	+	+
<i>Zygonyx iris insignis</i>	Emerald Cascader	彩虹蜻	P,PGC	VC													
No. of species					9	7	2	3	1	3	7	11	14	14	13	13	10

Note: NP – Not protected in Hong Kong; P-Protection in Hong Kong

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

“+” – Species exists in the study area

“++” – Species common in the study area

“+++” – Species abundant/dominant in study area

Commonness and status were decided according to AFCD biodiversity website (www.hkbiodiversity.net)

LC- Local Concern - Fellowes *et al* (2002)PGC - Potential Global Concern - Fellowes *et al* (2002)

Table 4.5 Aquatic Macro invertebrates recorded at Lam Tsuen River

(T1 - located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Species name				Baseline monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring															
				Jul-08		Aug-08		Jan-09				Jul-09				Jan-10				Jul-10				Jan-11				Jul-11				Jan-12											
				Upper stream	Lower stream	Upper stream	Lower stream	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4						
Chinese name	Status	Commonness																																									
<b>Molluscs</b>																																											
<i>Biomphalaria</i> sp.	--	NP	VC		+	+	+																																				
<i>Brotia hainanensis</i>	--	NP	VC	+++	++	++	++	+	+	+	+	+	+		+	+	+	++	++																								
<i>Melanoides tuberculata</i>	縮螺	NP	VC		+		+											+																									
<i>Pomacea canaliculata</i>	福寿螺	NP	VC		+		+	+	+	+				+				+																									
<i>Radix plicatulus</i>	羅白螺	NP	VC		+	+	+	+	+	+				+				+																									
<i>Sinotaita quadrata</i>	田螺	NP	VC		+		+	+	+	+				+				+																									
<b>Insects</b>																																											
<i>Baetis</i> sp.	--	NP	VC	+	+	+	+	+																																			
<i>Caenis</i> sp.	--	NP	VC					+	+	+	+							+																									
<i>Chironomus</i> sp.	蠅幼虫	NP	VC	+	+	+	+	+	+	+	+							+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+										
<i>Electrogena</i> sp.	--	NP	VC																																								
<i>Hydropsyche</i> sp.	--	NP	VC																																								
<i>Indobaetis</i> sp.	--	NP	VC	+	+	+	+	+	+	+								+																									
<i>Mnais</i> sp.	--	NP	VC					+	+																																		
<i>Orithetrum</i> sp.	--	NP	VC	+	+													+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+										
<b>Crustaceans</b>																																											
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC	+	+	+	+	+						+	+																												
<i>Cryptopotamon anacoluthon</i>	鯉刺孺蟹	NP	VC	+		+																																					
<i>Macrobrachium hainanense</i>	海南沼蝦	NP	VC	+	+	+	+	+						+	+																												
<i>Somaniathelphusa zanklon</i>	東莞蟹	NP	VC	+		+																																					
No. of species				9	12	10	11		10	11	3	2	9	10	3	3	2	9	12	5	3	2	7	12	5	4	2	7	15	13	11	13	15	16	4	1	1	2	17	9	6	5	0

Note: NP - Not protected in Hong Kong; P - Protected in Hong Kong  
 "VC" - Very Common; "UC" - Uncommon; "C" - Common; "R" - Rare  
 +, occurred; ++, common; +++, abundant/dominant Species in the the study area

Table 4.5 Aquatic Macro invertebrates recorded at Lam Tsuen River

(T1 - located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Species name	Chinese name	Status	Commonness	Impact monitoring				Impact monitoring				Impact monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring																						
				Jul-12				Aug-13				Dec-13				Jan-14				Feb-14				Mar-14				Apr-14				May-14				Jun-14																		
				Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4																
<b>Molluscs</b>																																																						
<i>Biomphalaria sp.</i>	--	NP	VC	+	+					+	+				+	+					+	+					+	+							+	+																		
<i>Brotia hainanensis</i>	--	NP	VC	++						++	+	+			++	+	+				++	+	+			++	+	+							++	+	+																	
<i>Melanoides tuberculata</i>	縮螺	NP	VC	+	+					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+													
<i>Pomacea canaliculata</i>	福寿螺	NP	VC	+	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+													
<i>Radix plicatulus</i>	羅白螺	NP	VC	+	+	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+													
<i>Sinotia quadrata</i>	田螺	NP	VC	+	+	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+													
<b>Insects</b>																																																						
<i>Baetis sp.</i>	--	NP	VC	+						+					+						+						+																											
<i>Caenis sp.</i>	--	NP	VC																																																			
<i>Chironomus sp.</i>	蠅幼虫	NP	VC	+	+	+				+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+													
<i>Electrogenus sp.</i>	--	NP	VC	+						+					+						+						+																											
<i>Hydropsyche sp.</i>	--	NP	VC	+						+					+						+						+																											
<i>Indobaetis sp.</i>	--	NP	VC							+					+						+						+																											
<i>Mnais sp.</i>	--	NP	VC	+	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+													
<i>Orithetrum sp.</i>	--	NP	VC	+	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+													
<b>Crustaceans</b>																																																						
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+													
<i>Cryptopotamon anacoluthon</i>	鯉刺溞	NP	VC	+	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+													
<i>Macrobrachium hainanense</i>	海南沼蝦	NP	VC	+						+					+						+						+																											
<i>Somaniathelphusa zanklon</i>	東莞蟹	NP	VC							+					+						+						+																											
No. of species				15	10	8	5	1		16	12	11	7	3	15	11	9	8	7		15	11	9	10	8	16	13	13	11	8		16	14	14	12	11		17	15	16	13	12		13	15	10	10	10		11	12	11	10	9

Note: NP - Not protected in Hong Kong; P - Protected in Hong Kong  
 "VC" - Very Common; "UC" - Uncommon; "C" - Common; "R" - Rare  
 +, occurred; ++, common; +++, abundant/dominant Species in the the study area

Table 4.5 Aquatic Macro invertebrates recorded at Lam Tsuen River

(T1 - located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Species name	Chinese name	Status	Commonness	Post construction monitoring																																																										
				Jul-14				Aug-14				Sep-14				Oct-14				Nov-14				Dec-14				Jan-15				Feb-15				Mar-15				Apr-15																						
				Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4																			
<b>Molluscs</b>																																																														
<i>Biomphalaria sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																						
<i>Brotia hainanensis</i>	--	NP	VC	++	+	+	+	+	++	+	+	+	+	++	+	+	+	+	++	++	+	+	+	+	++	++	+	+	+	+	++	++	+	+	+	+	++	++	+	+	+																					
<i>Melanoides tuberculata</i>	縮螺	NP	VC																																																											
<i>Pomacea canaliculata</i>	福果螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																					
<i>Radix plicatulus</i>	羅白螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																					
<i>Sinotaita quadrata</i>	田螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																					
<b>Insects</b>																																																														
<i>Baetis sp.</i>	--	NP	VC	+					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																					
<i>Caenis sp.</i>	--	NP	VC																																																											
<i>Chironomus sp.</i>	蠅幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																					
<i>Electrogenus sp.</i>	--	NP	VC	+	+				+	+				+	+				+	+																																										
<i>Hydropsyche sp.</i>	--	NP	VC	+	+	+			+	+				+	+				+	+																																										
<i>Indobaetis sp.</i>	--	NP	VC	+	+	+			+	+				+	+				+	+																																										
<i>Mnais sp.</i>	--	NP	VC		+	+			+	+				+	+				+	+																																										
<i>Orithetrum sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																					
<b>Crustaceans</b>																																																														
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	++	++	++	++	++	++	++	++	++																				
<i>Cryptopotamon anacoluthon</i>	鯉刺湯蟹	NP	VC		+	+				+	+				+	+				+	+																																									
<i>Macrobrachium hainanense</i>	海南沼蝦	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																					
<i>Somaniathelphusa zanklon</i>	東鰲蟹	NP	VC																																																											
No. of species				13	11	13	13	10		13	13	15	15	9		13	14	16	14	12		13	14	16	15	11		13	14	15	14	12		13	12	12	13	11		13	11	11	13	12		11	12	12	11	11		11	13	13	12	12		11	9	12	15	12

Note: NP - Not protected in Hong Kong; P - Protected in Hong Kong  
 "VC" - Very Common; "UC" - Uncommon; "C" - Common; "R" - Rare  
 +, occurred; ++, common; +++, abundant/dominant Species in the the study area



Table 4.5 Aquatic Macro invertebrates recorded at Lam Tsuen River

(T1 - located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Species name	Chinese name	Status	Commonness	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring																
				May-15				Jun-15				Jul-15				Aug-15				Sep-15				Oct-15				Nov-15				Dec-15												
				Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4						
<b>Molluscs</b>																																												
<i>Biomphalaria sp.</i>	--	NP	VC																																									
<i>Brotia hainanensis</i>	--	NP	VC	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	
<i>Melanoides tuberculata</i>	縮螺	NP	VC																																									
<i>Pomacea canaliculata</i>	福寿螺	NP	VC	+	+	+	+	+	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	
<i>Radix plicatulus</i>	田螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Sinotia quadrata</i>	田螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<b>Insects</b>																																												
<i>Baetis sp.</i>	--	NP	VC	+																																								
<i>Caenis sp.</i>	--	NP	VC																																									
<i>Chironomus sp.</i>	蠅幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Electrogena sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Hydropsyche sp.</i>	--	NP	VC	+	+	+			+	+				+	+				+	+				+	+				+	+				+	+				+	+				
<i>Indobaetis sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Mnais sp.</i>	--	NP	VC				+																																					
<i>Orithetrum sp.</i>	--	NP	VC			+	+	+																																				
<b>Crustaceans</b>																																												
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	
<i>Cryptopotamon anacoluthon</i>	蟹刺	NP	VC																																									
<i>Macrobrachium hainanense</i>	海南沼蝦	NP	VC	+					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Somaniathelphusa zanklon</i>	東螺	NP	VC																																									
No. of species				11	9	11	13	12	11	9	11	13	12	11	9	11	13	12	12	9	11	13	12	11	9	11	13	12	11	9	11	13	13	11	9	11	13	13	12	10	11	13	13	

Note: NP - Not protected in Hong Kong; P - Protected in Hong Kong  
 "VC" - Very Common; "UC" - Uncommon; "C" - Common; "R" - Rare  
 +, occurred; ++, common; +++, abundant/dominant Species in the the study area

Table 4.5 Aquatic Macro invertebrates recorded at Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Species name	Chinese name	Status	Commonness	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring							
				Jan-16				Feb-16				Mar-16				Apr-16				May-16				Jun-16				Jul-16				Aug-16				Sep-16				Oct-16			
				Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4
<b>Molluscs</b>																																											
<i>Biomphalaria sp.</i>	--	NP	VC	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++			
<i>Brotia hainanensis</i>	--	NP	VC	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++		
<i>Melanoides tuberculata</i>	縮螺	NP	VC	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++		
<i>Pomacea canaliculata</i>	福寿螺	NP	VC	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++		
<i>Radix plicatulus</i>	羅白螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Sinotaia quadrata</i>	田螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<b>Insects</b>																																											
<i>Baetis sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Caenis sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Chironomus sp.</i>	蠅幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Electrogenus sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Hydropsyche sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Indobaetis sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Mnais sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Orithetrum sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<b>Crustaceans</b>																																											
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++		
<i>Cryptopotamon anacoluthon</i>	刺毛蟹	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Macrobrachium hainanense</i>	海南沼蝦	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Somaniathelphusa zanklon</i>	東鰲蟹	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
No. of species				12	10	11	13	13	12	10	11	13	13	12	10	11	13	13	13	10	11	13	13	13	10	11	13	13	13	10	12	14	14	13	10	12	14	14	13	10	12	14	14

Note: NP – Not protected in Hong Kong; P - Protected in Hong Kong  
 “VC” – Very Common; “UC” – Uncommon; “C” - Common; “R” - Rare  
 +, occurred; ++, common; +++, abundant/dominant Species in the the study area

Table 4.6 Fish species and amphibians at Upper Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Species	Chinese name	Status	Sampling point	Baseline monitoring				Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring										
				Jul-08		Aug-08		Jan-09					Jul-09					Jan-10					Jul-10					Jan-11					Jul-11					
				Upper stream	Lower stream	Upper stream	Lower stream	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	
<i>Acrossocheilus parallens</i>	御條光唇魚	P, PGC	R		+		+						+																									
<i>Channa maculate</i>	斑鱧	NP	C				+																															
<i>Cirrhina molitorella</i>	鯪魚	NP	C																																			
<i>Clarias fuscus</i>	胡子鯰	NP	C																																			
<i>Cyprinus carpio var. viridivloaceus</i>	錦鯉	NP	C																																			
<i>Gambusia affinis</i>	食蚊魚	NP	VC				+	+		+			+	+						+				+						+	+							
<i>Limparhomaloptera disparis</i>	擬平鰈	NP	C																																			
<i>Misgurnus anguillicaudatus</i>	泥鰌	NP	C	+			+																															
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C		+		+																															
<i>Parazacco spilurus</i>	異鰮	V and NP	C	+			+																															
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC				+	+																														
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰕	NP	C		+	+	+		++	++	++	+		++	++					++	++			++	++		++	++		++	++							
<i>Pterocryptis cochinchinensis</i>	黃鰰	NP	C																																			
<i>Puntius semifasciolatus</i>	七星魚	NP	C	++	+	++	+		+	+	++																											
<i>Rhinogobius spp.</i>	鰕虎魚	NP	C/UN/R		+	+	+		+	+	+				+																							
<i>Schistura fasciolata</i>	橫紋南鰕	NP	C		+	+	+		+	+	+																											
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	+	+		+	+	++				++	+				+		+	++	+														
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C			+	+		+	+	+																											
<i>Zacco platypus</i>	密鱈鰻	NP	C	+	++	+	++		+++	+++	+++				++					++	++		++	++		++	++		++	++		++	++					
2x2m fish counting		No. of fish		70	60	75	60	38	45	40	40	8	38	20	5	15	7	38	20	5	15	7	32	12	6	10	20	30	22	10	7	5	10	4	2	0	0	
No. of species				5	8	11	12	7	7	4	8	2	5	3	3	5	6	5	3	2	2	2	9	8	10	13	9	9	7	4	4	8	10	8	9	5	3	
Amphibian																																						
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P (Cap 170, NT, PGC)	R	+		+	+		+	+							+	+		+																		
<i>Fejervarya limnocharis</i>	澤蛙	NP	VC																																			
No. of species				1	0	1	1	1	1	0	0	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	

Note: NP – Not protected in Hong Kong  
 “VC” – Very Common; “UC” – Uncommon; “C” - Common; "R" - Rare  
 +, occurred; ++, common; +++, abundant/dominant Species in the the study area  
 -V – Listed as vulnerable in China Fish Red Data Book  
 -Reference point was the sampling location outside the works area used to compare the with the data within works area.  
 "Cap 170" - List in Wild Animals Protection Ordinance (Cap.170)  
 "NT" - Near Threatened in IUCN Red List Status  
 "PGC"-Potential Global Concern by Fellowes *et al* (2002)

Table 4.6 Fish species and amphibians at Upper Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Species	Chinese name	Status	Sampling point	Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring									
				Jan-12					Jul-12					Aug-13					Dec-13					Jan-14					Feb-14					Mar-14					Apr-14									
				Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4					
Fish			Commonnes																																													
<i>Acrossocheilus parallens</i>	御條光唇魚	P, PGC	R			+	+			+	+	+			+	+	+			+	+	+			+	+	+			+	+	++	+++	+		+	++	++	+++	++		++	++	+++	++			
<i>Channa maculate</i>	斑鱧	NP	C																																													
<i>Cirrhina molitorella</i>	鯪魚	NP	C																																													
<i>Clarias fuscus</i>	胡子鯪	NP	C							+					+					+					+					+					+					+								
<i>Cyprinus carpio var. viridiviolaceus</i>	錦鯉	NP	C																																													
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+					
<i>Liriparomaloptera disparis</i>	擬平鰻	NP	C																																													
<i>Misgurnus anguillicaudatus</i>	泥鰻	NP	C							+					+					+					+					+					+					+								
<i>Oreochromis niloticus</i>	尼羅口鯪非鯪	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+					
<i>Parazacco spilurus</i>	異鰻	V and NP	C	+	+				+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+						
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC	+					+	+	+			+	+	+			+	+	+			+	+	+			+	+	+	+		+	+	+	+		+	+	+	+						
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰻	NP	C	+					+					+					+					+					+					+					+									
<i>Pterocryptis cochinchinensis</i>	黃鰻	NP	C																																													
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	+			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+	+		+	+	+	+		+	+	+	+						
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C/UN/R	+	+	+			+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+						
<i>Schistura fasciolata</i>	橫紋南鰻	NP	C	+	+				+	+	+			+	+	+			+	+	+			+	+	+			+	+	+	+		+	+	+	+		+	+	+	+						
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+					
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C	+					+	+	+			+	+	+			+	+	+			+	+	+			+	+	+	+		+	+	+	+		+	+	+	+						
<i>Zacco platypus</i>	寬鰻鰻	NP	C	+	+				+	+	+			+	+	++	++	++	+	+	++	+++	++	+	+	++	+++	++	+	+	++	+++	++	+	+	++	+++	++	+	+	++	+++	++					
2x2m fish counting		No. of fish		6	3	1	0	0	8	5	2	0	0	5	2	3	2	3	5	2	3	2	3	6	20	60	20	10	16	40	70	40	30	60	70	80	90	80	40	50	60	60	50					
No. of species				12	8	6	4	3	14	10	10	4	3	14	11	11	6	4	14	9	12	8	6	14	10	13	11	6	14	10	15	11	7	15	11	16	14	11	11	12	16	14	12					
Amphibian																																																
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P (Cap 170, NT, PGC)	R	+		+	+								+	+				+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+					
<i>Fejervarya limnocharis</i>	澤蛙	NP	VC																																													
No. of species				1	0	1	1	0	0	0	0	1	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					

Note: NP – Not protected in Hong Kong  
 “VC” – Very Common; “UC” – Uncommon; “C” - Common; "R" - Rare  
 +, occurred; ++, common; +++, abundant/dominant Species in the the study area  
 -V – Listed as vulnerable in China Fish Red Data Book  
 -Reference point was the sampling location outside the works area used to compare the with the data within works area.  
 "Cap 170" - List in Wild Animals Protection Ordinance (Cap.170)  
 "NT" - Near Threatened in IUCN Red List Status  
 "PGC"-Potential Global Concern by Fellowes *et al* (2002)

Table 4.6 Fish species and amphibians at Upper Lam Tsuen River

(T1 - located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Species	Chinese name	Status	Sampling point	Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring									
				May-14					Jun-14					Jul-14					Aug-14					Sep-14									
				Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4					
Fish			Commonnes																														
<i>Acrossocheilus parallens</i>	御條光唇魚	P, PGC	R		+	+	+	+		+	+	+	+		+	++	++	+		++	++	++	+		++	++	++	+					
<i>Channa maculate</i>	斑鱧	NP	C																														
<i>Cirrhina molitorella</i>	鯪魚	NP	C																														
<i>Clarias fuscus</i>	胡子鯰	NP	C					+					+					+					+					+					+
<i>Cyprinus carpio var. viridiviolaceus</i>	錦鯉	NP	C																														
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Limparhomaloptera disparis</i>	擬平鰈	NP	C	+	+	+	+		+	+	+			+	+	+			+	+	+			+	+	+			+	+	+		
<i>Misgurnus anguillicaudatus</i>	泥鰌	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Oreochromis niloticus</i>	尼羅口鯽非鯽	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Parazacco spilurus</i>	異鰌	V and NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰈	NP	C	+	+				+	+				+	+				+	+				+	+				+	+			
<i>Pterocryptis cochinchinensis</i>	黃鰰	NP	C	+					+					+					+					+					+				
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+
<i>Rhinogobius spp.</i>	鰕虎魚	NP	C/UN/R	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Schistura fasciolata</i>	橫紋南鰈	NP	C	+	+	+			+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+	
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+
<i>Zacco platypus</i>	寬鰭鱈	NP	C	+	+	++	++	++	+	+	+	+	+	+	+	+	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+
2x2m fish counting		No. of fish		20	30	30	20	20	6	12	10	6	8	8	16	15	5	10	10	12	18	10	12	20	30	30	20	20					
No. of species				13	13	13	12	11	10	12	13	11	11	11	12	13	12	11	10	12	13	13	11	11	13	14	15	13					
Amphibian																																	
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P (Cap 170, NT, PGC)	R	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Fejervarya limnocharis</i>	澤蛙	NP	VC																														
No. of species				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					

Note: NP – Not protected in Hong Kong  
 “VC” – Very Common; “UC” – Uncommon; “C” - Common; "R" - Rare  
 +, occurred; ++, common; +++, abundant/dominant Species in the the study area  
 -V – Listed as vulnerable in China Fish Red Data Book  
 -Reference point was the sampling location outside the works area used to compare the with the data within works area.  
 "Cap 170" - List in Wild Animals Protection Ordinance (Cap.170)  
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 "PGC"-Potential Global Concern by Fellowes *et al* (2002)

Table 4.6 Fish species and amphibians at Upper Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Species	Chinese name	Status	Sampling point	Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring									
				Oct-14					Nov-14					Dec-14					Jan-15					Feb-15					Mar-15				
				Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4	Referenc e	T1	T2	T3	T4
Fish			Commonnes																														
<i>Acrossocheilus parallens</i>	御條光唇魚	P, PGC	R		++	++	++	+		++	++	++	++		++	++	++	++		++	++	++	++		++	++	++	++		++	++	++	++
<i>Channa maculate</i>	斑鱧	NP	C																														
<i>Cirrhina molitorella</i>	鯪魚	NP	C																														
<i>Clarias fuscus</i>	胡子鯪	NP	C					+					+					+					+					+					+
<i>Cyprinus carpio var. viridiviolaceus</i>	錦鯉	NP	C																														
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Limparhmaloptera disparis</i>	擬平鰻	NP	C	+	+	+	+		+	+	+			+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+	
<i>Misgurnus anguillicaudatus</i>	泥鰻	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Oreochromis niloticus</i>	尼羅口鯪非鯪	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Parazacco spilurus</i>	異鰻	V and NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	+	+
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			+	+	+			+	+				+	+				+	+				+	+				+	+	
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰻	NP	C	+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+	
<i>Pterocryptis cochinchinensis</i>	黃鰻	NP	C	+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+	
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C/UN/R	+	+	+	+	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+
<i>Schistura fasciolata</i>	橫紋南鰻	NP	C	+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+	
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C		+	++	++	+		+	++	++	+		+	++	++	+		+	++	++	+		+	++	++	+		+	++	++	+
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C				+	+				+	+				+	+				+	+				+	+				+	+
<i>Zacco platypus</i>	寬鰻鱚	NP	C	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+
2x2m fish counting		No. of fish		30	40	40	30	30	50	70	70	60	60	60	60	60	50	50	50	50	60	60	60	50	60	60	60	40	50	60	60	60	40
No. of species				11	13	14	15	12	11	13	14	13	11	11	13	14	14	11	10	11	12	13	10	10	11	12	14	10	10	13	13	14	11
Amphibian																																	
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P (Cap 170, NT, PGC)	R	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Fejervarya limnocharis</i>	澤蛙	NP	VC																														
No. of species				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Note: NP – Not protected in Hong Kong  
 “VC” – Very Common; “UC” – Uncommon; “C” - Common; "R" - Rare  
 +, occurred; ++, common; +++, abundant/dominant Species in the the study area  
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Table 4.6 Fish species and amphibians at Upper Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Species	Chinese name	Status	Sampling point	Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring																			
				Apr-15					May-15					Jun-15					Jul-15					Aug-15					Sep-15					Oct-15														
				Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4										
Fish			Commonnes																																													
<i>Acrossocheilus parallens</i>	御條光唇魚	P, PGC	R		++	++	++	++							+	+	++	++																														
<i>Channa maculate</i>	斑鱧	NP	C										+																																			
<i>Cirrhina molitorella</i>	鯪魚	NP	C																																													
<i>Clarias fuscus</i>	胡子鯪	NP	C					+					+																																			
<i>Cyprinus carpio var. viridiviolaceus</i>	錦鯉	NP	C									+																																				
<i>Gambusia affinis</i>	食蚊魚	NP	VC		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+					
<i>Limparhmaloptera disparis</i>	擬平鰻	NP	C		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+					
<i>Misgurnus anguillicaudatus</i>	泥鰻	NP	C		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+					
<i>Oreochromis niloticus</i>	尼羅口鯽非鯽	NP	C		+	+	+	+		+	+	+	+		+	+	++	++		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++
<i>Parazacco spilurus</i>	異鰻	V and NP	C		+	+	++	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+					
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			+	+				+	+				+	+				+	+				+	+				+	+				+	+				+	+						
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰻	NP	C		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+					
<i>Pterocryptis cochinchinensis</i>	黃鰻	NP	C		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+					
<i>Puntius semifasciolatus</i>	七星魚	NP	C		+	+	++	++		+	+	++	++		+	+	++	++		+	+	++	++		+	+	++	++		+	+	++	++		+	+	++	++		+	+	++	++					
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C/UN/R		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++					
<i>Schistura fasciolata</i>	橫紋南鰻	NP	C		+	+	+	+		+	+	+	+		+	+	+	+		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++					
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C		+	+	++	++		+	+	++	++		+	+	++	++		+	+	++	++		+	+	++	++		+	+	++	++		+	+	++	++		+	+	++	++					
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C				+	+				+	+				+	+			+	+					+	+				+	+				+	+				+	+					
<i>Zacco platypus</i>	寬鰻鱚	NP	C		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++		+	++	++	++					
2x2m fish counting		No. of fish		40	50	55	50	40	20	30	30	20	20	20	30	30	20	20	12	15	18	8	7	15	12	16	10	10	18	15	20	15	15	25	20	22	18	20										
No. of species				13	12	14	15	11	13	12	14	12	13	12	13	13	13	12	12	12	13	13	12	12	12	13	13	12	12	10	13	13	12	12	10	13	13	12										
Amphibian																																																
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P (Cap 170, NT, PGC)	R		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+					
<i>Fejervarya limnocharis</i>	澤蛙	NP	VC																																													
No. of species				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1										

Note: NP – Not protected in Hong Kong  
 “VC” – Very Common; “UC” – Uncommon; “C” - Common; "R" - Rare  
 +, occurred; ++, common; +++, abundant/dominant Species in the the study area  
 -V – Listed as vulnerable in China Fish Red Data Book  
 -Reference point was the sampling location outside the works area used to compare the with the data within works area.  
 "Cap 170" - List in Wild Animals Protection Ordinance (Cap.170)  
 "NT" - Near Threatened in IUCN Red List Status  
 "PGC" -Potential Global Concern by Fellowes *et al* (2002)

Table 4.6 Fish species and amphibians at Upper Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Species	Chinese name	Status	Sampling point	Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring														
				Nov-15					Dec-15					Jan-16					Feb-16					Mar-16					Apr-16					May-16					Jun-16									
				Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4					
Fish			Commonnes																																													
<i>Acrossocheilus parallens</i>	御條光唇魚	P, PGC	R		+	+	+				+	+	++			+	+	++			+	+	++			+	+	++			+	+	++			+	+	++			+	+	++					
<i>Channa maculate</i>	斑鱧	NP	C					+					+					+					+					+					+					+					+					
<i>Cirrhina molitorella</i>	鯪魚	NP	C																																													
<i>Clarias fuscus</i>	胡子鯪	NP	C					+					+					+					+					+					+					+					+					
<i>Cyprinus carpio var. viridiviolaceus</i>	錦鯉	NP	C				+					+					+					+					+					+					+					+						
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+					
<i>Limparhmaloptera disparis</i>	擬平鰻	NP	C	+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+						
<i>Misgurnus anguillicaudatus</i>	泥鰻	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+					
<i>Oreochromis niloticus</i>	尼羅口鯪非鯽	NP	C	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++					
<i>Parazacco spilurus</i>	異鰻	V and NP	C	+					+					+					+					+					+					+					+									
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+					
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰻	NP	C	+	+				+	+				+	+				+	+				+	+				+	+				+	+				+	+								
<i>Pterocryptis cochinchinensis</i>	黃鰻	NP	C	+					+					+					+					+					+					+					+									
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+					
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C/UN/R	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++					
<i>Schistura fasciolata</i>	橫紋南鰻	NP	C	+	++	++			+	++	++			+	++	++			+	++	++			+	++	++			+	++	++			+	++	++			+	++	++							
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	++	+	+	+	+	++	+	+	+	+	++	+	+	+	+	++	+	+	+	+	++	+	+	+	+	++	+	+	+	+	++	+	+	+	+	++	+	+					
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C			+	+				+	+				+	+				+	+				+	+				+	+				+	+				+	+						
<i>Zacco platypus</i>	窗鰻	NP	C	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+					
2x2m fish counting		No. of fish		40	35	40	35	40	55	40	45	45	40	60	50	50	50	40	65	55	55	55	40	60	60	60	55	40	45	45	45	40	30	45	25	25	20	15	40	30	25	25	20					
No. of species				12	10	13	13	12	12	10	13	12	12	12	10	14	13	10	12	10	14	13	10	12	10	14	13	10	12	10	14	13	10	12	10	14	13	10	12	10	14	13	10					
Amphibian																																																
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P (Cap 170, NT, PGC)	R	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+					
<i>Fejervarya limnocharis</i>	澤蛙	NP	VC																																													
No. of species				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1					

Note: NP – Not protected in Hong Kong  
 “VC” – Very Common; “UC” – Uncommon; “C” - Common; "R" - Rare  
 +, occurred; ++, common; +++, abundant/dominant Species in the the study area  
 -V – Listed as vulnerable in China Fish Red Data Book  
 -Reference point was the sampling location outside the works area used to compare the with the data within works area.  
 "Cap 170" - List in Wild Animals Protection Ordinance (Cap.170)  
 "NT" - Near Threatened in IUCN Red List Status  
 "PGC"-Potential Global Concern by Fellowes *et al* (2002)



Table 4.6 Fish species and amphibians at Upper Lam Tsuen River

(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Species	Chinese name	Status	Sampling point	Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					
				Jul-16					Aug-16					Sep-16					Oct-16					
				Refere nce	T1	T2	T3	T4	Refere nce	T1	T2	T3	T4	Refere nce	T1	T2	T3	T4	Refere nce	T1	T2	T3	T4	
Fish																								
<i>Acrossocheilus parallens</i>	御條光唇魚	P, PGC	R			+	+	++			+	+	++			+	+	++			+	+	++	
<i>Channa maculate</i>	斑鱧	NP	C																					
<i>Cirrhina molitorella</i>	鯪魚	NP	C																					
<i>Clarias fuscus</i>	胡子鯪	NP	C					+					+										+	
<i>Cyprinus carpio var. viridiviolaceus</i>	錦鯉	NP	C			+						+										+		
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Limparhmaloptera disparis</i>	擬平鰈	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Misgurnus anguillicaudatus</i>	泥鰌	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Oreochromis niloticus</i>	尼羅口鯪非鯪	NP	C	+	+	++	++	++	+	+	++	++	++	++	+	+	++	++	++	+	+	++	++	++
<i>Parazacco spilurus</i>	異鱧	V and NP	C	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			+	+	+			+	+	+			+	+	+			+	+	+	
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰈	NP	C	+	+				+	+				+	+				+	+				
<i>Pterocryptis cochinchinensis</i>	黃鰔	NP	C	+					+					+					+					
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	++
<i>Rhinogobius spp.</i>	鰕虎魚	NP	C/UN/R	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	++
<i>Schistura fasciolata</i>	橫紋南鰈	NP	C	+	++	++			+	++	++			+	++	++			+	++	++			
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	++	+	+	+	+	++	+	+	+	+	++	+	+	+	+	+	++	+	+
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C			+	+				+	+				+	+				+	+		
<i>Zacco platypus</i>	寬鰭鱈	NP	C	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	++
2x2m fish counting		No. of fish		30	20	15	20	25	20	15	15	15	25	25	20	20	15	22	25	25	25	20	20	
No. of species				12	10	14	13	10	12	10	14	13	10	12	10	14	13	10	12	10	14	13	10	
Amphibian																								
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P (Cap 170, NT, PGC)	R	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Fejervarya limnocharis</i>	澤蛙	NP	VC																					
No. of species				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	

Note: NP – Not protected in Hong Kong  
 “VC” – Very Common; “UC” – Uncommon; “C” - Common; "R" - Rare  
 +, occurred; ++, common; +++, abundant/dominant Species in the the study area  
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Table 4.7 Abotic data for Upper Lam Tsuen River

(T1- located at upper river channel sampling site  
to T4 - located at lower river Channel sampling  
site)

Parameter / date	Baseline monitoring	Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring			
	8-Aug	Jan-09				Jul-09				Jan-10				Jul-10				Jan-11				Jul-11				Jan-12			
Replicate		T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
DO (mg/L)	9.2	9.8	9.9	9.4	9.1	6.4	6.4	6.5	6.8	9.7	9.5	9.5	9.3	8.3	8.5	8.5	8.7	9.6	9.5	9.5	9.1	9.5	9.6	9.4	9.3	9.4	9.2	9.4	9.2
pH	7.49	7.24	7.36	7.53	7.44	7.1	7.25	7	7.05	7.9	8.1	8.1	8.2	7.4	7.5	7.3	7.4	7.1	7.2	7.2	7.1	7.3	7.1	7.1	7.1	7.2	6.9	6.8	6.7
Nitrate (mg N/L)	0.36	0.79	1.1	1.2	1.2	0.31	0.48	0.48	0.59	0.56	1.11	1.13	1.33	0.1	0.2	0.2	0.3	0.1	0.2	0.4	0.5	0.1	0.2	0.3	0.45	0.2	0.3	0.5	0.6
Ammonia (mg/L)	<0.01	PO4-P (µg P/L): <100				0.02	0.02	0.02	0.03	0.01	0.16	0.17	0.07	0.2	0.4	0.2	0.2	0.05	0.07	0.07	0.1	0.06	0.05	0.08	0.1	0.04	0.05	0.06	0.2
Salinity (ppt)	<0.1	<0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conductivity (µS/cm)	60	80	100	120	120	45	51	52	63	62	96	98	114	84	100	460	54	90	87	93	120	93	90	90	100	92	84	96	110
BOD (mg/L)	<2	<2	<2	<2	3	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.1-0.3	0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2			
Water flow at riffle (m/s)	0.4-0.7	0.2-0.5				0.2-0.5				0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6			
Sand (%)	15	15	10	10	10	10	10	10	15	8	8	8	15	8	8	8	15	8	8	8	15	8	8	8	15	10	15	10	10
Stone (%)	80	80	88	88	88	88	88	88	70	90	90	90	70	90	90	90	70	90	90	90	70	90	90	90	70	80	70	80	70
Mud (%)	5	5	2	2	2	2	2	2	5	2	2	2	5	2	2	2	5	2	2	2	5	2	2	2	5	10	15	10	20

Table 4.7 Abotic data for Upper Lam Tsuen River

(T1- located at upper river channel sampling site  
to T4 - located at lower river Channel sampling  
site)

Parameter / date	Impact monitoring				Impact monitoring				Impact monitoring				Post construction monitoring			
	Jul-12				Aug-13				Dec-13				Jan-14			
Replicate	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
DO (mg/L)	8.2	8	7.8	7.3	8.9	8.5	8.7	8.8	9.3	8.6	8.8	8.7	9.1	9.0	8.6	8.5
pH	6.8	7.1	7.3	7.6	6.5	6.8	6.8	7.1	6.2	6.9	7.1	7.1	6.2	6.9	7.1	7.1
Nitrate (mg N/L)	0.13	0.67	0.62	0.82	0.74	0.72	0.83	0.79	0.48	0.57	0.77	0.89	0.9	0.8	1.3	1.26
Ammonia (mg/L)	0.01	0.02	0.04	0.03	0.02	0.03	0.03	0.04	<0.01	<0.01	<0.01	<0.01	0.04	0.1	0.12	0.15
Salinity (ppt)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conductivity (µS/cm)	41	38	73	86	67	77	74	75	62	64	90	110	72	78	88	108
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2			
Water flow at riffle (m/s)	0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6			
Sand (%)	10	10	10	10	10	10	10	10	5	5	5	5	5	5	5	5
Stone (%)	60	60	60	60	75	75	75	75	90	85	85	85	90	85	85	85
Mud (%)	30	30	30	30	15	15	15	15	5	10	10	10	5	10	10	10

Table 4.7 Abotic data for Upper Lam Tsuen River

(T1- located at upper river channel sampling site  
to T4 - located at lower river Channel sampling site)

Parameter / date	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring							
	Feb-14				Mar-14				Apr-14				May-14				Jun-14				Jul-14				Aug-14							
Replicate	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
DO (mg/L)	7.8	8.7	9.8	9.8	7.5	7.8	8.2	8.1	7.7	7.6	7.8	8.0	8.2	7.8	8.1	8.2	7.6	7.8	7.4	7.2	7.6	7.2	7.6	7.5	7.6	7.4	7.3	7.6	7.6	7.4	7.3	7.6
pH	8.2	8.5	8	7.8	8.3	8.2	7.6	7.2	7.6	7.8	8.2	7.8	7.7	7.8	7.9	8.2	7.6	7.8	7.8	8.1	7.6	7.7	7.8	8	7.8	7.5	7.6	7.8	7.8	7.5	7.6	7.8
Nitrate (mg N/L)	1.3	1.8	1.6	2.1	1.2	1.4	1.1	1.3	1.5	1.5	1.3	1.2	0.9	0.7	0.6	0.7	0.8	0.8	0.9	0.9	0.8	1.1	1.1	0.8	1.2	1.1	0.9	1.1	1.2	1.1	0.9	1.1
Ammonia (mg/L)	0.05	0.04	0.1	0.12	0.06	0.04	0.04	0.1	0.1	0.1	0.1	0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1
Salinity (ppt)	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0.02	0.03	0.03	0.01	0.02	0.03	0.03	0	0	0	0	0	0	0	0	0	0	0	0
Conductivity (µS/cm)	78	87	118	119	120	123	125	123	96	114	120	122	82	80	72	66	39	58	69	70	43	85	72	75	75	78	82	86	75	78	82	86
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2				0.03-0.2				0.03-0.2				0.03-0.2							
Water flow at riffle (m/s)	0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6							
Sand (%)	5	5	5	5	5	5	5	5	5	5	5	10	5	5	5	10	5	5	5	10	5	5	5	10	5	5	8	10	5	5	8	10
Stone (%)	90	85	85	85	90	85	85	80	90	85	85	75	90	85	85	75	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75
Mud (%)	5	10	10	10	5	10	10	15	5	10	10	15	5	10	10	15	2	5	5	15	2	5	5	15	2	5	2	15	2	5	2	15







**Agreement No. CE65/2013(EP)**  
**Post-Construction Ecological Monitoring of River**  
**Improvement Work in Upper Lam Tsuen River, She Shan**  
**River and Upper Tai Po River – Investigation**  
**Post-Construction Ecological Monitoring Report (No.34)**  
**She Shan River**

**October 2016**



Prepared by: Mike Pang

15 November, 2016

Validated by: Mark Shea

15 November, 2016

Ecology Team: China Hong Kong Ecology Consultants



# Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River – Investigation

## Agreement No. CE65/2013(EP) Post-Construction Ecological Monitoring Report (No.34) She Shan River

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## 1 Introduction

- 1.1 Agreement No. CE65/2013(EP) Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River – Investigation required a post-construction ecological monitoring programme when the project completed. The collected data are mainly used to assess ecological recovery process and effectiveness of ecological migration proposed and enforced during the construction period.
- 1.2 The scope of the ecological monitoring was detailed in EM & A Manual of the project. In brief, the survey aimed to collect data on abiotic factors such as water quality, substratum characteristics, water flow as well as flora and fauna.
- 1.3 China Hong Kong Ecology Consultants Ltd. was committed by Allied Environmental Consultants Ltd (AEC) to undertake the ecological monitoring tasks for the project from December 2014.
- 1.4 This is the number 34 post-construction ecological monitoring report for the project conducted **on 17<sup>th</sup> of October 2016**. It contains the following subsections:
  - Summary of major points
  - Monitoring Methods and Results
  - Summary and Comments

## 2 Summary of Major Points

- Field ecological monitoring was undertaken **on 17<sup>th</sup> of October 2016**;
- Fauna and flora along the drainage project sections is in a process of re-establishing or restoration;
- Fish abundance was similar to last month with slight increase;
- Bird diversity and abundance was in natural fluctuation;
- Odonata abundance was similar to the record of last month with slight decrease; and
- *Paramesotriton hongkongensis* was found during the survey.

## 3 Monitoring Methodology

### 3.1 Riparian Vegetation

Riparian vegetation, including aquatic and emergent, was sampled using line transects along the affected river channel and riparian habitat. Species, relative abundance and average heights were recorded. Vegetation survey was conducted at three selected belt transects located at the upper (T1), middle (T2) and lower portion (T3) of the river channel respectively (**Figure 1**). The belt transects was run across the river channel in order to collect quantitative data of vegetation, e.g., species inventory, height, percentage cover. Qualitative data of plants was collected by recording plant species along line transect, e.g., species inventory, relative abundance. Nomenclature and protection status of the species has followed those documented in the Lai *et al.* (2004) and Hong Kong Herbarium (2015).

### 3 Avifauna

Avifauna survey was conducted during the post construction monitoring period. Special attention was given to those stream channel area which birds used as feeding and foraging habitat. Avifauna surveys were undertaken in the early morning plus species recorded in the rest of the day when conducting other taxonomic groups (benthic, fish, insect) monitoring. Numerical abundance was recorded at fixed count points within a radius of 30 to 50m according to landscape feature and visual penetration extent. The duration of the point count of birds was standardized for 10 minutes at each location in order to collect comparable data. Transect count along accessible section of river channel were used in order to collect qualitative data. Binoculars and digital camera were the main items of equipment used. Nomenclature and protection status of the species has followed in the AFCD website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net)) and Carey *et al.* (2001).

The point count was conducted at three locations located at the lower (T3), middle (T2) and upper (T1) portion of the river channel respectively. The point count and survey transect locations for the bird survey and sampling sites for surveys of other faunal groups and flora were presented in **Figure 1**.

#### 3.3 Adult Odonata Survey

Adult Odonata survey was conducted along transects (**Figure 1**). Binoculars, digital camera and hand net were utilized to aid identification. Numerical abundance, species identity and other notable behavior were recorded. Nomenclature and protection status of the species has followed those documented in the AFCD website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net)), Wilson *et al.* (2004) and Tam *et al.* (2011). Adult Odonata survey was conducted along line transects in parallel with river channel within the works area where access was permitted.

#### 3.4 Aquatic Macro-invertebrates

Macro-invertebrates in the riverbed were surveyed. Four sampling sites were selected to collect necessary macro-invertebrate fauna for ecological monitoring information, which covered upper (T1), middle (T2) and lower (T3) sections of the river respectively, as well as reference site (**Figure 1**). Five replicates were taken at each sampling point and pool together for further sample process. Kick sampling and hand netting were the survey methodologies for stream organisms. Dissection microscope and digital camera were used to aid identification and enumeration. Numerical abundance, species identity was recorded. Nomenclature and protection status of the species has followed those documented in the AFCD website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net)), and other literatures such as Dudgeon (1994).

#### 3.5 Fish Population and Hong Kong Newt

Fish community at the specified river channel was monitored by live trapping, hand netting and direct observation methods. Hong Kong newt was surveyed by direct observation and hand netting as well.

Sampling was conducted at four proposed sampling locations at upper (T1), middle (T2), lower (T3) sections and reference site respectively. Those

sampling sites covered major type of stream habitats, e.g. river pool and riffle (**Figure 1**). The number of the observed fish was estimated and recorded. Nomenclature and protection status of the species has followed those documented in the AFCD website (www.hkbiodiversity.net) and Lee *et al.* (2004).

### 3.6 Abiotic Data Collection

#### 3.6.1 Water Quality Monitoring

Dissolved oxygen level, pH value, conductivity, salinity, BOD and nutrient level (nitrate and ammonium) were sampled and analyzed by conventional methods in situ or in laboratory. The instruments for measuring dissolved oxygen level, pH value, conductivity, salinity were model: DO-5510, AZ8685, AZ8361 and AZ8374 respectively. All the instruments were calculated every monitoring month according to the operation manuals in order to obtain the precise result. BOD test took 5 days to complete within darkness incubator with stable temperature at 20°C and was performed using model: DO-5510 for measuring dissolved oxygen. Nutrient levels including nitrate and ammonia were performed in laboratory by applying the In-house method SOP056 (FIA) and SOP057 (FIA) respectively.

#### 3.6.2 Sediment Characteristics

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

#### 3.6.3 Water Flow

Water flow rates in river channel were measured by recording the time taken for a floating object (e.g. floating ball) in a measured distance. The sampling locations for surveys were presented in **Figure 1**.

## 4 Monitoring Results

### 4.1 Vegetation

In total, 80 flora species was recorded within the survey transects along the river course. The recorded floras were generally common wetland species. The height of the dominated riparian grass and herb species were in a range from 0.2m to 1.4m as observed along survey transect. Dominant flora species were shown in the **Table 4.1** marked with relative abundance sign “+++”. Vegetation has partially covered the river bed in middle and lower sections (Photos 1-2) and generally covered the riverbed and riparian habitat in upper sections (Photo 3). Aquatic plants *Brachiaria mutica* was the most abundant plants found along the river channel. *Mucuna championii* and *Cibotium barometz* are classified as endangered and vulnerable in China respectively, were recorded in the woodland adjacent to She Shan River. *Cibotium barometz* is also classified as category II in wild plant under state protection. Results of vegetation survey and belt transect survey were presented in **Table 4.1** and **Table 4.2**. **Figure 1** shows the transect line for the flora surveys.

## 4.2 Fauna

### 4.2.1 Avifauna

An avifauna survey was undertaken along survey transects and at three selected point count locations. In total, 21 species of birds were recorded during the bird surveys within project area. 5 recorded species were wetland dependant birds and observed foraging in the river channel including *Ardeola bacchus*, *Motacilla cinerea*, *Egretta garzetta*, *Alcedo atthis* and *Motacilla alba*. The dominant species of the river was a common species *Pycnonotus jocosus*. All the birds in Hong Kong are under protection of Wild Animals Protection Ordinance (Cap. 170). Some of wetland dependent species with conservation interest including *Ardeola bacchus* and *Egretta garzetta* were observed foraging in the river. *Ardeola bacchus* and *Egretta garzetta* are considered as Regional Concern by Fellowes *et al.* (2002). Call of *Centropus sinensis* was heard from the adjacent habitat during the survey period, this species is considered as vulnerable in China Red Data Book Status. *Eurystomus orientalis*, an uncommon passage migrant, was recorded in the woodland near She Shan River. Except foraging and roosting behaviour of some birds were observed, no other remarkable behaviour was noticed. Transect and Point Count locations were shown on **Figure 1**. Result of bird survey was presented in the **Table 4.3**.

### 4.2.2 Adult Odonata Survey

Odonata survey was performed and a list of recorded odonata species at She Shan River is shown in **Table 4.4**. The number of odonata species was slightly decreased comparing with last month. Most of the odoanta species in Hong Kong has the peak emergence from spring to late summer. The decrease in abundance of odoanta was due to seasonality. It is expected that number of odonata will be decreasing and keep in low abundance in the following months during dry season (Wilson *et al.*, 2004 & Tam *et al.*, 2011). A total of 11 species was recorded, those recorded species were mostly common species in Hong Kong (Photos 4-7). The result of this month was similar to approximate period of last year. Mating behavior of *Pseudagrion rubriceps rubriceps* was noticed during the survey (Photo 5). Sampling location was shown on **Figure 1**.

### 4.2.3 Aquatic Macro-invertebrates

Survey of aquatic marco-invertebrates was carried out (Photo 8). The river benthic fauna collected was mainly comprised of insects, mollusks and crustaceans (Photo 10). Details of recorded benthic fauna refer to **Table 4.5**. Sampling location was shown on **Figure 1**.

### 4.2.4 Hong Kong Newt

Survey of Hong Kong Newt was performed (Photo 8). Adults of Hong Kong Newt were captured from the survey (Photo 9). It is assumed that Newt would turn back to the river habitat from terrestrial area during breeding period from September to March (Dudgeon, 2003). Hong Kong Newt is listed in Wild Animals Protection Ordinance (Cap. 170) and classified as “Near Threatened” under IUCN Red List Status and as “Potential Global Concern” by Fellowes *et al.* (2002). Record of Hong Kong Newts can be referred to **Table 4.6**.

#### 4.2.5 Fish Fauna

Fish surveys were performed at She Shan River and total 12 species of freshwater fish were recorded. Native fish *Zacco platypus* and *Oreochromis niloticus* were abundant species dominating in the river channel. Among the recorded fish, *Parazacco spilurus* is classified as “Vulnerable” in Red China Data Book, it was commonly observed along the river with low abundance. The number of fish recorded is similar to the record of last month with slight increase. Details of recorded of fish fauna refers to **Table 4.6**. Sampling location was shown on **Figure 1**.

### 4.3 **Abiotic Data**

Data on water quality and major stream hydrological feature (water flow and substratum) of the stream were collected and are presented in the **Table 4.7**.

Generally, the water was not polluted and nutrient levels were low even though there were cultivation activities observed nearby the river. Results of water test are presented in the **Table 4.7**.

The river substratum was comprised of over 30-80% stones or rocks in large proportion of the river sections with slow water flow (up to 0.2m/second at pool and 0.5m/second at riffle).

## 5 **Summary and Commentary**

Ecological monitoring was carried out in current months and relevant biotic and abiotic data was collected according to project specification and EM & A Manual. *Paramesotriton hongkongensis* was recorded during the survey. The rest of fauna was in a natural fluctuation.

Aquatic plants and riparian vegetation were generally established at new drainage channel. Vegetation has generally covered the riverbed and gabion in upper section and partially covered the rest portion of the river.

The water quality of the river was generally good along river channel. Water was clean and nutrient levels were low to moderate.

## 6 REFERENCES

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## **FIGURE**



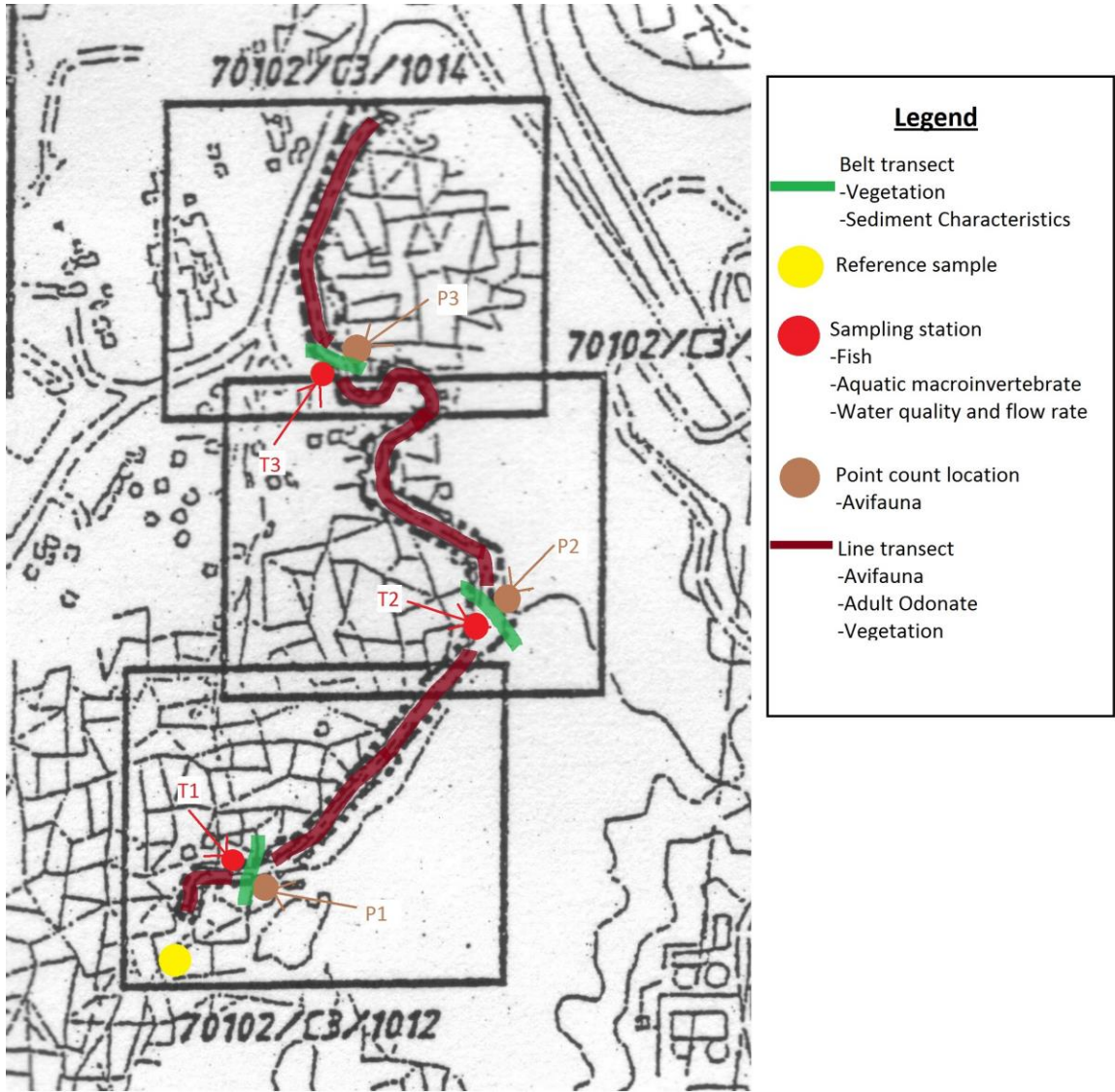


Figure 1. Sampling Location of Ecological Survey and Monitoring at She Shan River, Tai Po.

## **PHOTOS**



Photo 1: General view of the river habitat  
(Lower section)



Photo 2: General view of the river habitat  
(Middle section)



Photo 3 : General view of the river habitat  
(Upper section)



Photo 4 : Odonata – *Trithemis aurora*



Photo 5 : Odonata – *Pseudagrion rubriceps rubriceps*



Photo 6 : Odonata – *Trithemis festiva*



Photo 7 : Odonata –*Neurothemis fulvia*



Photo 8 : Kick sampling



Photo 9: Hong Kong Newt



Photo 10: Aquatic sampling

## **TABLE**





Table 4.2. Flora species recorded from belt transect survey at the She Shan River

(T1 - Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Family	Species	Stream Transect Chinese name	Baseline monitoring						Impact monitoring						Impact monitoring						Impact monitoring					
			Jul-08			Aug-08			Jan-09			Jul-09			Jan-10											
			P1	P3		P1	P3		T1	T2	T3	T1	T2	T3	T1	T2	T3									
Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%							
Commelinaceae	<i>Commelina diffusa</i>	節節草		0.2	20		10	6	0.2	2	0.1	5	0.2	5		0.2	10	0.3	60							
Poaceae	<i>Panicum repens</i>	枯骨草	0.3	5								0.2	5		0.6	5			0.6	25						
Asteraceae	<i>Mikania micrantha</i>	薇甘菊				0.2	7											0.2	5							
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜																								
Moraceae	<i>Ficus microcarpa</i>	細葉榕		0.7	5		0.6	7																		
Moraceae	<i>Ficus hispida</i>	對葉榕		3	10		3	10																		
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹	0.5	5		0.5	3																			
Fabaceae	<i>Pueraria lobata</i>	野葛		0.3	5	0.5	3	0.3	5	0.2	5	0.2	5													
Araceae	<i>Colocasia esculenta</i>	芋				0.2	5																			
Urticaceae	<i>Boehmeria nivea</i>	苧麻	1.5	30		2	7					3	10				2	5								
Asteraceae	<i>Bidens alba</i>	白花鬼針草													0.3	5	1	5								
Poaceae	<i>Pennisetum purpureum</i>	象草	3	50	1	60	3	80	2	60		4	40				2	50								
Poaceae	<i>Coix lacryma-jobi</i>	薏苡															1.5	20								
Amaranthaceae	<i>Alternanthera philoxeroides</i>	空心蓮子草	0.2	10		0.2	7								0.3	20										
Poaceae	<i>Panicum maximum</i>	大黍								0.5	5															
Moraceae	<i>Broussonetia papyrifera</i>	構樹										6	5													
Polygonaceae	<i>Polygonum chinense</i>	火炭母								0.1	10															
Onagraceae	<i>Ludwigia hyssopifolia</i>	草龍																								
Cyperaceae	<i>Cyperus sp.</i>	莎草																								
Poaceae	<i>Miscanthus floridulus</i>	五節芒																								
Poaceae	<i>Brachiaria mutica</i>	巴拉草																								
Blechnaceae	<i>Blechnum orientale</i>	烏毛蕨																								
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																								
Araceae	<i>Alocasia macrorrhizos</i>	海芋																								
Lemnaceae	<i>Lemna minor</i>	浮萍																								
Polygonaceae	<i>Polygonum hydropiper</i>	水蓼																								
Cyperaceae	<i>Cyperus involucratus</i>	風車草																								
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																								
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍																								
Bare Gound									98		75		30		##		95		10		15		70		##	

P1 – Point count location 1; P3 – Point count location 3



Table 4.2. Flora species recorded from belt transect survey at the She Shan River

(T1 - Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Family	Species	Chinese name	Impact monitoring						Impact monitoring						Impact monitoring						Impact monitoring					
			Stream		Jul-10		T3		T1		T2		T3		Jul-11		T2		T3		Jan-12		T2		T3	
			Transect	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)
Commelinaceae	<i>Commelina diffusa</i>	節節草			0.5	50	0.5	50	0.2	45	0.2	10			0.2	5	0.8	40			0.3	25	0.3	40		
Poaceae	<i>Panicum repens</i>	枯骨草						0.3	30					0.5	20											
Asteraceae	<i>Mikania micrantha</i>	薇甘菊				1	20	0.3	5					0.3	30					0.2	15					
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜						0.2	5																	
Moraceae	<i>Ficus microcarpa</i>	細葉榕																								
Moraceae	<i>Ficus hispida</i>	對葉榕																								
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹			1.5	30					1.5	30				1.5	15					1	45	0.8	5	
Fabaceae	<i>Pueraria lobata</i>	野葛										0.3	2													
Araceae	<i>Colocasia esculenta</i>	芋																								
Urticaceae	<i>Boehmeria nivea</i>	苧麻																								
Asteraceae	<i>Bidens alba</i>	白花鬼針草	0.5	5								0.5	2							1	5					
Poaceae	<i>Pennisetum purpureum</i>	象草									1.5	20				1.5	15					2.5	5	2.5	25	
Poaceae	<i>Coix lacryma-jobi</i>	薏苡										1	1									2.5	2			
Amaranthaceae	<i>Alternanthera philoxeroides</i>	空心蓮子草																								
Poaceae	<i>Panicum maximum</i>	大黍	0.4	5			1.5	5				0.4	2	1	15											
Moraceae	<i>Broussonetia papyrifera</i>	構樹																								
Polygonaceae	<i>Polygonum chinense</i>	火炭母																								
Onagraceae	<i>Ludwigia hyssopifolia</i>	草龍	0.4	5																						
Cyperaceae	<i>Cyperus sp.</i>	莎草	0.5	5																						
Poaceae	<i>Miscanthus floridulus</i>	五節芒			1.5	5																				
Poaceae	<i>Brachiaria mutica</i>	巴拉草														1.5	20						1	15		
Blechnaceae	<i>Blechnum orientale</i>	烏毛蕨																								
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																								
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Polygonaceae	<i>Polygonum hydropiper</i>	水蓼																								
Cyperaceae	<i>Cyperus involucratus</i>	風車草																								
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																								
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍																								
Bare Gound				80		15		25		15		40		93		30		10		##		3		15		100

P1 – Point count location 1; P3 – Point count location 3

Table 4.2. Flora species recorded from belt transect survey at the She Shan River

(T1- Upper stream section,T2 - middle stream section and T3 - Lower stream section)

Family	Species	Chinese name	Impact monitoring						Impact monitoring						Impact monitoring						Post construction monitoring						Post construction monitoring					
			Stream		Jul-12		Jul-13		Jul-13		Dec-13		Dec-13		Dec-13		Jan-14		Jan-14		Jan-14		Jan-14		Feb-14		Feb-14		Feb-14			
			T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2		
Comelinaceae	<i>Commelina diffusa</i>	節節草	0.3	2	0.3	30	0.3	20	0.3	15	0.3	5	0.1	10	0.5	30	0.1	1	0.2	15	0.5	30	0.2	1	0.2	20	0.5	30	0.2	5		
Poaceae	<i>Panicum repens</i>	枯骨草															0.2	1					0.2	1					0.2	1		
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.2	2									0.1	10			0.2	1	0.1	10			0.2	1	0.1	10			0.2	1		
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜																														
Moraceae	<i>Ficus microcarpa</i>	細葉榕																														
Moraceae	<i>Ficus hispida</i>	對葉榕																														
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹			0.8	30					0.8	35																				
Fabaceae	<i>Pueraria lobata</i>	野葛																														
Araceae	<i>Colocasia esculenta</i>	芋																														
Urticaceae	<i>Boehmeria nivea</i>	苧麻																														
Asteraceae	<i>Bidens alba</i>	白花鬼針草					0.3	10								0.3	1					0.3	1						0.4	1		
Poaceae	<i>Pennisetum purpureum</i>	象草	2.5	1	2.5	5				2.5	5			1.5	10	1.5	10			1.5	10	1.5	10			1.5	10	1.5	10			
Poaceae	<i>Coix lacryma-jobi</i>	薏苡																														
Amaranthaceae	<i>Alternanthera philoxeroides</i>	空心蓮子草					0.1	5																								
Poaceae	<i>Panicum maximum</i>	大黍																														
Moraceae	<i>Broussonetia papyrifera</i>	構樹																														
Polygonaceae	<i>Polygonum chinense</i>	火炭母	0.2	2																												
Onagraceae	<i>Ludwigia hyssopifolia</i>	草龍														0.3	2					0.3	2						0.4	1		
Cyperaceae	<i>Cyperus sp.</i>	莎草					1	5																								
Poaceae	<i>Miscanthus floridulus</i>	五節芒																														
Poaceae	<i>Brachiaria mutica</i>	巴拉草			1	15	1	10	1	20	1	50	1.5	60	0.8	20			1.5	60	0.8	20			1.5	55	0.8	25				
Blechnaceae	<i>Blechnum orientale</i>	烏毛蕨																														
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																														
Araceae	<i>Alocasia macrorrhizos</i>	海芋																														
Lemnaceae	<i>Lemna minor</i>	浮萍																														
Polygonaceae	<i>Polygonum hydropiper</i>	水蓼																														
Cyperaceae	<i>Cyperus involucratus</i>	風車草																														
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香					0.8	3			0.5	5			0.8	30					0.8	30					0.8	30				
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍																														
Bare Gound				93		20		50		65		5		94		10		10		94		5		10		94		5		5	91	

P1 – Point count location 1; P3 – Point count location 3

Table 4.2. Flora species recorded from belt transect survey at the She Shan River

(T1 - Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Family	Species	Chinese name	Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring					
			Stream		Mar-14		Apr-14		May-14		Jun-14		Jul-14		T1		T2		T3		T1		T2		T3		T1		T2		T3	
			Transect	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.3	20	0.5	35	0.3	6			0.5	30			0.5	20			0.5	25			0.5	25								
Poaceae	<i>Panicum repens</i>	枯骨草				0.4	1																									
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.1	10			0.2	1	0.3	10	0.3	10	0.3	1	0.3	10	0.3	1	0.3	10	0.3	10	0.3	1	0.3	10	0.3	10	0.3	2		
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜						0.3	20			0.3	5	0.3	5			0.3	5	0.3	5			0.3	5	0.3	2		0.3	2		
Moraceae	<i>Ficus microcarpa</i>	細葉榕																														
Moraceae	<i>Ficus hispida</i>	對葉榕																														
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																														
Fabaceae	<i>Pueraria lobata</i>	野葛																														
Araceae	<i>Colocasia esculenta</i>	芋																														
Urticaceae	<i>Boehmeria nivea</i>	苧麻																														
Asteraceae	<i>Bidens alba</i>	白花鬼針草				0.4	1			0.3	5	0.8	1		0.3	5	0.8	1		0.3	5	0.8	1		0.3	5	0.8	1				
Poaceae	<i>Pennisetum purpureum</i>	象草	1.5	5	1.5	5																										
Poaceae	<i>Coix lacryma-jobi</i>	薏苡								0.8	1			0.8	1					0.8	1						0.8	1				
Amaranthaceae	<i>Alternanthera philoxeroides</i>	空心蓮子草																														
Poaceae	<i>Panicum maximum</i>	大黍																														
Moraceae	<i>Broussonetia papyrifera</i>	構樹																														
Polygonaceae	<i>Polygonum chinense</i>	火炭母																														
Onagraceae	<i>Ludwigia hyssopifolia</i>	草龍				0.4	1																									
Cyperaceae	<i>Cyperus sp.</i>	莎草																														
Poaceae	<i>Miscanthus floridulus</i>	五節芒																														
Poaceae	<i>Brachiaria mutica</i>	巴拉草	1.5	60	0.8	30		1.5	50	1	50		1.5	40	1	40		1.5	45	1	45		1.5	45	1	45		1.5	45			
Blechnaceae	<i>Blechnum orientale</i>	烏毛蕨																														
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草						2	20				2	15				2	15				2	12								
Araceae	<i>Alocasia macrorrhizos</i>	海芋								0.8	1				0.8	1				0.8	1				0.8	1			0.8	1		
Lemnaceae	<i>Lemna minor</i>	浮萍									N.A	5				N.A	5				N.A	5					N.A	1				
Polygonaceae	<i>Polygonum hydropiper</i>	水蓼																														
Cyperaceae	<i>Cyperus involucratus</i>	風車草																														
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香			0.8	25					1	2				1	2					1	2					1	4			
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍																														
Bare Gound				5		5	90		0		5		84	30		25		84	25		15		84	31		15		87				

P1 – Point count location 1; P3 – Point count location 3

Table 4.2. Flora species recorded from belt transect survey at the She Shan River

(T1- Upper stream section,T2 - middle stream section and T3 - Lower stream section)

Family	Species	Chinese name	Post construction monitoring									Post construction monitoring									Post construction monitoring									Post construction monitoring									Post construction monitoring								
			Aug-14			Sep-14			Oct-14			Nov-14			Dec-14																																
			T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3																											
Comelinaceae	<i>Commelina diffusa</i>	節節草		0.5	25			0.5	25			1	10	1	50	0.1	2	1	10	1	50	0.1	2	1	10	1	50	0.1	2																		
Poaceae	<i>Panicum repens</i>	枯骨草																																													
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.3	12	0.3	12	0.3	5	0.3	12	0.3	12	0.3	5	0.3	5	1	15	0.3	2	0.3	5	1	15	0.3	2	0.3	5	1	15	0.3	2															
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜	0.3	1			0.3	1	0.3	1			0.3	1																																	
Moraceae	<i>Ficus microcarpa</i>	細葉榕																																													
Moraceae	<i>Ficus hispida</i>	對葉榕																																													
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																																													
Fabaceae	<i>Pueraria lobata</i>	野葛																																													
Araceae	<i>Colocasia esculenta</i>	芋																																													
Urticaceae	<i>Boehmeria nivea</i>	苧麻																																													
Asteraceae	<i>Bidens alba</i>	白花鬼針草		0.3	5	0.8	5		0.5	5	0.8	5	1	2	0.5	5	0.8	10	1	2	0.5	5	0.8	10	1	2	0.5	5	0.8	10																	
Poaceae	<i>Pennisetum purpureum</i>	象草																																													
Poaceae	<i>Coix lacryma-jobi</i>	薏苡			1.2	1			1.5	1					1.5	1					1.5	1					1.5	1																			
Amaranthaceae	<i>Alternanthera philoxeroides</i>	空心蓮子草																																													
Poaceae	<i>Panicum maximum</i>	大黍																																													
Moraceae	<i>Broussonetia papyrifera</i>	構樹																																													
Polygonaceae	<i>Polygonum chinense</i>	火炭母																																													
Onagraceae	<i>Ludwigia hyssopifolia</i>	草龍																																													
Cyperaceae	<i>Cyperus sp.</i>	莎草																																													
Poaceae	<i>Miscanthus floridulus</i>	五節芒																																													
Poaceae	<i>Brachiaria mutica</i>	巴拉草	1.5	50	1	50		1.5	50	1	50		1.8	65	1.8	20	1.5	5	1.8	70	1.8	25	1.5	8	1.8	70	1.8	25	1.5	8																	
Blechnaceae	<i>Blechnum orientale</i>	烏毛蕨																																													
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草	2	10			2	10				2	15	3	5			2	10	3	2			2	10	3	2																				
Araceae	<i>Alocasia macrorrhizos</i>	海芋			0.8	1			0.8	1																																					
Lemnaceae	<i>Lemna minor</i>	浮萍			N.A	1			N.A	1																																					
Polygonaceae	<i>Polygonum hydropiper</i>	水蓼											1	3					1	1						1	1																				
Cyperaceae	<i>Cyperus involucratus</i>	風車草											1.7	2					1.7	1					1.7	1																					
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香			1	6			1	6	1.5	1			2	5	1.5	1			2	5	1.5	1			2	5	1.5	1																	
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍																																													
Bare Gound				27		8		80		27		8		80		2		0		75		2		1		72		2		1	72																

P1 – Point count location 1; P3 – Point count location 3

Table 4.2. Flora species recorded from belt transect survey at the She Shan River

(T1 - Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Family	Species	Chinese name	Post construction monitoring									Post construction monitoring									Post construction monitoring									Post construction monitoring									Post construction monitoring								
			Jan-15			Feb-15			Mar-15			Apr-15			May-15																																
			T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3																											
Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%																				
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.5	10	0.8	70	0.3	40	0.6	10	1	70	0.4	40	0.6	10	1	70	0.5	40	0.6	10	1	70	0.5	40	0.3	5	0.7	50	0.5	25															
Poaceae	<i>Panicum repens</i>	枯骨草																																													
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.4	10	0.5	15			0.4	10	0.5	15			0.4	10	0.5	15			0.4	10	0.5	15			0.3	5	0.5	10																	
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜																																													
Moraceae	<i>Ficus microcarpa</i>	細葉榕																																													
Moraceae	<i>Ficus hispida</i>	對葉榕																																													
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																																													
Fabaceae	<i>Pueraria lobata</i>	野葛																																													
Araceae	<i>Colocasia esculenta</i>	芋																																													
Urticaceae	<i>Boehmeria nivea</i>	苧麻																																													
Asteraceae	<i>Bidens alba</i>	白花鬼針草																																													
Poaceae	<i>Pennisetum purpureum</i>	象草																																													
Poaceae	<i>Coix lacryma-jobi</i>	薏苡																																													
Amaranthaceae	<i>Alternanthera philoxeroides</i>	空心蓮子草																																													
Poaceae	<i>Panicum maximum</i>	大黍																																													
Moraceae	<i>Broussonetia papyrifera</i>	構樹																																													
Polygonaceae	<i>Polygonum chinense</i>	火炭母																																													
Onagraceae	<i>Ludwigia hyssopifolia</i>	草龍																																													
Cyperaceae	<i>Cyperus sp.</i>	莎草																																													
Poaceae	<i>Miscanthus floridulus</i>	五節芒																																													
Poaceae	<i>Brachiaria mutica</i>	巴拉草	1.5	80	1	5	1	25	1.5	80	1.3	5	1.3	25	1.5	80	1.3	5	1.3	25	1.5	80	1.4	5	1.4	25	1.5	40	1.2	5	1.2	15															
Blechnaceae	<i>Blechnum orientale</i>	烏毛蕨																																													
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																																													
Araceae	<i>Alocasia macrorrhizos</i>	海芋																																													
Lemnaceae	<i>Lemna minor</i>	浮萍																																													
Polygonaceae	<i>Polygonum hydropiper</i>	水蓼																																													
Cyperaceae	<i>Cyperus involucratus</i>	風車草			1.5	5					1.5	5					1.5	5					1.5	5				1.4	5																		
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香				2	10					2	10						2	10					2	10					1.6	5															
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍																																													
Bare Gound				0		5		25		0		5		25		0		5		25		0		5		25		50		30		55															

P1 – Point count location 1; P3 – Point count location 3

Table 4.2. Flora species recorded from belt transect survey at the She Shan River

(T1 - Upper stream section, T2 - middle stream section and T3 - Lower stream section)

		Post construction monitoring									Post construction monitoring									Post construction monitoring									Post construction monitoring									Post construction monitoring								
		Jun-15									Jul-15									Aug-15									Sep-15									Oct-15								
		T1			T2			T3			T1			T2			T3			T1			T2			T3			T1			T2			T3											
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%												
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.3	5	0.7	50	0.5	25																																						
Poaceae	<i>Panicum repens</i>	枯骨草																																												
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.3	5	0.5	10			0.4	10	0.4	10				0.5	10	0.4	5				0.5	10	0.4	5			0.5	10	0.4	20														
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜																																												
Moraceae	<i>Ficus microcarpa</i>	細葉榕																																												
Moraceae	<i>Ficus hispida</i>	對葉榕																																												
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																																												
Fabaceae	<i>Pueraria lobata</i>	野葛																																												
Araceae	<i>Colocasia esculenta</i>	芋																																												
Urticaceae	<i>Boehmeria nivea</i>	苧麻																																												
Asteraceae	<i>Bidens alba</i>	白花鬼針草							0.9	15			0.3	2	0.9	15			0.5	2	0.9	15			0.5	2	0.9	30																		
Poaceae	<i>Pennisetum purpureum</i>	象草																																												
Poaceae	<i>Coix lacryma-jobi</i>	薏苡							1	2					1	2																														
Amaranthaceae	<i>Alternanthera philoxeroides</i>	空心蓮子草																																												
Poaceae	<i>Panicum maximum</i>	大黍																																												
Moraceae	<i>Broussonetia papyrifera</i>	構樹																																												
Polygonaceae	<i>Polygonum chinense</i>	火炭母																																												
Onagraceae	<i>Ludwigia hyssopifolia</i>	草龍																																												
Cyperaceae	<i>Cyperus sp.</i>	莎草																																												
Poaceae	<i>Miscanthus floridulus</i>	五節芒																																												
Poaceae	<i>Brachiaria mutica</i>	巴拉草	1.5	45	1.2	10	1.2	20	0.8	60	1	50	0.8	10	0.9	60	1	35	0.9	10	0.9	60	1	38	0.9	10	0.3	30	1	15	0.9	1														
Blechnaceae	<i>Blechnum orientale</i>	烏毛蕨																																												
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																																												
Araceae	<i>Alocasia macrorrhizos</i>	海芋																																												
Lemnaceae	<i>Lemna minor</i>	浮萍																																												
Polygonaceae	<i>Polygonum hydropiper</i>	水蓼																																												
Cyperaceae	<i>Cyperus involucratus</i>	風車草			1.4	5					1.2	5			1.2	5						1.2	5					1.2	5	0.4	2															
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香					1.6	5					1.5	50			1.5	50					1.5	50						0.3	15															
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍									0.3	5			0.3	5						0.3	5					0.3	5																	
Bare Gound				45		25		50		13		10		38		13		40		38		13		35		38		28		43		72														

P1 – Point count location 1; P3 – Point count location 3

Table 4.2. Flora species recorded from belt transect survey at the She Shan River

(T1- Upper stream section,T2 - middle stream section and T3 - Lower stream section)

Family	Species	Chinese name	Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring					
			Stream		Nov-15		Dec-15		Jan-16		Feb-16		Mar-16		T1		T2		T3		T1		T2		T3		T1		T2		T3	
			Transect	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	
Commelinaceae	<i>Commelina diffusa</i>	節節草			0.3	17	0.2	10			0.3	10	0.2	5			0.3	5	0.2	5			0.3	5	0.2	5			0.3	5	0.2	5
Poaceae	<i>Panicum repens</i>	枯骨草																														
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.5	10	0.4	20			0.5	10	0.5	10			0.5	10	0.5	5			0.5	10	0.5	5			0.5	10	0.5	5		
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜															0.3	10					0.3	10					0.3	10		
Moraceae	<i>Ficus microcarpa</i>	細葉榕																														
Moraceae	<i>Ficus hispida</i>	對葉榕																														
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																														
Fabaceae	<i>Pueraria lobata</i>	野葛																														
Araceae	<i>Colocasia esculenta</i>	芋																														
Urticaceae	<i>Boehmeria nivea</i>	苧麻																														
Asteraceae	<i>Bidens alba</i>	白花鬼針草	0.9	30				1	30					1	30							1	30					1	35			
Poaceae	<i>Pennisetum purpureum</i>	象草																														
Poaceae	<i>Coix lacryma-jobi</i>	薏苡	1	2				1	2					1	2							1	2					1	2			
Amaranthaceae	<i>Alternanthera philoxeroides</i>	空心蓮子草																														
Poaceae	<i>Panicum maximum</i>	大黍																														
Moraceae	<i>Broussonetia papyrifera</i>	構樹																														
Polygonaceae	<i>Polygonum chinense</i>	火炭母																														
Onagraceae	<i>Ludwigia hyssopifolia</i>	草龍																														
Cyperaceae	<i>Cyperus sp.</i>	莎草																														
Poaceae	<i>Miscanthus floridulus</i>	五節芒																														
Poaceae	<i>Brachiaria mutica</i>	巴拉草	0.3	30	1	15	0.9	1	0.3	30	1	5	1	1	0.3	15	1	5	1	5	0.3	15	1	5	1	5	0.3	15	1	5	1	5
Blechnaceae	<i>Blechnum orientale</i>	烏毛蕨																														
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																														
Araceae	<i>Alocasia macrorrhizos</i>	海芋																														
Lemnaceae	<i>Lemna minor</i>	浮萍																														
Polygonaceae	<i>Polygonum hydropiper</i>	水蓼																														
Cyperaceae	<i>Cyperus involucratus</i>	風車草			1.2	5	0.4	2			1.2	5	0.4	2			1.2	5	0.4	2			1.2	5	0.4	2			1.2	5	0.4	2
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香					0.3	15					0.3	5					0.3	5					0.3	5					0.3	5
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍			0.3	5					0.3	5					0.3	5					0.3	5					0.3	5		
Bare Gound				28		43		72		28		70		87		43		70		83		43		70		83		38		70		83

P1 – Point count location 1; P3 – Point count location 3

Table 4.2. Flora species recorded from belt transect survey at the She Shan River

(T1 - Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Family	Species	Stream Transect Chinese name	Post construction monitoring						Post construction monitoring						Post construction monitoring					
			Apr-16						May-16						Jun-16					
			T1		T2		T3		T1		T2		T3		T1		T2		T3	
Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%			
Commelinaceae	<i>Commelina diffusa</i>	節節草			0.3	10	0.2	5			0.3	5	0.2	8			0.3	5	0.2	8
Poaceae	<i>Panicum repens</i>	枯骨草																		
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.5	10	0.5	10			0.5	10	0.5	8			0.5	10	0.5	8		
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜			0.3	10					0.3	8					0.3	8		
Moraceae	<i>Ficus microcarpa</i>	細葉榕																		
Moraceae	<i>Ficus hispida</i>	對葉榕																		
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																		
Fabaceae	<i>Pueraria lobata</i>	野葛																		
Araceae	<i>Colocasia esculenta</i>	芋																		
Urticaceae	<i>Boehmeria nivea</i>	苧麻																		
Asteraceae	<i>Bidens alba</i>	白花鬼針草	1	35					1	15					1	15				
Poaceae	<i>Pennisetum purpureum</i>	象草																		
Poaceae	<i>Coix lacryma-jobi</i>	薏苡	1	2					1	10					1	10				
Amaranthaceae	<i>Alternanthera philoxeroides</i>	空心蓮子草																		
Poaceae	<i>Panicum maximum</i>	大黍																		
Moraceae	<i>Broussonetia papyrifera</i>	構樹																		
Polygonaceae	<i>Polygonum chinense</i>	火炭母																		
Onagraceae	<i>Ludwigia hyssopifolia</i>	草龍																		
Cyperaceae	<i>Cyperus sp.</i>	莎草																		
Poaceae	<i>Miscanthus floridulus</i>	五節芒																		
Poaceae	<i>Brachiaria mutica</i>	巴拉草	0.3	15	1	5	1	5	0.3	15	1	5	1	10	0.3	15	1	5	1	10
Blechnaceae	<i>Blechnum orientale</i>	烏毛蕨																		
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																		
Araceae	<i>Alocasia macrorrhizos</i>	海芋																		
Lemnaceae	<i>Lemna minor</i>	浮萍																		
Polygonaceae	<i>Polygonum hydropiper</i>	水蓼																		
Cyperaceae	<i>Cyperus involucratus</i>	風車草			1.2	5	0.4	2			1.2	5	0.4	5			1.2	5	0.4	5
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香					0.3	5					0.3	5					0.3	5
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍			0.3	5					0.3	5					0.3	5		
Bare Gound				38		60		83		50		69		72		50		69		72

P1 – Point count location 1; P3 – Point count location 3



Table 4.2 (Continuous). Flora species recorded from belt transect survey at the She Shan River

(T1 - Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Family	Species	Stream Transect Chinese name	Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring							
			Jul-16						Aug-16						Sep-16						Oct-16							
			T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3			
Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%					
Commelinaceae	<i>Commelina diffusa</i>	節節草																										
Poaceae	<i>Panicum repens</i>	枯骨草			0.3	5	0.2	8			0.3	5	0.2	8			0.5	15	0.3	8			0.5	15	0.5	8		
Asteraceae	<i>Mikania micrantha</i>	薇甘菊																										
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜							0.5	3	0.5	5																
Moraceae	<i>Ficus microcarpa</i>	細葉榕			0.3	5					0.3	5																
Moraceae	<i>Ficus hispida</i>	對葉榕																										
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹			0.3	5	0.3	15			0.3	5	0.3	15			0.4	10	0.4	15			0.5	10	0.5	15		
Fabaceae	<i>Pueraria lobata</i>	野葛																										
Araceae	<i>Colocasia esculenta</i>	芋																										
Urticaceae	<i>Boehmeria nivea</i>	苧麻																										
Asteraceae	<i>Bidens alba</i>	白花鬼針草																										
Poaceae	<i>Pennisetum purpureum</i>	象草	1	15					1	15					1.3	15					1.4	15						
Poaceae	<i>Coix lacryma-jobi</i>	薏苡																										
Amaranthaceae	<i>Alternanthera philoxeroides</i>	空心蓮子草	1	10					1	10											1.1	10						
Poaceae	<i>Panicum maximum</i>	大黍																										
Moraceae	<i>Broussonetia papyrifera</i>	構樹																										
Polygonaceae	<i>Polygonum chinense</i>	火炭母																										
Onagraceae	<i>Ludwigia hyssopifolia</i>	草龍																										
Cyperaceae	<i>Cyperus sp.</i>	莎草																										
Poaceae	<i>Miscanthus floridulus</i>	五節芒																										
Poaceae	<i>Brachiaria mutica</i>	巴拉草			0.4	10	0.5	25			0.4	15	0.5	20			0.4	15	0.5	20			0.5	15	0.5	20		
Blechnaceae	<i>Blechnum orientale</i>	烏毛蕨	0.3	15	1	5	1	10	0.3	15	1	10	1	10	0.3	15	1	10	1	10	0.4	15	1	10	1	10		
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																										
Araceae	<i>Alocasia macrorrhizos</i>	海芋																										
Lemnaceae	<i>Lemna minor</i>	浮萍																										
Polygonaceae	<i>Polygonum hydropiper</i>	水蓼																										
Cyperaceae	<i>Cyperus involucratus</i>	風車草																										
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																										
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍			0.2	5	0.3	5			0.2	5	0.3	5			0.2	5	0.3	5			0.2	5	0.3	5		
Bare Gound					0.3	5					0.3	5					0.3	5					0.3	5				
					60		65		37			57		50			60		45		42			60		45		42

P1 – Point count location 1; P3 – Point count location 3

Table 4.3 Avifauna recorded along survey transects and at three selected point count locations at She Shan River.

(T1 - Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Common Name	Species name	Chinese name	Status	Commonness	Baseline monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Post construction monitoring														
					Jul-08			Aug-08			Jan-09			Jul-09			Jan-10			Jul-10			Jan-11			Jul-11			Jan-12			Jul-12			Jan-13			Dec-13			Jan-14		
					C	P1	P3	C	P1	P3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	
Ashy Drongo	<i>Dicrurus leucophaeus</i>	灰卷尾	SWV, LC	U																																							
Barn Swallow	<i>Hirundo rustica</i>	家燕	PM	C																																							
Black Drongo	<i>Dicrurus macrocerus</i>	黑卷尾	Sv	C																																							
Black Kite	<i>Milvus lineatus</i>	黑鷹	R, RC, Cap.586	C																																							
Black-necked Stirling	<i>Sturnus nigricollis</i>	黑領椋鳥	R	C																																							
Black-throated Laughingthrush	<i>Garrulus chinensis</i>	黑喉噪鵲	R	C																																							
Buzard (Common Buzard)	<i>Buteo buteo</i>	普通鵟	WV, Cap.586	U																																							
Chestnut Bulbul	<i>Hemixos castanonotus</i>	栗背短脚鵲	R, WV	C																																							
Chinese Bulbul	<i>Pycnonotus sinensis</i>	白頸鵲	R	C																																							
Chinese Pond Heron	<i>Ardeola bacchus</i>	萍鴛	R, RC	C																																							
Chinese Hwamei	<i>Garrulus canorus</i>	畫眉	R, Cap.586	C																																							
Common Emerald Dove	<i>Chalcophaps indica</i>	綠翅金鳩	R, VU	U																																							
Common Kingfisher	<i>Alcedo atthis</i>	普通翠鳥	R	C																																							
Common Koel	<i>Eudynamis scolopacea</i>	雉鴉	R	C																																							
Common Sandpiper	<i>Actitis hypoleucos</i>	磯鶉	WV&P, M	C																																							
Common Tailorbird	<i>Orthotomus sutorius</i>	長尾隱鶯	R	C																																							
Crested Bulbul	<i>Pycnonotus jocosus</i>	紅耳鵲	R	C																																							
Crested Goshawk	<i>Accipiter trivirgatus</i>	鳳頭鷹	R, CR, Cap.586	U																																							
Crested Myna	<i>Acridotheres cristatellus</i>	八哥	R	C																																							
Crested Serpent Eagle	<i>Spilornis cheela</i>	蛇鵟	R, VU, LC, Cap.586	U																																							
Domestic pigeon	<i>Columba sp.</i>	鴿	R	C																																							
Dusky Warbler	<i>Phylloscopus fuscatus</i>	樟柳鶯	WV	C																																							
Eurasian tree sparrow	<i>Passer montanus</i>	麻雀	R	C																																							
Fork-tailed Sunbird	<i>Aethopyga christinae</i>	叉尾太陽鳥	R	C																																							
Great Coucal	<i>Centropus sinensis</i>	褐翅鷓鴣	R, VU	C																																							
Great Egret	<i>Ardea alba</i>	大白鷺	R, RC	C																																							
Great Tit	<i>Parus major(commistus)</i>	大山雀	R	C																																							
Green Sandpiper	<i>Tringa ochropus</i>	白腰草鶉	PM&W, V	C																																							
Grey Heron	<i>Ardea cinerea</i>	蒼鷺	WV, PRC	C																																							
Grey Wagtail	<i>Motacilla cinerea</i>	灰鶇	WV	C																																							
Japanese White Eye	<i>Zosterops japonica(simplex)</i>	暗綠繡眼鳥	R	C																																							
Large Hawk Cuckoo	<i>Cuculus sparverioideus</i>	鷹鵞	SV	C																																							
Little Egret	<i>Egretta garzetta</i>	小白鷺	R, RC	C																																							
Maggie Robin	<i>Copsychus saularis</i>	鵲鴝	R	C																																							
Night Heron	<i>Nycticorax nycticorax</i>	夜鷺	R, LC	C																																							
Olive Backed Pipit	<i>Anthus hodgsoni</i>	樹鶇	WV	C																																							
Oriental Dullardbird	<i>Eurytommus orientalis</i>	三寶鳥	PM	U																																							
Plaintive Cuckoo	<i>Cacomantis merulinus</i>	八聲杜鵑	SV	C																																							
Plain Prinia	<i>Prinia inornata</i>	棕色鶇鶯	R	C																																							
Red-flanked Bluetail	<i>Tarsiger cyanurus</i>	紅脇藍尾鶇	WV&P, M	C																																							
Rufous-backed Shrike	<i>Lanius schach</i>	柳鶯伯勞	R	C																																							
Rufous-capped Babbler	<i>Stachyridopsis ruficeps</i>	紅頭穗鶇	R, LC	U																																							
Scarlet Minivet	<i>Pericrocotus speciosus</i>	赤紅山椒鳥	R	C																																							
Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>	白喉紅背鵲	R	C																																							
Spotted Dove	<i>Streptopelia chinensis</i>	珠頸斑鳩	R	C																																							
Spotted Munia	<i>Lonchura punctulata</i>	斑文鳥	R	C																																							
Stejneger's Stonechat	<i>Saxicola stejnegeri</i>	黑喉石鶇	PM, WV	C																																							
White Wagtail	<i>Motacilla alba</i>	白鶇	WV	C																																							
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	白胸苦惡鳥	R	C																																							
Yellow Bellied Prinia	<i>Prinia flavescentis</i>	黃腹鶇鶯	R	C																																							
Number of birds																																											
No. of species																																											

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

SpM - Spring migrant; Sv - Summer visitor

C - transect count; P1 - Point count location 1; P3 - Point count location 3

+, occurred; ++, common; +++, abundant/dominant species in the study area

Commonness and status were decided according to AICD biodiversity website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net))

All bird species are under protection of Wild Animals Protection Ordinance (Cap. 170)

Endangered Species of Animals and Plants Ordinance (Cap. 586)

RC : Regional concern Fellowes et al (2002)

LC : Local Concern Fellowes et al (2002)

PRC: Potential Regional concern Fellowes et al (2002)

CR: Rare in China Red Data Book Status

VU: Vulnerable in China Red Data Book Status

Table 4.3 Avifauna recorded along survey transects and at three selected point count locations at She Shan River.

(T1 - Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Table with columns for Common Name, Species name, Chinese name, Status, Commonness, and 12 columns for monitoring periods (Feb-14 to Dec-14), each with sub-columns for abundance at points C, T1, T2, T3.

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

SpM - Spring migrant; Sv - Summer visitor

C - transect count; P1 - Point count location 1; P3 - Point count location 3

+, occurred; ++, common; +++, abundant/dominant species in the the study area

Commonness and status were decided according to AFCD biodiversity website (www.hkbiodiversity.net)

All bird species are under protection of Wild Animals Protection Ordinance (Cap. 170)

Endangered Species of Animals and Plants Ordinance (Cap. 586)

RC : Regional concern Fellowes et al (2002)

LC : Local Concern Fellowes et al (2002)

PRC: Potential Regional concern Fellowes et al (2002)

CR: Rare in China Red Data Book Status

VU: Vulnerable in China Red Data Book Status







Table 4.4. Odonate species recorded at the She Shan River

Species name	Common name	Chinese name	Status	Commonness	Post construction monitoring														
					Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15
<i>Agriocnemis pygmalis</i>	Wandering Midget	黃尾小蠅	NP	VC															
<i>Brachythemis contaminata</i>	Asian Amberwing	黃翅蜻	NP	VC															
<i>Burmagomphus vermicularis</i>	Dog-legged Clubtail	聯紋緬春蜓	P, LC	C															
<i>Ceriagrion auranticum ryukyuanum</i>	Orange-tailed Sprite	琉球橘黃蠅	NP	VC						+	+	+	+	+	+	+			
<i>Copera ciliata</i>	Black-knees Featherlegs	白狹扇蠅	NP	VC															
<i>Copera marginipes</i>	Yellow Featherlegs	黃狹扇蠅	NP	VC	+					+	+	+	+	+	+	+			
<i>Crocothemis servilia servilia</i>	Crimson Darter	紅蜻	NP	VC	+	+	+	+		+	+	+	+	+	+	+	+	+	
<i>Diplacodes trivialis</i>	Blue Percher	紋藍小蜻	NP	VC															
<i>Ictinogomphus pertinax</i>	Common Flangetail	霸王葉春蜓	NP	C	+							+	+	+	+	+	+	+	
<i>Ischnura senegalensis</i>	Common Bluetail	褐斑異痣蠅	NP	VC															
<i>Nannophya pygmaea</i>	Scarlet Dwarf	侏紅小蜻	NP	C															
<i>Neurobasis chinensis chinensis</i>	Chinese Greenwing	華艷色蠅	NP	VC	+	+				+	+	+			+	+	+	+	
<i>Neurothemis fulvia</i>	Russet Percher	網脈蜻	NP	VC						+	+	+	+	+	+	+	+	+	
<i>Orthetrum chrysis</i>	Red-faced Skimmer	華麗灰蜻	NP	VC											+	+	+	+	
<i>Orthetrum glaucum</i>	Common blue skimmer	黑尾灰蜻	NP	VC															
<i>Orthetrum luzonicum</i>	Marsh Skimmer	呂宋灰蜻	NP	VC									+	+					
<i>Orthetrum pruinosum neglectum</i>	Common Red Skimmer	赤褐灰蜻	NP	VC	+						+	+	+	+					
<i>Orthetrum Sabina sabina</i>	Green Skimmer	狹腹灰蜻	NP	C	+												+	+	
<i>Pantala flavescens</i>	Wandering Glider	黃蜻	NP	VC	+	+						+	+	+	+	+	+	+	+
<i>Prodasineura autumnalis</i>	Black Threadtail	烏齒原蠅	NP	VC							+	+	+	+	+				
<i>Pseudagrion pruinosum fraseri</i>	Ferruginous-faced Sprite	赤斑蠅	NP	C															
<i>Pseudagrion rubriceps rubriceps</i>	Orange-faced Sprite	丹頂斑蠅	NP	UC	+	+													
<i>Rhinocypha perforata perforata</i>	Common Blue Jewel	三斑鼻蠅	NP	VC	+	+											+	+	
<i>Rhyothemis variegata arria</i>	Variiegated Flutterer	斑麗翅蜻	NP	C									+	+	+	+	+	+	
<i>Trithemis aurora</i>	Crimson Dropwing	曉褐蜻	NP	VC	+	+	+	+			+	+	+	+	+	+	+	+	+
<i>Trithemis festiva</i>	Indigo Dropwing	慶褐蜻	NP	VC	+	+					+	+	+	+	+	+	+	+	+
<i>Zygonyx iris insignis</i>	Emerald Cascader	彩虹蜻	P,PG	VC															
No of Species					11	7	2	2	1	5	10	12	13	13	13	12	9	7	2

Note: NP – Not protected in Hong Kong ; P - Protected in Hong Kong

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

“+” – Species exists in the study area

“++” – Species common in the study area

“+++” – Species abundance in the study area

Commonness and status were decided according to AFCD biodiversity website

(www.hkbiodiversity.net)

LC- Local Concern - Fellowes *et al* (2002)PGC - Potential Global Concern - Fellowes *et al* (2002)

Table 4.4. Odonate species recorded at the She Shan River

Post construction monitoring														
Species name	Common name	Chinese name	Status	Commonness	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16
<i>Agriocnemis pygmalis</i>	Wandering Midget	黃尾小蠅	NP	VC										
<i>Brachythemis contaminata</i>	Asian Amberwing	黃翅蜻	NP	VC										
<i>Burmagomphus vermicularis</i>	Dog-legged Clubtail	聯紋緬春蜓	P, LC	C						+				
<i>Ceriagrion auranticum ryukyuanum</i>	Orange-tailed Sprite	琉球橘黃蠅	NP	VC				+	+	+	+	+	+	+
<i>Copera ciliata</i>	Black-knees Featherlegs	白狹扇蠅	NP	VC				+	+	+	+	+	+	
<i>Copera marginipes</i>	Yellow Featherlegs	黃狹扇蠅	NP	VC						+	+	+	+	
<i>Crocothemis servilia servilia</i>	Crimson Darter	紅蜻	NP	VC				+	+	+	+	+	+	+
<i>Diplacodes trivialis</i>	Blue Percher	紋藍小蜻	NP	VC										
<i>Ictinogomphus pertinax</i>	Common Flangetail	霸王葉春蜓	NP	C					+	+	+	+	+	+
<i>Ischnura senegalensis</i>	Common Bluetail	褐斑異痣蠅	NP	VC								+	+	
<i>Nannophya pygmaea</i>	Scarlet Dwarf	侏紅小蜻	NP	C										
<i>Neurobasis chinensis chinensis</i>	Chinese Greenwing	華艷色蠅	NP	VC				+	+	+	+	+	+	+
<i>Neurothemis fulvia</i>	Russet Percher	網脈蜻	NP	VC				+	+	+	+	+	+	+
<i>Orthetrum chrysis</i>	Red-faced Skimmer	華麗灰蜻	NP	VC	+			+	+	+	+	+	+	+
<i>Orthetrum glaucum</i>	Common blue skimmer	黑尾灰蜻	NP	VC										
<i>Orthetrum luzonicum</i>	Marsh Skimmer	呂宋灰蜻	NP	VC				+	+	+	+	+		+
<i>Orthetrum pruinosum neglectum</i>	Common Red Skimmer	赤褐灰蜻	NP	VC										
<i>Orthetrum Sabina sabina</i>	Green Skimmer	狹腹灰蜻	NP	C										
<i>Pantala flavescens</i>	Wandering Glider	黃蜻	NP	VC	+	+	+	+	+	+	+	+	+	+
<i>Prodasineura autumnalis</i>	Black Threadtail	烏齒原蠅	NP	VC										
<i>Pseudagrion pruinosum fraseri</i>	Ferruginous-faced Sprite	赤斑蠅	NP	C										
<i>Pseudagrion rubriceps rubriceps</i>	Orange-faced Sprite	丹頂斑蠅	NP	UC										+
<i>Rhinocypha perforata perforata</i>	Common Blue Jewel	三斑鼻蠅	NP	VC					+	+	+			
<i>Rhyothemis variegata arria</i>	Variiegated Flutterer	斑麗翅蜻	NP	C						+	+	+	+	
<i>Trithemis aurora</i>	Crimson Dropwing	曉褐蜻	NP	VC			+	+	+	+	+	+	+	+
<i>Trithemis festiva</i>	Indigo Dropwing	慶褐蜻	NP	VC	+		+	+	+	+	+	+	+	+
<i>Zygonyx iris insignis</i>	Emerald Cascader	彩虹蜻	P,PG	VC										
No of Species					3	1	3	10	12	15	14	14	13	11

Note: NP – Not protected in Hong Kong ; P - Protected in Hong Kong

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

“+” – Species exists in the study area

“++” – Species common in the study area

“+++” – Species abundance in the study area

Commonness and status were decided according to AFCD biodiversity website

(www.hkbiodiversity.net)

LC- Local Concern - Fellowes *et al* (2002)

PGC - Potential Global Concern - Fellowes *et al* (2002)



Table 4.5 Aquatic Macro invertebrates recorded at She Shan River.

(T1- Upper stream section, T2 - middle stream section, T3 - Lower stream section)

Species	Chinese name	Sampling location		Baseline monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring							
				Jul-08		Aug-08		Jan-09				Jul-09				Jan-10				Jul-10				Jan-11				Jul-11			
				Status	Common-ness	Upper stream	Lower stream	Upper stream	Lower stream	Referen	T1	T2	T3	Referer	T1	T2	T3	Referenc	T1	T2	T3	Reference	T1	T2	T3	Referenc	T1	T2	T3	Reference	T1
<b>Mollusks</b>																															
<i>Anodonta woodiana</i>	背角無齒蚌	NP	VC																												
<i>Biomphalaria sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Brotia hainanensis</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Corbicula fluminea</i>	河蜆	NP	VC																												
<i>Melanoides tuberculata</i>	瘤擬黑螺	NP	VC	+	+	+	++																								
<i>Pomacea canaliculata</i>	蘋果螺	NP	VC	+	++	+	+	+		+	+	+		+	+		++		+	+	++	++	+	+++	+++	+++	+	++	++	+++	
<i>Radix plicatulus</i>	--	NP	VC	+	+	+	+	+			+	+		+	+		+		+	+	+		+	+	+	+	+	+	++		
<i>Sinotaia quadrata</i>	田螺	NP	VC	+	+	+	++	+			+	+		+	+		++		+	+	++	++	+	+++	++	++	+	+++	++	+	
<b>Insects</b>																															
<i>Baetis sp.</i>		NP	VC	+	+	+	+	+		+	+	+		+	+		+		+	+	+		+	+	+	+	+	+	+		
<i>Caenis sp.</i>	--	NP	VC	+	+	+	+	+			+	+		+	+		+		+	+	+		+	+	+	+	+	+	+		
<i>Chironomus sp.</i>	蠓幼虫	NP	VC	+	+	++	++	+		+	+	+		+	+		+		+	+	+	+	+	+	+	+	+	+	+		
<i>Euphaea sp.</i>		NP	VC																												
<i>Indobaetis sp.</i>	--	NP	VC	+	+	+	+	+		+	+	+		+	+		+		+	+	+		+	+	+	+	+	+	+		
<i>Odonate larvae</i>		NP	VC																												
<i>Orthetrum spp.</i>	--	NP	VC							+	+			+						+	+		+	+	+	+	+	+	+		
<i>Pseudagrion spp.</i>	--	NP	UC											+																	
<i>Pseudocloeon sp.</i>	--	NP	VC	+	+	+	+				+			+																	
<i>Serratella sp.</i>		NP	VC	+	+	+	+										+														
<b>Crustaceans</b>																															
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC																												
<i>Cryptopotamon anacoluthon</i>	鯉刺溪蟹	NP	VC																												
No of Species				12	12	12	12	9	0	7	11	9	0	0	12	10	0	11	0	10	8	14	4	10	9	9	8	10	10	9	7

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

Table 4.5 Aquatic Macro invertebrates recorded at She Shan Rive

(T1- Upper stream section, T2 - middle stream section, T3 - Lower stream section)

Species	Chinese name	Sampling location		Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
				Jan-12				Jul-12				Jul-13				Dec-13				Jan-14				Feb-14				Mar-14				Apr-14				May-14			
				Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
<b>Mollusks</b>																																							
<i>Anodonta woodiana</i>	背角無齒蚌	NP	VC																																				+
<i>Biomphalaria sp.</i>	--	NP	VC	+	+			+	+	+			+								+				+	+	+					+	+	+					
<i>Brotia hainanensis</i>	--	NP	VC	+	+			+					+	+	+						+	+	+	+	+	+	+					+	+	+					
<i>Corbicula fluminea</i>	河蜆	NP	VC	+									+								+				+														+
<i>Melanoides tuberculata</i>	縮擬黑螺	NP	VC	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pomacea canaliculata</i>	蘋果螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Radix plicatulus</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Sinotaia quadrata</i>	田螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<b>Insects</b>																																							
<i>Baetis sp.</i>		NP	VC	+				+	+					+							+	+			+	+	+					+		+					
<i>Caenis sp.</i>	--	NP	VC																																				
<i>Chironomus sp.</i>	孿幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Euphaea sp.</i>		NP	VC																																				
<i>Indobaetis sp.</i>	--	NP	VC	+																	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Odonate larvae</i>		NP	VC																																				
<i>Orthetrum spp.</i>	--	NP	VC	+	+	+		+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pseudagrion spp.</i>	--	NP	UC											+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pseudocloeon sp.</i>	--	NP	VC																						+								+	+					
<i>Serratella sp.</i>		NP	VC																					+				+	+	+		+	+	+					+
<b>Crustaceans</b>																																							
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC																																				
<i>Cryptopotamon anacoluthon</i>	鯉刺溪蟹	NP	VC																																				
No of Species				11	7	6	5	9	8	7	5	11	8	7	6	11	8	8	7	11	8	8	7	13	10	9	8	14	12	12	9	14	12	13	9	11	11	13	8

Note: NP – Not protected in Hong Kong;  
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 “+++” – Species abundance in the study area  
 - Reference point was the sampling location outside the works area used to compare the with the data within works area.

Table 4.5 Aquatic Macro invertebrates recorded at She Shan Rive

(T1- Upper stream section, T2 - middle stream section, T3 - Lower stream section)

Species	Chinese name	Sampling location		Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring							
		Status	Common-ness	Jun-14				Jul-14				Aug-14				Sep-14				Oct-14				Nov-14				Dec-14				Jan-15				Feb-15			
				Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
<b>Mollusks</b>																																							
<i>Anodonta woodiana</i>	背角無齒蚌	NP	VC																																				
<i>Biomphalaria sp.</i>	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+		
<i>Brotia hainanensis</i>	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+		
<i>Corbicula fluminea</i>	河蜆	NP	VC			+				+	+			+	+			+	+			+	+			+	+			+	+			+	+		+	+	
<i>Melanoides tuberculata</i>	縮擬黑螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Pomacea canaliculata</i>	蘋果螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Radix plicatulus</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Sinotaia quadrata</i>	田螺	NP	VC	+	+	+	+	+	+	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<b>Insects</b>																																							
<i>Baetis sp.</i>		NP	VC		+				+	+			+	+			+	+	+		+	+	+			+				+						+			
<i>Caenis sp.</i>	--	NP	VC																																				
<i>Chironomus sp.</i>	鱃幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Euphaea sp.</i>		NP	VC			+				+				+										+				+											
<i>Indobaetis sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Odonate larvae</i>		NP	VC																																				
<i>Orthetrum spp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pseudagrion spp.</i>	--	NP	UC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pseudocloeon sp.</i>	--	NP	VC																																				
<i>Serratella sp.</i>		NP	VC		+	+				+				+	+																					+	+		
<b>Crustaceans</b>																																							
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC																																				
<i>Cryptopotamon anacoluthon</i>	鯉刺溪蟹	NP	VC																																				
No of Species				10	12	13	8	10	11	14	7	10	12	15	6	12	12	14	8	12	12	13	7	12	11	13	7	10	8	13	6	10	11	14	6	7	10	12	6

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 P - protected species in Hong Kong  
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 “+” – Species exists in the study area  
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 - Reference point was the sampling location outside the works area used to compare the with the data within works area.

Table 4.5 Aquatic Macro invertebrates recorded at She Shan Rive

(T1- Upper stream section, T2 - middle stream section, T3 - Lower stream section)

Species	Chinese name	Sampling location	Post construction monitoring																																				
			Mar-15				Apr-15				May-15				Jun-15				Jul-15				Aug-15				Sep-15				Oct-15				Nov-15				
			Status	Common-ness	Referen	T1	T2	T3	Referen	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Referenc	T1	T2	T3	Reference	T1	T2	T3	Referen	T1	T2	T3	Reference	T1	T2
<b>Mollusks</b>																																							
<i>Anodonta woodiana</i>	背角無齒蚌	NP	VC																																				
<i>Biomphalaria sp.</i>	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
<i>Brotia hainanensis</i>	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
<i>Corbicula fluminea</i>	河蜆	NP	VC			+				+				+				+				+				+				+				+				+	
<i>Melanoides tuberculata</i>	縮擬黑螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pomacea canaliculata</i>	蘋果螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+	++	++	+	+	++	++	+
<i>Radix plicatulus</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Sinotaia quadrata</i>	田螺	NP	VC	+	+	++	+	+	+	++	+	+	+	++	+	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	++	++	+	+	++	++
<b>Insects</b>																																							
<i>Baetis sp.</i>		NP	VC			+				+				+				+				+				+				+				+				+	
<i>Caenis sp.</i>	--	NP	VC																																				
<i>Chironomus sp.</i>	鱒幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Euphaea sp.</i>		NP	VC		+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+	
<i>Indobaetis sp.</i>	--	NP	VC	+	+	+																																	
<i>Odonate larvae</i>		NP	VC						+				+				+				+				+				+				+				+		
<i>Orthetrum spp.</i>	--	NP	VC	+	+	+	+					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pseudagrion spp.</i>	--	NP	UC		+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+	
<i>Pseudocloeon sp.</i>	--	NP	VC					+	+	+	+																												
<i>Serratella sp.</i>		NP	VC		+				+	+			+				+				+				+				+				+				+		
<b>Crustaceans</b>																																							
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC																																				
<i>Cryptopotamon anacoluthon</i>	鯉刺溪蟹	NP	VC																																				
No of Species				9	12	13	6	9	12	13	6	9	12	13	6	9	12	13	6	9	12	14	6	9	12	15	6	9	13	15	6	9	13	15	6	9	13	15	6

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 “+” – Species exists in the study area  
 “++” – Species common in the study area  
 “+++” – Species abundance in the study area  
 - Reference point was the sampling location outside the works area used to compare the with the data within works area.

Table 4.5 Aquatic Macro invertebrates recorded at She Shan Rive

(T1- Upper stream section, T2 - middle stream section, T3 - Lower stream section)

Species	Chinese name	Sampling location	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring																				
			Dec-15				Jan-16				Feb-16				Mar-16				Apr-16				May-16				Jun-16				Jul-16																
			Status	Common-ness	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3											
<b>Mollusks</b>																																															
<i>Anodonta woodiana</i>	背角無齒蚌	NP	VC																																												
<i>Biomphalaria sp.</i>	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+					
<i>Brotia hainanensis</i>	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+					
<i>Corbicula fluminea</i>	河蜆	NP	VC			+				+				+				+			+				+				+				+				+				+						
<i>Melanoides tuberculata</i>	縮擬黑螺	NP	VC	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+			
<i>Pomacea canaliculata</i>	蘋果螺	NP	VC	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+			
<i>Radix plicatulus</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Sinotaia quadrata</i>	田螺	NP	VC	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+		
<b>Insects</b>																																															
<i>Baetis sp.</i>		NP	VC			+			+				+			+				+				+				+																	+		
<i>Caenis sp.</i>	--	NP	VC																																												
<i>Chironomus sp.</i>	鱒幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Euphaea sp.</i>		NP	VC		+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+	
<i>Indobaetis sp.</i>	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
<i>Odonate larvae</i>		NP	VC		+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+	
<i>Orithetrum spp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pseudagrion spp.</i>	--	NP	UC		+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+	
<i>Pseudocloeon sp.</i>	--	NP	VC																																												
<i>Serratella sp.</i>		NP	VC		+				+				+			+				+				+				+																			+
<b>Crustaceans</b>																																															
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC		+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+	
<i>Cryptopotamon anacoluthon</i>	鯉刺溪蟹	NP	VC			+			+				+			+				+				+				+																			+
No of Species				9	14	15	6	9	14	15	6	9	14	15	6	9	14	15	6	9	14	15	6	9	14	15	6	9	14	16	6	9	14	16	6	9	14	16	6	9	14	16	6	9	14	16	6

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

Table 4.5 Aquatic Macro invertebrates recorded at She Shan Rive

(T1- Upper stream section, T2 - middle stream section, T3 - Lower stream section)

Species	Chinese name	Sampling location		Post construction monitoring				Post construction monitoring				Post construction monitoring			
				Aug-16				Sep-16				Oct-16			
				Status	Common-ness	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1
<b>Mollusks</b>															
<i>Anodonta woodiana</i>	背角無齒蚌	NP	VC												
<i>Biomphalaria sp.</i>	--	NP	VC	+	+	+		+	+	+		+	+	+	
<i>Brotia hainanensis</i>	--	NP	VC	+	+	+		+	+	+		+	+	+	
<i>Corbicula fluminea</i>	河蜆	NP	VC			+				+				+	
<i>Melanoides tuberculata</i>	瘤擬黑螺	NP	VC	+	++	++	+	+	++	++	+	+	++	++	+
<i>Pomacea canaliculata</i>	蘋果螺	NP	VC	+	++	++	+	+	++	++	+	+	++	++	+
<i>Radix plicatulus</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+
<i>Sinotaia quadrata</i>	田螺	NP	VC	+	+	++	++	+	+	++	++	+	+	++	++
<b>Insects</b>															
<i>Baetis sp.</i>		NP	VC			+				+				+	
<i>Caenis sp.</i>	--	NP	VC												
<i>Chironomus sp.</i>	蠓幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+
<i>Euphaea sp.</i>		NP	VC		+	+			+	+			+	+	
<i>Indobaetis sp.</i>	--	NP	VC	+	+	+		+	+	+		+	+	+	
<i>Odonate larvae</i>		NP	VC		+	+			+	+			+	+	
<i>Orthetrum spp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pseudagrion spp.</i>	--	NP	UC		+	+			+	+			+	+	
<i>Pseudocloeon sp.</i>	--	NP	VC												
<i>Serratella sp.</i>		NP	VC		+				+				+		
<b>Crustaceans</b>															
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC		+	+			+	+			+	+	
<i>Cryptopotamon anacoluthon</i>	鯉刺溪蟹	NP	VC			+				+				+	
No of Species				9	14	16	6	9	14	16	6	9	14	16	6

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

Table 4.6 Fish species and Hong Kong Newt recorded at She Shan River  
(T1- Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Species		Status	Commonness	Baseline monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring			
				Jul-08		Aug-08		Jan-09				Jul-09				Jan-10				Jul-10			
				Upper stream	Lower stream	Upper stream	Lower stream	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
<i>Channa maculata</i>	斑鱧	NP	C																				
<i>Clarias gariepinus</i>	革胡子鯰	NP	VC																				
<i>Gambusia affinis</i>	食蚊魚	NP	VC			++	++	+		+	+	+				+		+		+		+	
<i>Misgurnus anguillicaudatus</i>	泥鰍	NP	C														+					+	
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C			+	++				+			+		+				+		+	
<i>Parazacco spilurus</i>	異鱧	NP, V	C	+	++	+	++	+	+	+	++	+	+		+		+			+	+		
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			++	++				+	+		+		+				+		+	
<i>Pterocryptis cochinchinensis</i>	越南隱鱮	NP	C																				
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+++	++	+++	+++	++		+	+	+			+		+		+	+	+	+	
<i>Rhinogobius spp.</i>	鰕虎魚	NP	C			+	+	+		+	+						+			+	+	+	
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	++	++	+		+	+	+			+++	+		+		+		+	
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C			+	+					+									+	+	
<i>Zacco platypus</i>	寬鱮	NP	C	++	+	+	+	+		+	+	+			+	+		+		+		+	
			2x2m fish number	80	60	80	60	30		15	45	30	0	0	300	30	0	13		20	5	20	200
			No of Species	4	4	9	9	6	1	6	9	7	1	0	5	7	1	6	0	7	3	9	8
<b>Amphibian</b>																							
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P, Cap 170, NT, PGC	R																				

Note: NP – Not protected in Hong Kong

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

“+” – Species exists in the study area

“++” – Species common in the study area

“+++” – Species abundance in the study area

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

"Cap 170" - List in Wild Animals Protection Ordinance (Cap.170)

"NT" - Near Threatened in IUCN Red List Status

"PGC"-Potential Global Concern by Fellowes *et al* (2002)

"V" - Vulnerable - in Red China Data Book

Table 4.6 Fish species and Hong Kong Newt recorded at She Shan River  
(T1- Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Species	Commonness	Status	Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Post construction monitoring								
			Jan-11				Jul-11				Jan-12				Jul-12				Jul-13				Dec-13				Jan-14				
			Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	
<i>Channa maculata</i>	斑鱧	NP	C																												
<i>Clarias gariepinus</i>	革胡子鯰	NP	VC																												
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+		+		+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Misgurnus anguillicaudatus</i>	泥鰍	NP	C													+				+				+				+			
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C	+				+				+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Parazacco spilurus</i>	異鱾	NP, V	C	+				+				+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	++
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC	+	+			+		+		+	+			+	+	+		+	+	+		+	+	+		+	+		
<i>Pterocryptis cochinchinensis</i>	越南隱鱮	NP	C																												
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+			+				+	+			+	+	+		+	+	+		+	+	+		+	+	+	+
<i>Rhinogobius spp.</i>	鰕虎魚	NP	C	+	+			+				+	+			+	+	+		+	+	+		+	+	+		+	+	+	+
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+			+				+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	++
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C																									+			
<i>Zacco platypus</i>	寬鱮	NP	C	+	+			+		+		+	+			+	+	+		+	+	+		+	+	+		+	+	++	+
2x2m fish number				22	16	3	0	6	4	2	3	8	2	4	0	4	2	2	0	5	3	4	2	5	3	4	2	12	16	30	40
No of Species				8	6	1	0	8	0	2	1	8	6	1	0	9	7	7	3	9	8	8	3	8	8	7	6	8	8	7	7
<b>Amphibian</b>																															
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P, Cap 170, NT, PGC	R																									+			

Note: NP – Not protected in Hong Kong

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Table 4.6 Fish species and Hong Kong Newt recorded at She Shan River  
(T1- Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Species		Status	Commonness	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring							
				Feb-14				Mar-14				Apr-14				May-14				Jun-14				Jul-14				Aug-14			
				Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
<i>Channa maculata</i>	斑鱧	NP	C	+				+	+	+		+	+	+		+	+	+		+	+			+	+	+					
<i>Clarias gariepinus</i>	革胡子鯰	NP	VC	+				+				+						+					+	+			+	+			
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Misgurnus anguillicaudatus</i>	泥鰍	NP	C	+				+	+	+		+	+	+		+	+	+		+		+	+	+		+	+	+			
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Parazacco spilurus</i>	異鱧	NP, V	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Pterocryptis cochinchinensis</i>	越南隱鱨	NP	C	+				+				+						+					+					+			
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Rhinogobius spp.</i>	鰕虎魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C		+				+	+			+	+			+	+				+				+					
<i>Zacco platypus</i>	寬鱮	NP	C	+	+	++	++	+	+	++	++	+	+	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+			
		2x2m fish number		30	40	50	60	60	60	70	70	40	40	50	40	20	10	20	10	12	5	8	6	16	8	10	10	12	10	16	12
		No of Species		12	8	7	7	12	11	11	8	12	11	12	9	10	10	13	9	10	9	11	9	9	8	11	10	9	9	12	10
<b>Amphibian</b>																															
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P, Cap 170, NT, PGC	R	+		+		+	+	+				+														+			

Note: NP – Not protected in Hong Kong

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Table 4.6 Fish species and Hong Kong Newt recorded at She Shan River  
(T1- Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Species		Status	Commonness	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring							
				Sep-14				Oct-14				Nov-14				Dec-14				Jan-15				Feb-15				Mar-15			
				Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
<i>Channa maculata</i>	斑鱧	NP	C	+	+	+			+	+				+	+						+					+					
<i>Clarias gariepinus</i>	革胡子鯰	NP	VC			+	+			+	+				+						+					+		+			
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Misgurnus anguillicaudatus</i>	泥鰍	NP	C	+	+	+	+	+	+	+	+	+	+			+					+	+			+	+	+	+			
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	+			
<i>Parazacco spilurus</i>	異鱧	NP, V	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC				+					+					+						+	+			+	+			
<i>Pterocryptis cochinchinensis</i>	越南隱鱨	NP	C			+				+						+					+			+			+				
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Rhinogobius spp.</i>	鰕虎魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+		+	+	+	+	+	+	+	+			
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C			+										+					+			+			+	+			
<i>Zacco platypus</i>	寬鱮	NP	C	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+			
		2x2m fish number		20	20	30	16	40	30	40	30	50	50	60	50	60	50	50	40	50	40	40	50	40	30	40	40	40	50		
		No of Species		9	9	12	10	8	9	11	10	8	9	12	8	7	6	11	9	7	8	11	8	7	9	12	8	8	10		
<b>Amphibian</b>																															
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P, Cap 170, NT, PGC	R			+				+				+				+									+				

Note: NP – Not protected in Hong Kong

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Table 4.6 Fish species and Hong Kong Newt recorded at She Shan River  
(T1- Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Species		Status	Commonness	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
				Apr-15				May-15				Jun-15				Jul-15				Aug-15				Sep-15			
				Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
<i>Channa maculata</i>	斑鱧	NP	C		+				+	+				+					+					+			
<i>Clarias gariepinus</i>	革胡子鯰	NP	VC			+	+			+	+			+	+				+	+				+	+		
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Misgurnus anguillicaudatus</i>	泥鰍	NP	C	+	+	+		+	+	+				+	+	+			+	+	+			+	+		
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C	+	+	++	+	+	+	++	++			+	+	++	++			+	++	++			+	++	
<i>Parazacco spilurus</i>	異鱾	NP, V	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			+	+			+	+			+	+				+	+				+	+		
<i>Pterocryptis cochinchinensis</i>	越南隱鱮	NP	C			+				+				+					+					+			
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Rhinogobius spp.</i>	鰕虎魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C		+	+				+	+			+	+				+	+			+	+	+		
<i>Zacco platypus</i>	寬鱮	NP	C	+	++	++	+	+	+	++	+	+	+	+	+	++	+	+	+	++	+	+	++	+	+		
			2x2m fish number	30	35	55	45	20	10	20	10	20	10	20	10	15	8	15	8	20	10	20	10	20	12	23	12
			No of Species	8	10	12	9	8	9	13	10	8	8	13	10	8	8	13	10	8	8	13	7	8	8	13	6
<b>Amphibian</b>																											
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P, Cap 170, NT, PGC	R			+				+					+												

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Table 4.6 Fish species and Hong Kong Newt recorded at She Shan River  
(T1- Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Species		Status	Commonness	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring							
				Oct-15				Nov-15				Dec-15				Jan-16				Feb-16				Mar-16				Apr-16			
				Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
<i>Channa maculata</i>	斑鱧	NP	C			+				+					+					+						+					
<i>Clarias gariepinus</i>	革胡子鯰	NP	VC			+	+			+	+			+	+				+	+				+	+		+	+			
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Misgurnus anguillicaudatus</i>	泥鰍	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+			
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C	+	++	++		+	++	++		+	++	++		+	++	++	+	+	++	++	+	+	++	++	+	+			
<i>Parazacco spilurus</i>	異鱧	NP, V	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+			
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			+	+			+	+			+	+				+	+				+	+		+	+			
<i>Pterocryptis cochinchinensis</i>	越南隱鱮	NP	C			+				+				+																	
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+			
<i>Rhinogobius spp.</i>	鰕虎魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+			
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C			+	+			+	+			+	+				+	+			+	+			+	+			
<i>Zacco platypus</i>	寬鱮	NP	C	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+			
		2x2m fish number		35	35	25	20	45	45	35	30	55	50	40	35	55	45	35	25	60	45	40	30	60	50	35	25	40	40	30	20
		No of Species		8	8	13	6	8	8	13	6	8	8	13	6	8	8	12	7	8	8	12	7	8	8	12	7	8	8	12	7
<b>Amphibian</b>																															
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P, Cap 170, NT, PGC	R											+														+			

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Table 4.6 Fish species and Hong Kong Newt recorded at She Shan River  
(T1- Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Species		Status	Commonness	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
				May-16				Jun-16				Jul-16				Aug-16				Sep-16				Oct-16			
				Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
<i>Channa maculata</i>	斑鱧	NP	C			+				+					+					+					+		
<i>Clarias gariepinus</i>	革胡子鯰	NP	VC			+	+			+	+			+	+					+					+		
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Misgurnus anguillicaudatus</i>	泥鰍	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+		
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	
<i>Parazacco spilurus</i>	異鱧	NP, V	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+		
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			+	+			+	+			+	+					+				+			
<i>Pterocryptis cochinchinensis</i>	越南隱鱨	NP	C																								
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+		
<i>Rhinogobius spp.</i>	鰕虎魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+		
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C			+	+			+	+			+	+					+				+			
<i>Zacco platypus</i>	寬鱮	NP	C	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	
			2x2m fish number	30	20	20	10	30	20	25	8	20	15	20	3	20	10	15	5	20	12	15	8	25	20	20	10
			No of Species	8	8	12	7	8	8	12	7	8	8	12	8	8	8	12	5	8	8	12	5	8	8	12	5
<b>Amphibian</b>																											
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P, Cap 170, NT, PGC	R																						+		

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“+++” – Species abundance in the study area

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

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Table 4.7 Abotic data for the Upper She Shan River

(T1- Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Parameter / date	Baseline monitoring	Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring		
	Aug-08	Jan-09			Jul-09			Jan-10			Jul-10			Jan-11			Jul-11			Jan-12		
Replicate		T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
DO (mg/L)	8.9	--	9.1	8.3	6	5.8	6.5	--	8.9	--	8.2	8.3	8.3	8	8.5	8.8	8	8.5	9	8.6	8.2	8.8
pH	7.29	--	7.51	7.42	7.22	7.16	7.35	--	7.5	--	7.5	7.5	7.5	6.9	7	7.2	7	7.2	7.5	6.9	6.6	7.1
Nitrate (mg N/L)	0.5	--	1.6	1.5	0.22	0.3	0.4	--	0.75	--	0.1	0.14	0.2	0.1	0.2	0.7	0.1	0.3	0.4	0.2	0.2	0.4
Ammonia (mg N/L)	0.1	--	PO4-P (µg P/L) :<100	PO4-P (µg P/L) :110	0.83	0.97	0.99	--	0.03	--	0.25	0.2	0.12	0.1	0.1	0.12	0.1	0.1	0.15	0.2	0.2	0.3
Salinity (ppt)	<0.1	--	0.1	0.1	0	0	0	--	0	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	0	0
Conductivity (µS/cm)	90	--	140	170	116	114	116	--	105	--	410	410	390	110	111	115	120	115	130	122	118	126
BOD (mg/L)	<2	--	<2	4	<2	<2	<2	--	2	--	<2	3.2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.1-0.3	--	<0.01-0.1		<0.01	N.A	<0.01-0.1	--	<0.01-0.1	--	0.1	0	0	0.1	0	0	0.2	0.05	0.1	0.2	0.05	0.1
Water flow at riffle (m/s)	0.4-0.5	--	0.2-0.3		<0.01	N.A	0.2-0.3	--	0.01	--	0.1	0	0	0.1	0	0	0.2	0.1	0.1	0.2	0.1	0.1
Sand (%)	55	65	23	65	23	23	65	5	23	--	5	30	5	5	30	2	5	30	2	10	25	5
Stone (%)	25	30	75	30	75	75	30	40	75	--	40	65	80	40	65	2	40	65	2	45	65	5
Mud (%)	30	5	2	5	2	2	5	5	2	--	5	5	5	5	5	1	5	5	1	5	10	10
Concrete (%)	0	0	0	0	0	0	0	50	0	100	50	0	10	50	0	95	50	0	95	40	0	80

Table 4.7 Abotic data for the Upper She Shan River

(T1- Upper stream section, T2 - middle stream section and T3 - Lower stream section)

Parameter / date	Impact monitoring			Impact monitoring			Impact monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring					
	Jul-12			Jul-13			Dec-13			Jan-14			Feb-14			Mar-14			Apr-14			May-14			Jun-14			Jul-14					
Replicate	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
DO (mg/L)	7.7	7.7	6.3	7.8	7.8	7.7	8.7	8.6	9.2	8.3	8.2	8.6	7.2	7.6	7.8	7.1	7.2	7.2	7.3	7.5	7.6	7.8	7.6	7.7	7.6	7.8	7.4	7.7	7.7	7.4			
pH	6.7	6.6	6.6	6.8	7.2	7.6	6.6	6.9	7.1	6.8	7.3	7.4	7.8	6.7	7.6	7.2	6.8	7.5	6.6	7.3	7.2	7.5	7.5	7.4	7.5	7.5	7.4	7.4	7.5	7.3			
Nitrate (mg N/L)	0.84	0.86	1.14	0.6	0.61	0.7	0.78	0.63	0.53	1.2	1.12	1.02	1.5	1.2	1.6	1.2	1.1	0.77	0.6	0.8	1.2	1.1	1.0	1.1	0.5	0.6	0.6	0.8	0.6	0.5			
Ammonia (mg N/L)	0.05	0.02	1.08	0.14	0.06	0.05	0.08	<0.01	0.42	1.9	1.8	1.73	0.8	1.2	1.4	0.4	0.6	0.01	0.6	0.5	0.8	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1			
Salinity (ppt)	0.03	0.04	0.07	0.03	0.03	0.04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.04	0.04	0.06	0.04	0.05	0.05	0.04	0.05	0.05			
Conductivity (µS/cm)	121	120	160	94	97	97	116	116	134	124	118	132	128	113	132	123	136	140	112	116	120	124	121	123	118	115	119	110	113	111			
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2			
Water flow at pool (m/s)	0.2	0.05	0.1	0.2	0.05	0.1	0.1	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2			
Water flow at riffle (m/s)	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2-0.4	0.2-0.3	0.2-0.4	0.2-0.5	0.2-0.4	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5			
Sand (%)	10	25	5	15	25	5	15	10	5	15	10	5	15	10	5	15	10	5	10	10	5	5	5	5	5	5	5	5	5	5			
Stone (%)	45	65	5	65	65	15	65	80	20	65	80	20	65	80	20	65	80	20	70	80	30	80	80	30	80	80	30	80	80	30			
Mud (%)	5	10	10	10	10	10	10	10	5	10	10	5	10	10	5	10	10	5	10	10	5	5	5	2	5	5	2	5	5	2			
Concrete (%)	40	0	80	10	0	70	10	0	70	10	0	70	10	0	70	10	0	70	10	0	60	10	10	63	10	10	63	10	10	63			











**Agreement No. CE65/2013(EP)  
Post-Construction Ecological Monitoring of River  
Improvement Work in Upper Lam Tsuen River, She Shan  
River and Upper Tai Po River – Investigation**

**Post-Construction Ecological Monitoring Report (No. 34)  
Upper Lam Tsuen River**

**October 2016**



Prepared by: Mike pang

November 14, 2016

Validated by: Mark Shea

November 14, 2016

Ecology Team: China-Hong Kong Ecology Consultants

Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River – Investigation Agreement No. CE65/2013(EP)

## Post-Construction Ecological Monitoring Report (No. 34)

### Upper Lam Tsuen River

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- Table 4.7: Abiotic data for Upper Lam Tsuen River.

## 1 Introduction

- 1.1 Agreement No. CE65/2013(EP) Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River – Investigation required a post-construction ecological monitoring programme when the project completed. The collected data are mainly used to assess ecological recovery process and effectiveness of ecological migration proposed and enforced during the construction period.
- 1.2 The scope of the ecological monitoring was detailed in EM & A Manual of the project. In brief, the survey aimed to collect data on abiotic factors such as water quality, substratum characteristics, water flow as well as flora and fauna.
- 1.3 China Hong Kong Ecology Consultants Ltd. was committed by Allied Environmental Consultants Ltd (AEC) to undertake the ecological monitoring tasks for the project for December 2014.
- 1.4 This is the number 34 post-construction ecological monitoring report for the project conducted **on 19<sup>th</sup> of October 2016**. It contains the following subsections:
- Summary of major points
  - Monitoring Methods and Results
  - Summary and Comments

## 2 Summary of Major Points

- Field ecological monitoring was undertaken **on 19<sup>th</sup> of October 2016**;
- Fauna and flora along the drainage project sections is in a process of re-establishing or restoration; Plants on river bed was experiencing seasonal changes in abundance and phonological appearance;
- The species richness of odonata was lower than the record of last month;
- Bird diversity and abundance was in natural fluctuation;
- Abundance of a target river fauna (i.e. *Paramesotriton hongkongensis* adult was recorded in the potential habitats along the Lam Tsuen River ); and
- Fish abundance was similar to last month with slight increase.

## 3 Monitoring Methodology

### 3.1 Riparian Vegetation

Riparian vegetation, including aquatic and emergent, was sampled using line transects along the affected river channel and riparian habitat. Species, relative abundance and average heights were recorded. Vegetation surveys were conducted at four selected belt transects with two located at the lower portion (T3 and T4) of the river channel and another two at the upper section (T1 and T2) of the river respectively (**Figure 1**). The belt transects was run across the river channel in order to collect quantitative data of the vegetation, e.g.,

species inventory, height, percentage cover. Qualitative data of plants was collected by recording plant species, relative abundance along line transect. Nomenclature and protection status of the species followed those documented in Lai *et al.* (2004) and Hong Kong Herbarium (2015).

### 3.2 Avifauna

Avifauna survey was conducted during post construction monitoring period. Special attention was given to the river channel and corridor area which birds used as feeding and foraging habitat. Avifauna surveys were undertaken in the early morning plus species recorded in the rest of the day when conducting other taxonomic groups (benthic, fish, insect) monitoring. Numerical abundance was recorded at fixed count points within a radius of 30-50m according to landscape feature and visual penetration extent. The duration of the point count of birds was standardized for 10 minutes at each location in order to collect comparable data. Transect count along accessible section of river channel were used in order to collect qualitative data. Binoculars and digital camera were the main items of equipment used. Nomenclature and protection status of the species follows the AFCD website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net)) and Carey *et al.* (2001).

The point count was conducted at four locations with two located at the lower portion of the river channel (T3&T4) and the other two located at the upper section of the river (T1&T2). The point count and survey transect locations for the bird survey and sampling sites for surveys of other faunal groups and flora were presented in **Figure 1**.

### 3.3 Adult Odonata Survey

Adult Odonata survey was conducted along transects (**Figure 1**). Binoculars, digital camera and hand net were utilized to aid identification. Numerical abundance, species identity and other notable behavior were recorded. Nomenclature and protection status of the species followed those documented in the AFCD website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net)), Wilson *et al.* (2004) and Tam *et al.* (2011). Adult Odonata survey was conducted along line transects in parallel with river channel within the works area where access was permitted.

### 3.4 Aquatic Macro-invertebrates

Macro-invertebrates in the river channel were surveyed. Sampling was conducted at five sampling locations including two sites located at the lower portion (T3 and T4) of the river channel and another two sites at the upper section (T1 and T2) of the river, as well as the reference site. Those sampling sites covered major type of river habitats, e.g. river pool and riffle (**Figure 1**) Five replicates were taken at each sampling point and pool together for further sample sorting and identification. Kick sampling and hand netting were the survey methodologies for river organisms. Dissection microscope and digital camera were used to aid identification and enumeration. Numerical abundance and species identity were recorded. Nomenclature and protection status of the species has followed those documented in the AFCD website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net)) and other literatures such as Dudgeon (1994).

### 3.5 Fish and Newt

Fish community and *Paramesotriton hongkongensis* at the specified river channel was monitored by live trapping, hand netting and direct observation methods.

Sampling was conducted at five sampling locations including two sites located at the lower portion (T3 and T4) of the river channel and another two sites at the upper section (T1 and T2) of the river, as well as reference site. Those sampling sites covered major type of river habitats, e.g. river pool and riffle (**Figure 1**). The number of the observed fish and newt was estimated and recorded. Nomenclature and protection status of the species followed those documented in the AFCD website ([www.hkbiodiversity.net](http://www.hkbiodiversity.net)) and Lee *et al.* (2004).

### 3.6 Abiotic Data Collection

#### 3.6.1 Water Quality Monitoring

Dissolved oxygen level, pH value, conductivity, salinity, BOD and nutrient level (nitrate and ammonium) were measured and analyzed by conventional methods in situ or in laboratory. The instruments for measuring dissolved oxygen level, pH value, conductivity, salinity were model: DO-5510, AZ8685, AZ8361 and AZ8374 respectively. All the instruments were calibrated every monitoring month according to the operation manuals in order to obtain the precise result. BOD test took 5 days to complete within darkness incubator with stable temperature at 20°C and was performed using model: DO-5510 for measuring dissolved oxygen. Nutrient levels including nitrate and ammonia were performed in laboratory by applying the In-house method SOP056 (FIA) and SOP057 (FIA) respectively.

#### 3.6.2 Sediment Characteristics

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

#### 3.6.3 Water Flow

Water flow rates in river channel were measured by recording the time taken for a floating object (e.g. floating ball) to cover a measured distance.

The sampling locations for surveys were presented in **Figure 1**.

## 4 Monitoring Results

### 4.1 Vegetation

Vegetation has generally covered the gabion and river bed along Lam Tsuen River (Photos 1-3). In total, 75 flora species were recorded within the survey



transects along the river course. Some of the vegetation at river bed has been washed out by flooding, especially vegetation in lower section of the river. The recorded floras were generally in good health, and the height of the dominated riparian grass and herb species were in a range from 0.2m to 1.5m as observed along survey transect. Dominant flora species were shown in the **Table 4.1** marked with relative abundance sign “+++”. Results of vegetation survey and belt transect survey were presented in **Table 4.1** and **Table 4.2**. **Figure 1** shows the transect line for the flora surveys.

## 4.2 Fauna

### 4.2.1 Avifauna

An avifauna survey was undertaken along survey transects and at four selected point count locations. In total, 19 species of birds were recorded during the bird survey and 5 of the total were wetland dependent species including *Ardeola bacchus*, *Egretta garzetta* (Photo 4), *Alcedo atthis*, *Motacilla alba* and *Motacilla cinerea*. They were commonly observed foraging in the river channel. *Pycnonotus jocosus* was a dominated species along the river. All the birds in Hong Kong are under protection of Wild Animals Protection Ordinance (Cap. 170). Among the recorded species, *Ardeola bacchus* and *Egretta garzetta* are both classified as Regional Concern by Fellowes *et al.* (2002). *Centropus sinensis* was observed in the river, which is considered as Vulnerable in China Red Data Book. *Eurystomus orientalis* (Photo 5), an uncommon passage migrant, was recorded from the plantation area adjacent to Lam Tsuen River. Apart from mentioned species above, the others recorded in Lam Tsuen River were common species in Hong Kong. Transect and Point Count locations were shown on **Figure 1**. Result of bird survey was presented in the **Table 4.3**.

### 4.2.2 Adult Odonata Survey

Odonata survey was performed, and a list of recorded odonata species at Upper Lam Tsuen River is shown in **Table 4.4**. In total, 10 odonata species were recorded during the survey and the recorded species was common species and widely distributed in Hong Kong (Photos 6-8). The result obtained this month is similar to previous surveys conducted in approximate period of last year. Species richness in this month was lower than the record of last month. Most of the odonata species in Hong Kong has the peak emergence from spring to late summer. The decrease in abundance of odonata was due to seasonality. It is expected that number of odonata will be decreasing and keep in low abundance in the following months during dry season (Wilson *et al.*, 2004 & Tam *et al.*, 2011). Sampling location was shown in **Figure 1**.

### 4.2.3 Aquatic Macro-invertebrates

Upper Lam Tsuen River was flowing with constant water during survey (Photo 9). The river benthic fauna collected was mainly comprised of insects, molluscs and crustaceans. *Pomacea canaliculata* was found abundant along the river. Details of recorded of river benthic fauna refers to **Table 4.5**. Sampling location was shown on **Figure 1**.

#### 4.2.4 Hong Kong Newt

Surveys of Hong Kong Newt were conducted (Photo 9) at Upper Lam Tsuen River. Adult *Paramesotriton hongkongensis* (Photo 10) were observed at the Lam Tsuen River where the habitat consisted of riparian vegetation during the survey. It is assumed that Hong Kong Newt would stay in river habitat during breeding period from September to March (Dudgeon, 2003). Riparian vegetation grown along the channel especially along water margin could provide shelter and breeding habitat for Hong Kong Newt. Hong Kong Newt is listed in Wild Animals Protection Ordinance (Cap. 170) and classified as “Near Threatened” under IUCN Red List Status and as “Potential Global Concern” by Fellowes *et al.* (2002). Record of Hong Kong Newts can be referred to **Table 4.6**.

#### 4.2.5 River Fish Fauna

Fish surveys were performed at Upper Lam Tsuen River during field monitoring. In total, 17 species of freshwater fish, including species recorded from reference site, were recorded. *Oreochromis niloticus*, *Zacco platypus* and *Rhinogobius* spp were the dominated species in the river. *Acrossocheilus parallens* is a rare freshwater fish that only recorded in few of reservoir catchments and streams in Hong Kong (Lee *et al.*, 2004) and listed as Global Concern by Fellowes (2002). It was observed along the surveyed river with pool. Except *Acrossocheilus parallens*, *Parazacco spilurus* is classified as Vulnerable in China Red Data Book and observed along the river with low abundance. Fish counting at 2 x 2 meter area were performed and number of fish individuals was similar to the record of last month with slight increase. Details of recorded of fish fauna refers to **Table 4.6**. Sampling location was shown on **Figure 1**.

### 4.3 **Abiotic Data**

Data on water quality and major river hydrological feature (water flow and substratum) of the river were collected and are presented in the **Table 4.7**.

Generally, the water was not polluted and nutrient levels were generally low. Results of water test were presented in the **Table 4.7**.

The river substratum was comprised of over 75-93% stones or rocks in most of the river sections with moderate water flow (up to 0.2m/second at pool and 0.5m/second at riffle).

## 5 **Summary and Commentary**

Post construction ecological monitoring was carried out October 2016 and relevant biotic and abiotic data was collected according to project specification and EM & A Manual. Benthic fauna was temporally de-faunated in river sections due to river bed engineering works during construction period between 2008 and early 2013 and is under recovery process after that period. Adult amphibian *Paramesotriton hongkongensis* was recorded at river channel

where the river margin covered with riparian vegetation. *Acrossocheilus parallens*, a rare freshwater fish species in Hong Kong, was observed at a few locations in the river channel with pool. Except *Acrossocheilus parallens*, *Parazacco spilurus* recorded in the river is also considered with conservation interest and observed along the river with low abundance.

Aquatic and riparian vegetation along river channel was re-established. Vegetation has generally covered the gabion and covered the river bed along Upper Lam Tsuen River.

The water quality of the surveyed river was not polluted although the river receives low concentration of nutrients from the nearby agriculture lands and resident houses.

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**FIGURES**

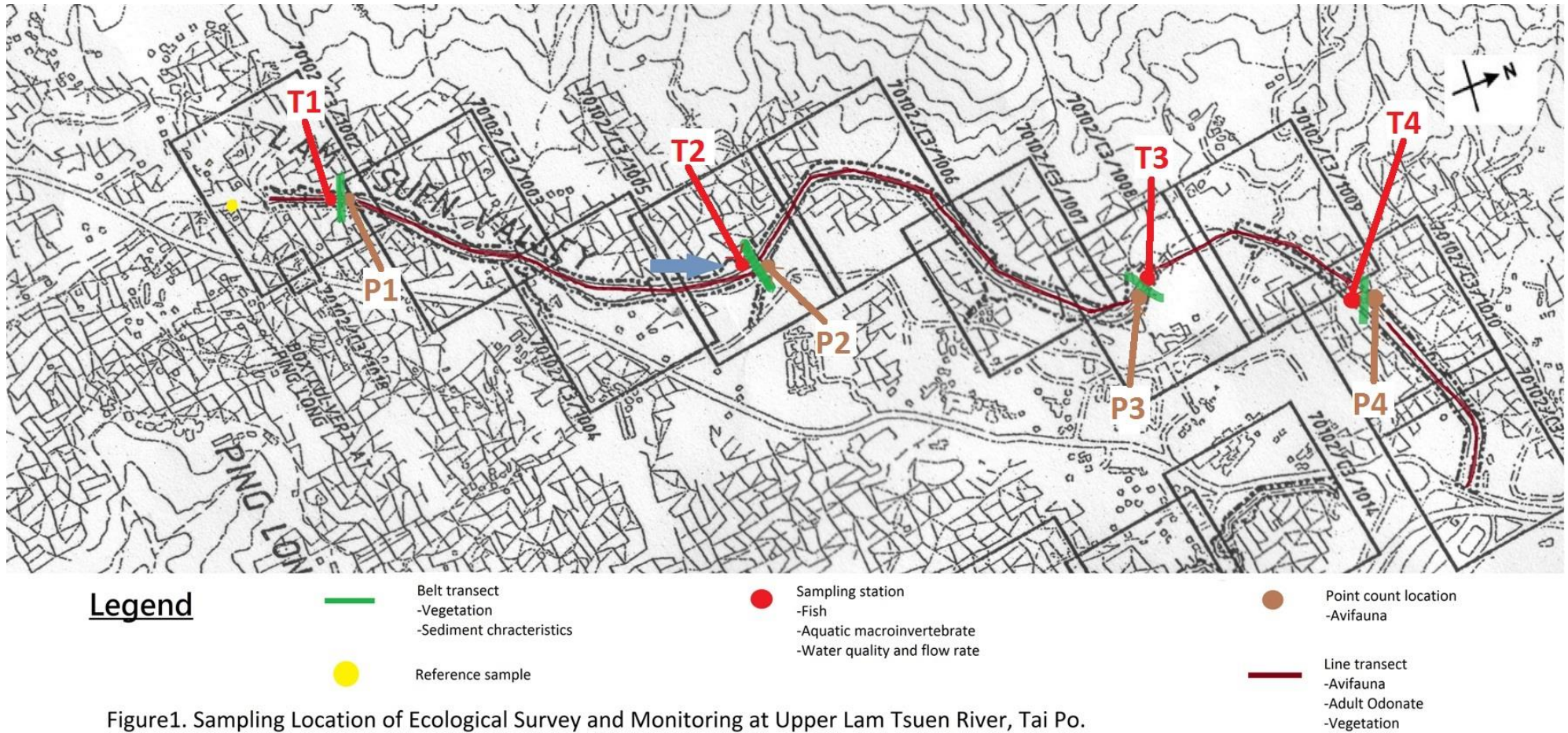


Figure1. Sampling Location of Ecological Survey and Monitoring at Upper Lam Tsuen River, Tai Po.

## **PHOTOS**



Photo 1: General view of the river channel  
(Reference site)



Photo 2: General view of the river channel  
(Upper section)



Photo 3: General view of the river channel  
(Middle section)



Photo 4: Vegetation sparsely growing on  
gabion (Middle section)



Photo 5: Avifauna – *Egretta garzetta*



Photo 6: Odonata – *Orthetrum chrysis*



Photo 7: Aquatic sample



Photo 8: Hong Kong Newt



Photo 9: Fish – *Pseudobagrus trilineatus*



## **TABLE**





Table 4.2. 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	Baseline survey				Impact monitoring						Impact monitoring						Impact monitoring						Impact monitoring							
			Stream		Transect		Oct-07		Jan-09						Jul-09						Jan-10						Jul-10					
			P1	P2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2							
Height (m)	%	Height (m)	%	Height (m)	%	Height(m)	%	Height (m)	%	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	15	1	40	0.5	5	0.5	5			0.5	5			0.5	3	0.2	5	0.2	2	0.5	20	0.5	60						
Moraceae	<i>Ficus hispida</i>	對葉榕	1	2			5	5			2	10	5	5			2	10	5	5			5	5								
Ulmaceae	<i>Celtis sinensis</i>	朴樹	5	2							6	15					6	15								4m	5					
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹	1.2	45	1.2	30			0.8	10	0.5	12					0.7	30					1	35	1	5	0.5	10				
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐	2	2			5	5	3	5	1.5	4	5	5	3	5	1.5	5	5	5			5	5								
Araceae	<i>Alocasia odora</i>	海芋	1.5	23							1.5	25					2	30								2	10					
Araceae	<i>Colocasia esculenta</i>	芋	0.3	<1	0.4	<1	0.3	2					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			0.4	10	7	5			0.4	10						
Athyriaceae	<i>Callipteris esculenta</i>	菜蕨			0.6	1	0.8	10			0.4	10	0.8	10			0.4	2	0.8	6			0.8	6								
Poaceae	<i>Phragmites karka</i>	卡開蘆					1.5	51					1.5	51					1.5	53			1.5	10								
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨	0.4	10							0.4	10					0.4	2														
Equisetaceae	<i>Equisetum debile</i>	箬管草			0.6	<1	0.3	2					0.3	2					0.3	2												
Asteraceae	<i>Ageratum conyzoides</i>	勝紅菊						0.4	2					0.4	2					0.2	2											
Commelinaceae	<i>Commelina diffusa</i>	節節草																0.2	5	0.2	5	0.2	5		0.5	20						
Solanaceae	<i>Solanum nigrum</i>	龍葵																			0.4	5										
Euphorbiaceae	<i>Mallotus paniculatus</i>	白楸																0.3	5													
Poaceae	<i>Eleusine indica</i>	牛筋草											0.5	5						5												
Poaceae	<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																														
Poaceae	<i>Panicum repens</i>	枯骨草																														
Poaceae	<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																														
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																														
Poaceae	<i>Brachiaria mutica</i>	巴拉草																														
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																														
Malvaceae	<i>Hibiscus rosa-sinensis</i>	大紅花																														
Cyperaceae	<i>Cyperus sp.</i>	莎草																														
Balsaminaceae	<i>Impatiens walleriana</i>	非洲鳳仙																														
Amaranthaceae	<i>Celosia argentea</i>	青葙																														
Bare Gound							10		73		10		10		78		6		10		73		88		9		15	65				

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

P1 – Point count location 1; P2 – Point count location 2

Table 4.2. 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						Impact monitoring						Impact monitoring						Impact monitoring						Impact monitoring											
			Jan-11			Jul-11			Jan-12			Jul-12			Mar-13			Jul-13			Jan-11			Jul-11			Jan-12			Jul-12			Mar-13			Jul-13		
			Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2						
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.5	10					0.5	10						0.4	20																					
Moraceae	<i>Ficus hispida</i>	對葉榕																																				
Ulmaceae	<i>Celtis sinensis</i>	朴樹																																				
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹	1	15	1	5	0.5	2	1	2						1	55																					
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐			4m	5																																
Araceae	<i>Alocasia odora</i>	海芋					0.4	3																														
Araceae	<i>Colocasia esculenta</i>	芋																																				
Myrtaceae	<i>Cleistocalyx operculatus</i>	水翁	0.4	5	5m	5																																
Athyriaceae	<i>Callipteris esculenta</i>	菜蕨																																				
Poaceae	<i>Phragmites karka</i>	卡開蘆	1.5	2					1.5	2																												
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																																				
Equisetaceae	<i>Equisetum debile</i>	篔簹草																																				
Asteraceae	<i>Ageratum conyzoides</i>	勝紅菊			0.3	2	1.2	10								0.4	20																					
Commelinaceae	<i>Commelina diffusa</i>	節節草			0.2	4										0.4	10																					
Solanaceae	<i>Solanum nigrum</i>	龍葵																																				
Euphorbiaceae	<i>Mallotus paniculatus</i>	白楸																																				
Poaceae	<i>Eleusine indica</i>	牛筋草																																				
Poaceae	<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																															
Poaceae	<i>Panicum repens</i>	枯骨草							1.5	5						1.5	5																					
Poaceae	<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			0.2	5																																
Fabaceae	<i>Pueraria lobata</i>	野葛																																				
Convolvulaceae	<i>Merremia hederacea</i>	魚黃草																																				
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																																				
Poaceae	<i>Brachiaria mutica</i>	巴拉草																																				
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																																				
Malvaceae	<i>Hibiscus rosa-sinensis</i>	大紅花																																				
Cyperaceae	<i>Cyperus sp.</i>	莎草																																				
Balsaminaceae	<i>Impatiens walleriana</i>	非洲鳳仙																																				
Amaranthaceae	<i>Celosia argentea</i>	青葙																																				
Bare Gound				68		80		89		71		100		89		35		100		100		20		100		100		10				20		76				

- Reference point was the sampling location outside the works area used to compare with the data within works area.  
P1 – Point count location 1; P2 – Point count location 2



Table 4.2. Flora species recorded from belt transect survey at the Upper Tai Po stream (T1- Upper stream sampling site and T2 - Lower stream sampling site )

		Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring											
		Stream						Stream						Stream						Stream						Stream											
		Aug-14						Sep-14						Oct-14						Nov-14						Dec-14											
		ce		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2	
Family	Species	Chinese name	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%				
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	10	0.4	28			0.4	10	0.4	28			0.4	10	0.4	30			0.4	12	0.4	30			0.4	12	0.4	30								
Moraceae	<i>Ficus hispida</i>	對葉榕																																			
Ulmaceae	<i>Celtis sinensis</i>	朴樹																																			
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹	5					0.6	5					0.6	10					0.6	15					0.6	15										
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐		0.6	1					0.6	1					0.6	1					0.6	1					0.6	1								
Araceae	<i>Alocasia odora</i>	海芋																																			
Araceae	<i>Colocasia esculenta</i>	芋												0.5	5					0.5	5					0.5	5										
Myrtaceae	<i>Cleistocalyx operculatus</i>	水翁																																			
Athyriaceae	<i>Callipteris esculenta</i>	菜蕨																																			
Poaceae	<i>Phragmites karka</i>	卡開蘆	5					1.8	5					2	5					2	5					2	5										
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																																			
Equisetaceae	<i>Equisetum debile</i>	箬管草												0.3	5					0.3	5					0.3	5										
Asteraceae	<i>Ageratum conyzoides</i>	勝紅菊																																			
Commelinaceae	<i>Commelina diffusa</i>	節節草		0.3	5					0.3	5					0.3	10					0.3	10					0.3	10								
Solanaceae	<i>Solanum nigrum</i>	龍葵																																			
Euphorbiaceae	<i>Mallotus paniculatus</i>	白楸																																			
Poaceae	<i>Eleusine indica</i>	牛筋草																																			
Poaceae	<i>Pennisetum purpureum</i>	象草																																			
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊																																			
Asteraceae	<i>Bidens alba</i>	白花鬼針草														1	10					1	10					1	10								
Poaceae	<i>Panicum repens</i>	枯骨草	3					0.6	4					0.6	4					0.6	4					0.6	4										
Poaceae	<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	15					0.4	18					0.4	18					0.4	20					0.4	20										
Convolvulaceae	<i>Merremia hederacea</i>	魚黃草																																			
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草		1.5	5					1.5	5					2	20					2	20					2	20								
Poaceae	<i>Brachiaria mutica</i>	巴拉草												1.5	25					1.5	25					1.5	25										
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																																			
Malvaceae	<i>Hibiscus rosa-sinensis</i>	大紅花																																			
Cyperaceae	<i>Cyperus sp.</i>	莎草																																			
Balsaminaceae	<i>Impatiens walleriana</i>	非洲鳳仙																																			
Amaranthaceae	<i>Celosia argentea</i>	青葙																																			
Bare Gound			62		61				58		61				43		4					34		4				34		4							

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

P1 – Point count location 1; P2 – Point count location 2

Table 4.2. Flora species recorded from belt transect survey at the Upper Tai Po stream (T1- Upper stream sampling site and T2 - Lower stream sampling site )

		Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring												
		Jan-15						Feb-14						Mar-14						Apr-14						May-15						Jun-15						
		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		
Family	Species	Chinese name	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%				
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.8	15			0.3	10																														
Moraceae	<i>Ficus hispida</i>	對葉榕																																				
Ulmaceae	<i>Celtis sinensis</i>	朴樹																																				
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹	1.3	5			1	5					1	5			1.3	5							1	5					1	5			1	3		
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐					0.6	1					0.6	1												0.6	1					0.5	1			0.5	1	
Araceae	<i>Alocasia odora</i>	海芋																																				
Araceae	<i>Colocasia esculenta</i>	芋	0.8	5													0.8	5																0.5	5			
Myrtaceae	<i>Cleistocalyx operculatus</i>	水翁																																				
Athyriaceae	<i>Callipteris esculenta</i>	菜蕨																																				
Poaceae	<i>Phragmites karka</i>	卡開蘆	1.7	10																																		
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																																				
Equisetaceae	<i>Equisetum debile</i>	籐管草	0.3	5																																		
Asteraceae	<i>Ageratum conyzoides</i>	勝紅薊			0.3	2																																
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.2	10																																		
Solanaceae	<i>Solanum nigrum</i>	龍葵																																				
Euphorbiaceae	<i>Mallotus paniculatus</i>	白楸																																				
Poaceae	<i>Eleusine indica</i>	牛筋草																																				
Poaceae	<i>Pennisetum purpureum</i>	象草																																				
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊																																				
Asteraceae	<i>Bidens alba</i>	白花鬼針草	1	5			0.8	2					0.8	2			1	5							0.8	2			0.7	5			0.6	2			0.7	5
Poaceae	<i>Panicum repens</i>	枯骨草	0.6	5													0.6	5																	0.4	5		
Poaceae	<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																																				
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草					4	10																														
Poaceae	<i>Brachiaria mutica</i>	巴拉草																																				
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香			0.2	4																																
Malvaceae	<i>Hibiscus rosa-sinensis</i>	大紅花																																				
Cyperaceae	<i>Cyperus sp.</i>	莎草			0.2	6																																
Balsaminaceae	<i>Impatiens walleriana</i>	非洲鳳仙					1	5																														
Amaranthaceae	<i>Celosia argentea</i>	青葙	1.7	5																																		
Bare Gound				35		88																																

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

P1 – Point count location 1; P2 – Point count location 2



Table 4.2. Flora species recorded from belt transect survey at the Upper Tai Po stream (T1- Upper stream sampling site and T2 - Lower stream sampling site )

		Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring																			
Stream		Jul-15						Aug-15						Sep-15						Oct-15						Nov-15						Dec-15																			
Transect		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2															
Family	Species	Chinese name	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%															
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.5	10					0.5	10									0.5	10																															
Moraceae	<i>Ficus hispida</i>	對葉榕																																																	
Ulmaceae	<i>Celtis sinensis</i>	朴樹																																																	
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹	1	5	1	1			1	5	1	1							1	5	1	3																													
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐			1.5	5					1.5	5										1.5	5												1.5	5															
Araceae	<i>Alocasia odora</i>	海芋																																																	
Araceae	<i>Colocasia esculenta</i>	芋	0.5	5	1.2	10			0.5	5	1.2	5							0.5	5	1.2	5																													
Myrtaceae	<i>Cleistocalyx operculatus</i>	水翁																																																	
Athyriaceae	<i>Callipteris esculenta</i>	菜蕨																																																	
Poaceae	<i>Phragmites karka</i>	卡開蘆	1.5	10					1.5	10									1.5	10																															
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																																																	
Equisetaceae	<i>Equisetum debile</i>	籐管草	0.3	5					0.3	5									0.3	5																															
Asteraceae	<i>Ageratum conyzoides</i>	勝紅薊																																																	
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.3	10			0.4	40	0.4	10	0.2	20	0.4	30					0.4	10	0.2	15	0.4	30																											
Solanaceae	<i>Solanum nigrum</i>	龍葵																																																	
Euphorbiaceae	<i>Mallotus paniculatus</i>	白楸																																																	
Poaceae	<i>Eleusine indica</i>	牛筋草																																																	
Poaceae	<i>Pennisetum purpureum</i>	象草																																																	
Asteraceae	<i>Wedelia chinensis</i>	豨薟菊																																																	
Asteraceae	<i>Bidens alba</i>	白花鬼針草	0.7	5			0.5	5	0.7	5			0.5	5	0.7	5			0.5	5	0.7	5			0.5	5	0.7	5			0.5	5			0.5	5															
Poaceae	<i>Panicum repens</i>	枯骨草	0.4	5					0.4	5									0.4	5																															
Poaceae	<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																																																	
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草		2.5	20	2	30			2.5	5	2	20						2	7	2	20					2	10	2	20				2	10	2	20														
Poaceae	<i>Brachiaria mutica</i>	巴拉草		1.2	50	0.5	15			1.2	30	0.5	15						1.2	2	0.5	15					1.2	2	0.5	15				1.2	2	0.5	15														
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																																																	
Malvaceae	<i>Hibiscus rosa-sinensis</i>	大紅花																																																	
Cyperaceae	<i>Cyperus sp.</i>	莎草		0.2	5					0.2	5								0.2	2								0.2	2																						
Balsaminaceae	<i>Impatiens walleriana</i>	非洲鳳仙																																																	
Amaranthaceae	<i>Celosia argentea</i>	青葙	1.7	5					1.7	5									1.7	5																															
Bare Gound				40		14		5		40		34		25					1.7	40		83		25			1.7	40		66		25				1.7	40		58		25				1.7	51		58			25

- Reference point was the sampling location outside the works area used to compare with the data within works area.  
P1 – Point count location 1; P2 – Point count location 2

Table 4.2. 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	Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring											
			Jan-16			Feb-16			Mar-16			Apr-16			May-16			Jun-16			Jul-16																							
			Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2												
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.5	5				0.5	5					0.6	5					0.6	5					0.6	5							0.6	5									
Moraceae	<i>Ficus hispida</i>	對葉榕																																										
Ulmaceae	<i>Celtis sinensis</i>	朴樹																																										
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹	1	5	1	3		1	5	1	3			1.2	5	1	3			1.2	5	1	3			1.2	5							1.2	5									
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐				1.5	5					1.5	5							1.5	5					1.5	5					1.5	5			1.5	10							
Araceae	<i>Alocasia odora</i>	海芋																																										
Araceae	<i>Colocasia esculenta</i>	芋	0.5	5	1.2	5		0.5	5	1.2	5			0.5	5	1.2	5			0.5	5	1.2	5			0.5	5					0.5	5			0.5	5							
Myrtaceae	<i>Cleistocalyx operculatus</i>	水翁																																										
Athyriaceae	<i>Callipteris esculenta</i>	菜蕨																																										
Poaceae	<i>Phragmites karka</i>	卡開蘆	1.5	7				1.5	7					1.5	7					1.5	7					1.5	5					1.5	5			1.5	5							
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																																										
Equisetaceae	<i>Equisetum debile</i>	籐管草	0.3	5				0.3	5					0.3	5					0.3	5					0.3	5					0.3	5			0.3	5							
Asteraceae	<i>Ageratum conyzoides</i>	勝紅菊																																										
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.4	10	0.2	25	0.4	10	0.2	25	0.4	35	0.4	10	0.3	25	40	0	0.4	8	0.3	20	40	0	0.4	5	0.3	5	0.4	2	0.4	5	0.3	5	0.4	2	0.4	5	0.3	5	0.4	5		
Solanaceae	<i>Solanum nigrum</i>	龍葵																																										
Euphorbiaceae	<i>Mallotus paniculatus</i>	白楸																																										
Poaceae	<i>Eleusine indica</i>	牛筋草																																										
Poaceae	<i>Pennisetum purpureum</i>	象草																																										
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊																																										
Asteraceae	<i>Bidens alba</i>	白花鬼針草	0.7	5			0.5	5	0.7	5			0.5	5	0.7	5			0.5	5	0.7	5			0.5	5	0.7	5			0.5	5	0.7	5			0.5	8						
Poaceae	<i>Panicum repens</i>	枯骨草	0.4	5				0.4	5					0.4	5					0.4	5					0.4	5					0.4	5			0.4	5							
Poaceae	<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																																										
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草		2	10		2	20		2	10		2	20		2	10		2	8		2	10			2	3					2	3											
Poaceae	<i>Brachiaria mutica</i>	巴拉草		1.2	2		0.5	15		1.2	2		0.5	15		1.2	2		0.5	10					1.2	2				1.2	2					1.2	2							
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																																										
Malvaceae	<i>Hibiscus rosa-sinensis</i>	大紅花																																										
Cyperaceae	<i>Cyperus sp.</i>	莎草		0.2	2				0.2	2				0.2	2					0.2	2																							
Balsaminaceae	<i>Impatiens walleriana</i>	非洲鳳仙																																										
Amaranthaceae	<i>Celosia argentea</i>	青葙	1.7	5				1.7	5					1.7	5					1.7	5					1.7	5							1.7	5			1.7	5					
Bare Gound				48		53		20		48		53		20		48		53		55		50		60		70		55		93		85		55		93		85		55		93		72

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

P1 – Point count location 1; P2 – Point count location 2

Table 4.2. 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	Post construction monitoring						Post construction monitoring						Post construction monitoring					
			Aug-16						Sep-16						Oct-16					
			Reference		T1		T2		Reference		T1		T2		Reference		T1		T2	
Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.6	5					0.5	10					0.5	10				
Moraceae	<i>Ficus hispida</i>	對葉榕																		
Ulmaceae	<i>Celtis sinensis</i>	朴樹																		
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹	1.2	5					1.5	10					1.5	10				
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐					1.5	10					1.5	10					1.6	10
Araceae	<i>Alocasia odora</i>	海芋							0.4	5					0.4	5				
Araceae	<i>Colocasia esculenta</i>	芋	0.5	5					0.5	5					0.5	5				
Myrtaceae	<i>Cleistocalyx operculatus</i>	水翁																		
Athyriaceae	<i>Callipteris esculenta</i>	菜蕨																		
Poaceae	<i>Phragmites karka</i>	卡開蘆	1.5	5					1.6	5					1.6	5				
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																		
Equisetaceae	<i>Equisetum debile</i>	筆管草	0.3	5					0.5	5					0.5	5				
Asteraceae	<i>Ageratum conyzoides</i>	勝紅薊																		
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.4	5	0.3	5	0.4	5	0.4	10	0.4	10	0.4	10	0.5	10	0.3	10	0.3	10
Solanaceae	<i>Solanum nigrum</i>	龍葵																		
Euphorbiaceae	<i>Mallotus paniculatus</i>	白楸																		
Poaceae	<i>Eleusine indica</i>	牛筋草																		
Poaceae	<i>Pennisetum purpureum</i>	象草																		
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊																		
Asteraceae	<i>Bidens alba</i>	白花鬼針草	0.7	5			0.5	8	0.7	5			0.5	8	0.8	5			0.5	8
Poaceae	<i>Panicum repens</i>	枯骨草	0.4	5					0.4	5					0.4	5				
Poaceae	<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																		
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草					2	5					1.6	5					1.6	5
Poaceae	<i>Brachiaria mutica</i>	巴拉草			1.2	2					1.2	5	1.3	5			1.2	5	1.3	5
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																		
Malvaceae	<i>Hibiscus rosa-sinensis</i>	大紅花																		
Cyperaceae	<i>Cyperus sp.</i>	莎草																		
Balsaminaceae	<i>Impatiens walleriana</i>	非洲鳳仙																		
Amaranthaceae	<i>Celosia argentea</i>	青葙	1.7	5					1.5	5					1.5	5				
Bare Gound				55		93		72		35		85		62		35		85		62

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

P1 – Point count location 1; P2 – Point count location 2







Table 4.4. Odonate species recorded at the UpperTai Po River

Species	Common name	Chinese name	Status	Commonness	Post construction monitoring																	
					Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16	Aug-16	Sep-16	Oct-16	
<i>Aethriamanta brevipennis brevipennis</i>	Elusive Adjutant	短腹異蜻	NP	U													+	+	+			
<i>Macrodiptax cora</i>	Coastal Glider	高翔濛蜻	NP	C	+	+																
<i>Ceriatagrion auranticum ryukyuanum</i>	Orange-tailed Sprite	琉球橘黃蟬	NP	VC	+	+	+	+									+	+	+	+		
<i>Copera marginipes</i>	Yellow Featherlegs	黃狹扇蟬	NP	VC	+	+	+	+														
<i>Crocothemis servilia servilia</i>	Crimson Darter	紅蜻	NP	VC		+	+	+	+	+									+	+	+	+
<i>Euphaea decorata</i>	Black-banded Gossamerwing	方帶幽蟬	NP	VC																		
<i>Neurobasis chinensis</i>	Chinese Greenwing	華麗色蟬	NP	C			+	+	+						+	+	+	+	+	+	+	
<i>Neurothemis fulvia</i>	Russet Percher	網脈蜻	NP	VC		+	+	+											+	+	+	+
<i>Orthetrum chrysis</i>	Red-faced Skimmer	華麗灰蜻	NP	VC			+	+	+	+					+	+	+	+	+	+	+	+
<i>Orthetrum glaucum</i>	Common blue skimmer	黑尾灰蜻	NP	VC					+	+												
<i>Orthetrum luconicum</i>	Marsh Skimmer	呂宋灰蜻	NP	VC	+	+	+												+	+	+	+
<i>Orthetrum pruinosum neglectum</i>	Common Red Skimmer	赤褐灰蜻	NP	VC	+	+										+	+	+	+	+		
<i>Palpopleura sexmaculata sexmaculata</i>	Asian Widow	六斑曲緣蜻	NP	C	+	+																
<i>Pantala flavescens</i>	Wandering Glider	黃蜻	NP	VC					+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Paracercion calamarum dyeri</i>	Dusky Lilysquatter	蒼尾蟬	P, LC	C																		
<i>Prodasineura autumnalis</i>	Black Threadtail	烏齒原蟬	NP	VC			+															
<i>Pseudagrion rubriceps rubriceps</i>	Orange-faced Sprite	丹頂斑蟬	NP	C	+	+																
<i>Rhinocypha perforata</i>	Common Blue Jewel	三斑鼻蟬	NP	VC	+	+	+	+	+								+	+	+	+	+	+
<i>Trithemis aurora</i>	Crimson dropwing	曉褐蜻	NP	VC					+	+						+	+	+	+	+	+	+
<i>Trithemis festiva</i>	Indigo Dropwing	慶褐蜻	NP	VC	+	+	+	+	+					+		+	+	+	+	+	+	+
<i>Urothemis signata signata</i>	Scarlet Basket	赤斑曲鈞脈蜻	NP	C																		
<i>Zygonyx iris insignis</i>	Emerald Cascader	彩虹蜻	P	P,PGC																		
No of Species					9	11	10	8	8	5	1	2	1	2	7	10	11	11	10	8	7	

Note: NP – Not protected in Hong Kong P- Protected in Hong Kong  
“VC” – Very Common; “UC” – Uncommon; “C” - Common  
“+” – Species exists in the study area  
“++” – Species common in the study area  
“+++” – Species abundance in the study area  
Commonness and status were decided according to AFCDB biodiversity website (www.hkbiobiodiversity.net)  
LC- Local Concern - Fellowes *et al* (2002)  
PGC - Potential Global Concern - Fellowes *et al* (2002)

Table 4.5 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		Impact monitoring		Impact monitoring		Impact monitoring		Impact monitoring		Impact monitoring		Impact monitoring		Impact monitoring		Post construction monitoring		Post construction monitoring		Post construction monitoring		Post construction monitoring		Post construction monitoring		Post construction monitoring		Post construction monitoring		Post construction monitoring																		
			Oct-07		Jan-09		Jul-09		Jan-10		Jul-10		Jan-11		Jul-11		Jan-12		Jul-12		Mar-13		Jul-13		Jan-14		Feb-14		Mar-14		Apr-14		May-14		Jun-14		Jul-14		Aug-14																				
			T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2																			
<b>Mollusca</b>																																																											
<i>Biomphalaria sp.</i>		NP	VC	+	+				+	+									+	+																																							
<i>Brotia hainanensis</i>		NP	VC	++	+	++			++	+	++	+	++	+	++	+	++	+	+																																								
<i>Melanoides tuberculata</i>	瘤唇里螺	NP	VC						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+													
<i>Physella acuta</i>	尖唇蚌螺	NP	VC																																																								
<i>Pomacea canaliculata</i>	福寿螺	NP	VC						+	+	++	+	+	+	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+													
<i>Radix plicatulus</i>	羅白螺	NP	VC																																																								
<i>Sinotia quadrata</i>	田螺	NP	VC																																																								
<b>Insects</b>																																																											
<i>Anisocentropus sp.</i>		NP	VC																																																								
<i>Arctopora sp.</i>		NP	VC																																																								
<i>Aulocodes sp.</i>		NP	VC																																																								
<i>Baetis sp.</i>		NP	VC						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+									
<i>Chironomus sp.</i>	蠓幼虫	NP	VC						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+								
<i>Ephemera sp.</i>		NP	VC																																																								
<i>Indobaetis sp.</i>		NP	VC						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+									
<i>Mnais sp.</i>		NP	VC						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+								
<i>Odonate Larvae</i>		NP	VC																																																								
<i>Orthetrum sp.</i>		NP	VC						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+							
<i>Perla sp.</i>		NP	VC																																																								
<i>Rhaphium sp.</i>		NP	VC																																																								
<i>Tipulidae spp.</i>		NP	VC						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+								
<b>Crustacea</b>																																																											
<i>Caridina cantonensis</i>	廣東米蝦	NP	VC						+	+	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+							
<i>Cryptotamon anacoluthon</i>	蟹刺溪蟹	NP	C						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+							
<i>Macrobrachium hainanense</i>	海南沼蝦	NP	VC						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+						
No of Species				5	6	9	0	5	11	2	5	11	12	6	11	16	8	10	6	5	12	4	4	10	6	4	14	7	1	14	2	0	13	4	1	13	7	4	14	10	8	17	11	9	18	13	9	15	9	7	15	9	5	18	10	6	18	9	8

Note:  
 "NP" – Not protected in Hong Kong  
 "I" - Listed in Wild Animals Protection Ordinance (Cap. 170) and listed as "Near Threatened" in IUCN Red List Status  
 "VC" – Very Common; "UC" – Uncommon; "C" - Common  
 "+" – Species exists in the study area  
 "+" – Species common in the study area  
 "++" – Species abundance in the study area  
 - Reference point was the sampling location outside the works area used to compare the with the data within works area.



Table 4.5 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	Post construction monitoring															Post construction monitoring															Post construction monitoring														
			Sep-14			Oct-14			Nov-14			Dec-14			Jan-15			Feb-15			Mar-15			Apr-15			May-15			Jun-15			Jul-15			Aug-15			Sep-15			Oct-15			Nov-15		
			Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2						
<b>Mollusca</b>																																															
<i>Biomphalaria sp.</i>		NP	VC	+			+				+				+				+	+	+				+			+			+			+			+			+			+				
<i>Brodiaea hainanensis</i>		NP	VC	+	+	+		+			+	+			+	+			+	+	+			+	+			+	+			+	+			+	+			+	+			+	+		
<i>Melanoides tuberculata</i>	瘤腹田螺	NP	VC	+							+				+				+					+				+			+			+			+			+			+				
<i>Physella acuta</i>	尖唇蚌	NP	VC	+			+				+				+				+					+				+			+			+			+			+			+				
<i>Pomacea canaliculata</i>	福寿螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Radix plicatulus</i>	羅白螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Sinotia quadrata</i>	田螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<b>Insects</b>																																															
<i>Anisocentropus sp.</i>		NP	VC	+			+				+				+				+				+				+			+			+			+			+			+			+		
<i>Arctopora sp.</i>		NP	VC	+			+				+				+				+				+				+			+			+			+			+			+			+		
<i>Aulocodes sp.</i>		NP	VC	+							+				+				+				+				+			+			+			+			+			+			+		
<i>Baetis sp.</i>		NP	VC	+	+		+	+			+	+			+	+			+	+	+	+			+	+			+	+			+	+			+	+			+	+			+	+	
<i>Chironomus sp.</i>	孳幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Ephemera sp.</i>		NP	VC	+	+		+	+			+	+			+	+			+	+	+			+	+			+	+			+	+			+	+			+	+			+	+		
<i>Endopterygota sp.</i>		NP	VC	+	+		+	+			+	+			+	+			+	+	+			+	+			+	+			+	+			+	+			+	+			+	+		
<i>Mnais sp.</i>		NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Odonate Larvae		NP	VC	+							+				+				+				+				+			+			+			+			+			+			+		
<i>Orthetrum sp.</i>		NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Perla sp.</i>		NP	VC	+							+				+				+				+				+			+			+			+			+			+			+		
<i>Rhaphium sp.</i>		NP	VC	+			+												+								+											+									
<i>Tipulidae spp.</i>		NP	VC																																												
<b>Crustacea</b>																																															
<i>Caridina cantonensis</i>	廣東米蝦	NP	VC	+	+	+	+	++	+	+	++	+	+	++	+	+	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++		
<i>Cryptotamox anacoluthon</i>	蟹類幼虫	NP	C	+			+				+				+				++	++	+	+	++	++		+	+	++	++			++	++			++	++			++	++			++	++		
<i>Macrobrachium hainanense</i>	海南沼蝦	NP	VC	+	+		+	+			+	+			+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
No of Species				19	12	8	19	13	7	19	11	6	16	10	5	19	10	5	18	7	4	19	7	5	20	7	4	15	7	4	15	7	4	16	6	4	16	6	3	16	6	3	16	6	3		

Note:  
"NP" - Not protected in Hong Kong  
"L" - Listed in Wild Animals Protection Ordinance (Cap. 170) and I listed as "Near Threatened" in IUCN Red List Status  
"VC" - Very Common; "UC" - Uncommon; "C" - Common  
"+", "++", "+++" - Species exists in the study area  
"-", "++", "+++)" - Species common in the study area  
"-", "++", "+++)" - Species abundance in the study area  
- Reference point was the sampling location outside the works area used to compare the with the data within works area.

Table 4.5 Aquatic Macro invertebrates recorded at Upper Tai Po River (T1- Upper stream sampling site and T2- Lower stream sampling site )

		Post construction monitoring																																				
Species	Chinese name	Sampling point	Dec-15			Jan-16			Feb-16			Mar-16			Apr-16			May-16			Jun-16			Jul-16			Aug-16			Sep-16			Oct-16					
			Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Referenc	T1	T2	Referenc	T1	T2	Referenc	T1	T2	Referenc	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2						
<b>Mollusca</b>																																						
<i>Biomphalaria sp.</i>	...	NP	VC	+			+			+			+			+			+			+			+			+			+			+				
<i>Brotia hainanensis</i>	...	NP	VC	+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+			
<i>Melanoides tuberculata</i>	福壽螺	NP	VC	+			+			+			+			+			+			+			+			+			+			+				
<i>Physella acuta</i>	小陸鮮螺	NP	VC																																			
<i>Pomacea canaliculata</i>	福壽螺	NP	VC	++	+	+	++	+	+	++	+	+	++	+	+	++	+	+	++	+	+	++	+	+	++	+	+	++	+	+	++	+	+	++	+	+		
<i>Radix plicatulus</i>	羅白螺	NP	VC	+			+			+			+			+			+			+			+			+			+			+				
<i>Sinotia quadrata</i>	田螺	NP	VC	+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+			
<b>Insects</b>																																						
<i>Anisocentropus sp.</i>	...	NP	VC	+			+			+			+			+			+			+			+			+			+			+				
<i>Arctopora sp.</i>	...	NP	VC	+			+			+			+			+			+			+			+			+			+			+				
<i>Aulocodes sp.</i>	...	NP	VC																																			
<i>Baetis sp.</i>	...	NP	VC																																			
<i>Chironomus sp.</i>	孑孓幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Ephemera sp.</i>	...	NP	VC																																			
<i>Endobaetis sp.</i>	...	NP	VC	+			+			+			+			+			+			+			+			+			+			+				
<i>Mnais sp.</i>	...	NP	VC	+			+			+			+			+			+			+			+			+			+			+				
Odonate Larvae	...	NP	VC	+			+			+			+			+			+			+			+			+			+			+				
<i>Orthetrum sp.</i>	...	NP	VC	+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+			
<i>Perla sp.</i>	...	NP	VC	+			+			+			+			+			+			+			+			+			+			+				
<i>Rhaphium sp.</i>	...	NP	VC																																			
<i>Tipulidae spp.</i>	...	NP	VC																																			
<b>Crustacea</b>																																						
<i>Caridina cantonensis</i>	廣東米蝦	NP	VC	++	+		++	+		++	+		++	+		++	+		++	+		++	+		++	+		++	+		++	+		++	+			
<i>Cryptopotamon anacoluthon</i>	擬刺溪蟹	NP	C																																			
<i>Macrobrachium hainanense</i>	海南沼蝦	NP	VC	+			+			+			+			+			+			+			+			+			+			+				
No of Species				16	6	3	16	6	3	16	6	3	16	6	3	15	6	3	15	6	3	15	6	3	15	6	3	17	6	3	17	6	3	17	6	3		

Note:  
 "NP" - Not protected in Hong Kong  
 "I" - Listed in Wild Animals Protection Ordinance (Cap. 170) and listed as "Near Threatened" in IUCN Red List Status  
 "VC" - Very Common; "UC" - Uncommon; "C" - Common  
 "+" - Species exists in the study area  
 "++" - Species common in the study area  
 "+++ " - Species abundance in the study area  
 - Reference point was the sampling location outside the works area used to compare the with the data within works area.







Table 4.6 Fish species and Hong Kong Newt recorded at Upper Tai Po River (T1- Upper stream sampling site and T2 - Lower stream sampling

Species		Status	Commonness	Post construction monitoring									Post construction monitoring									Post construction monitoring					
				Mar-16			Apr-16			May-16			Jun-16			Jul-16			Aug-16			Sep-16			Oct-16		
				T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	
<i>Cyprinus carpio var. viridiviolaceus</i>	錦鯉	NP	C																								
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+		+	+		+																		
<i>Glyptothorax pallozonum</i>	白線紋胸鮡	NP	R																								
<i>Limiparhomaloptera disparis</i>	擬平鰻	NP	C			+			+																		
<i>Misgurnus anguillicaudatus</i>	泥鰻	NP	C																								
<i>Oreochromis niloticus</i>	尼羅口鯽非鯽	NP	C			+			+																		
<i>Parazacco spilurus</i>	異鱮	V and	C	+		+	+		+	+																	
<i>Poecilia reticulata</i>	孔雀花魚將	NP	C																								
<i>Pseudobagrus trilineatus</i>	三線擬鱧	NP,GC	R						+																		
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰻	NP	C			+			+																		
<i>Pterocryptis cochinchinensis</i>	越南隱鰭鮠	NP	C			+			+																		
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+		+	+		+																		
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Schistura fasciolata</i>	橫紋南鰻	NP	C			+			+																		
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C			+			+																		
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C																								
		2x2m fish		20	5	40	15	5	25	10	5	25	10	5	20	7	2	22	5	2	22	2	2	25	2	2	
		No of Speices		4	1	11	4	1	12	2	1	11	2	1	12	2	1	12	2	1	12	1	1	12	1	1	
<b>Amphibian</b>																											
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P	UC			+			+																		

Note: NP – Not protected in Hong Kong; P - Protected in Hong Kong

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

“+” – Species exists in the study area

“++” – Species common in the study area

“+++” – Species abundance in the study area

V – Listed as vulnerable in China Fish Red Data Book

GC- Global Concern - Fellowes *et al* (2002)

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

Table 4.7 Abiotic data for Upper Tai Po River (T1- Upper stream sampling site and T2- Lower stream sampling site )

Parameters/ Date	Baseline survey		Impact monitoring												Impact monitoring						
	Oct-07		Jan-09		Jul-09		Jan-10		Jul-10		Jan-11		Jul-11		Jan-12		Jul-12		Mar-13		Jul-13
Replicate	T1	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
DO (mg/L)	8.2	9	4	6.3	6	9.4	8.8	9	6.5	10.5	9.8	9	8.2	8.8	8.4	7.6	7.8	7.9	8.1	8	7.8
pH	6.9	7.18	6.86	7.28	6.96	8.2	8.5	7.3	7.2	6.9	7.1	7.1	7.3	6.8	7.6	6.9	7.8	6.8	7.5	7.2	7.6
Nitrate (mg N/L)	0.39	0.1	1.3	0.07	1.32	0.12	0.71	0.1	0.5	0.1	0.5	0.1	0.5	<0.1	0.5	0.29	0.26	0.15	0.22	0.21	0.29
Ammonia (mg/L)	<0.01	PO4-P (µg P/L): <100		0.01	0.22	<0.01	0.2	0.1	0.2	0.01	0.3	0.01	0.2	<0.01	0.3	<0.01	0.03	<0.01	0.02	<0.01	0.04
Salinity (ppt)	<0.1	<0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.01	0.01	0.02	0.01	0.01
Conductivity (mS/cm)	40	40	190	34	118	42	72	49	43	50	60	50	60	65	74	52	54	54	58	44	42
BOD (mg/L)	<2	<2	12	<2	<2	<2	2	<2	2	2	<2	<2	2	<2	3	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.2		
Water flow at riffle (m/s)	0.2-0.5		0.2-0.5		0.2-0.5		0.2-0.5		0.2-0.5		0.2-0.5		0.2-0.5		0.2-0.5		0.2-0.5		0.2-0.5		
Sand (%)	15	15		15	25	15	25	15	25	15	25	15	15	15	15	15	15	0	0	0	0
Stone (%)	80	80		80	70	80	70	80	70	80	70	80	70	80	70	80	70	40	20	40	20
Mud (%)	5	5		5	5	5	5	5	5	5	5	5	5	5	5	5	5	0	0	0	0
Concrete(%)	0	0	0	0	0	0	0	0	0	0	0	0	10	0	10	0	10	60	80	60	80







