

Issue No. : Issue 1
Issue Date : December 2017
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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. 45)**

Prepared By:

ALLIED ENVIRONMENTAL CONSULTANTS LTD.

For:

Drainage Services Department

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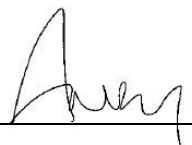
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**Agreement No. CE65/2013(EP)
Post-Construction Ecological Monitoring of River
Improvement Work in Upper Lam Tsuen River, She Shan
River and Upper Tai Po River – Investigation**

**Post-Construction Ecological Monitoring Report (No. 45)
Upper Lam Tsuen River**

September 2017



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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. 45)

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 45 post-construction ecological monitoring report for the project conducted **on 14th of September 2017**. 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 **14th of September 2017**;
- 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 phenological appearance;
- The species richness of odonata was lower than the record of last month;
- Bird diversity and abundance was in natural fluctuation;
- *Paramesotriton hongkongensis* adult was recorded in the potential habitats along the Lam Tsuen River; and
- Fish abundance increased in this month.

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) 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), 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) 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) 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 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 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 in this month. 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. Common 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, 16 species of birds were recorded during the bird survey and 4 of the total were wetland dependent species including *Egretta garzetta* (Photo 4), *Ardeola bacchus* (Photo 5), *Motacilla alba* and *Motacilla cinerea* (Photo 6). 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 classified as Regional Concern by Fellowes *et al.* (2002). Apart from species mentioned 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, 14 odonata species were recorded during the survey and the recorded species were common species and widely distributed in Hong Kong. The result obtained this month is similar to previous surveys conducted in approximate period of last year. Species richness in this month decreased in comparison with 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 in this month was due to seasonality. It is expected that number of odonata will decrease in coming 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 7). The river benthic fauna collected was mainly comprised of insects, molluscs and crustaceans (Photos 9-10). *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 7) at Upper Lam Tsuen River. Adult *Paramesotriton hongkongensis* were captured at the Lam Tsuen River where the habitat consisted of riparian vegetation during the survey (Photo 8). 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 increased in this month. 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 in September 2017 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. In addition to *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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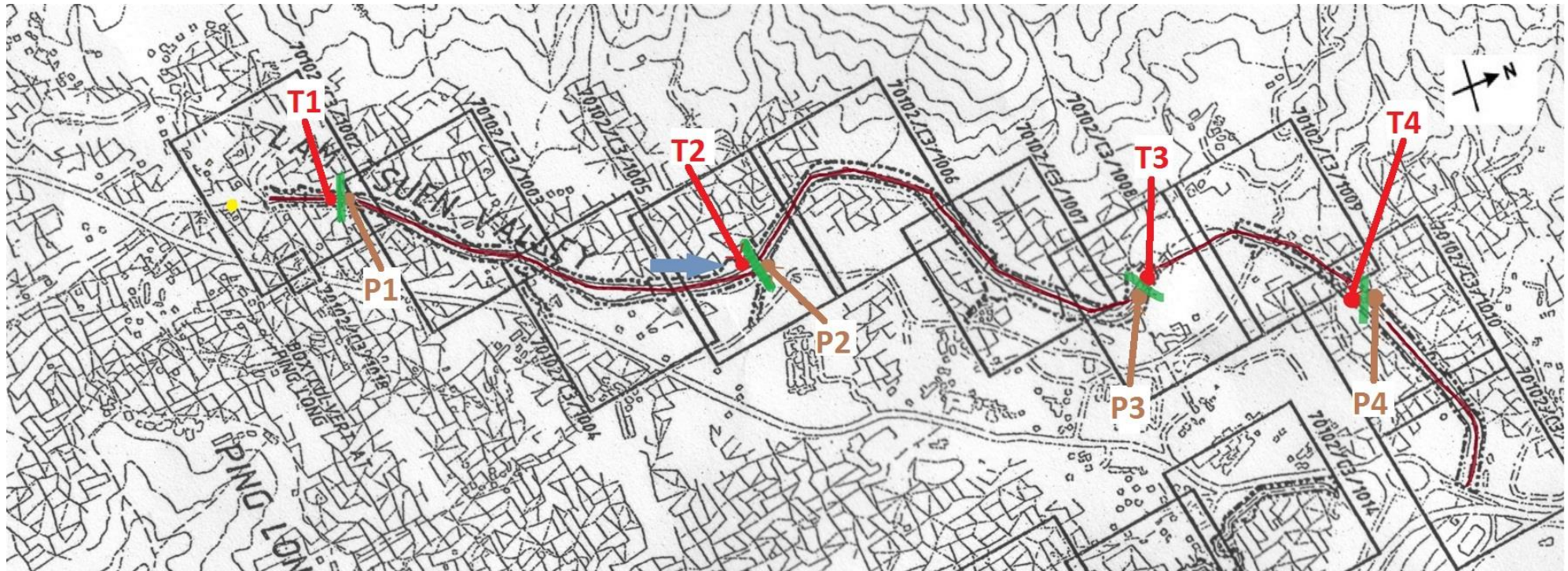
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FIGURES



Legend

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

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 – *Ardeola bacchus*

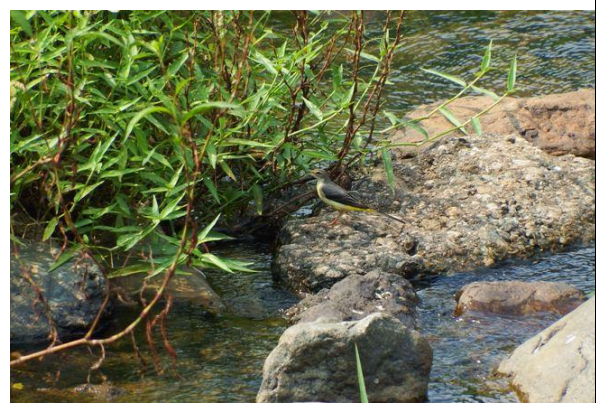


Photo 6 : Avifauna – *Motacilla cinerea*



Photo 7: Kick Sampling



Photo 8. Hong Kong Newt



Photo 9. Aquatic sample



Photo 10. Aquatic sample

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				Impact monitoring				Impact monitoring															
			Stream				Stream				Jan-09				Jan-09				Jul-09				Jan-10				Jul-10				Jul-10											
			Jul-08		P4		Aug-08		P4		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)	%	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											0.5	50							0.5	5					0.5	5								
Poaceae	<i>Pennisetum purpureum</i>	象草	3	20			3	20																																		
Araceae	<i>Alocasia odora</i>	海芋	1	10			1	10							0.3	<1																										
Caesalpiniaceae	<i>Cassia alata</i>	翅荳決明			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									0.5	20			1.2	5	1	40	0.8	40	0.9	50	1	15			0.8	20	0.9	30	1	60	1.5	30
Moraceae	<i>Ficus hispida</i>	對葉榕							1.5	5									1.5	5	4	5							4	5	0.5	30					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	0.3	25					0.5	20	0.3	5				
Musaceae	<i>Musa paradisiaca</i>	大蕉											3	5																												
Ulmaceae	<i>Celtis sinensis</i>	朴樹			6	10			6	10																																
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																																								
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐																																								
Asteraceae	<i>Wedelia chinensis</i>	蟛蜞菊																																								
Commelinaceae	<i>Commelina diffusa</i>	節節草																																								
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>	馬纒丹																																								
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																																										

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)

		Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring												
		Sep-15				Oct-15				Nov-15				Dec-15				Jan-16				Feb-16												
Family	Species	Chinese name	T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4	
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)	%	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	0.5	10				
Poaceae	<i>Pennisetum purpureum</i>	象草																																
Araceae	<i>Alocasia odora</i>	海芋																																
Caesalpiniaceae	<i>Cassia alata</i>	翅葉決明																																
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	0.8	5	1.5	35	1.2	60		
Moraceae	<i>Ficus hispida</i>	對葉榕																																
Asteraceae	<i>Mikania micrantha</i>	薹甘菊	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	0.3	5	0.2	5	0.3	5		
Musaceae	<i>Musa paradisiaca</i>	大蕉																																
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Asteraceae	<i>Bidens alba</i>	白花鬼針草				0.4	5									0.4	10													0.4	10			
Poaceae	<i>Coix lacryma-jobi</i>	蒼耳								1	5										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									1	10		
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐																																
Asteraceae	<i>Wedelia chinensis</i>	錦雞菊	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	0.3	10	0.2	20	0.2	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>	馬纒丹																																
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	
Amaranthaceae	<i>Celosia argentea</i>	青葙																												0.4	5			
Acanthaceae	<i>Dicliptera chinensis</i>	狗肝菜								0.3	20										0.3	20								0.3	20			
Bare Ground			15	30	13	55	30	45	20	55	30	40	20	45	30	40	20	45	30	40	20	45	30	40	20	45	30	40	20	45	30	40	20	

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				Post construction monitoring																			
			Mar-16				Apr-16				May-16				Jun-16				Jul-16				Aug-16																			
			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												
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																																								
Fabaceae	<i>Pueraria lobata</i>	野葛	0.5	10																																						
Poaceae	<i>Pennisetum purpureum</i>	象草																																								
Araceae	<i>Alocasia odora</i>	海芋																																								
Caesalpiniaceae	<i>Cassia alata</i>	翅葉決明																																								
Magnoliaceae	<i>Michelia alba</i>	白蘭																																								
Poaceae	<i>Brachiaria mutica</i>	巴拉草	0.4	10	0.4	25	0.4	35	0.4	15	0.4	8	0.4	25	0.4	35	0.4	10	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>	蕺甘菊	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	0.3	5	0.4	5	0.3	5	0.4	5	0.3	5	0.2	5	0.3	5	0.4	5	0.3	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	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																																								
Poaceae	<i>Miscanthus floridulus</i>	五節芒	1	10							1	8																														
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐																																								
Asteraceae	<i>Wedelia chinensis</i>	錦雞菊	0.4	5							0.4	5																														
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.3	10	0.2	20	0.2	5	0.4	25	0.3	8	0.2	20	0.2	5	0.4	20	0.3	7	0.2	15	0.2	5	0.4	15	0.3	7	0.2	15	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>	馬纒丹																																								
Mimosaceae	<i>Leucaena leucocephala</i>	銀合歡																																								
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜				0.2	5								0.2	5																										
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	10														
Amaranthaceae	<i>Celosia argentea</i>	青葙			0.4	5								0.4	5												0.4	5														
Acanthaceae	<i>Dicliptera chinensis</i>	狗仔菜	0.3	20							0.3	15											0.3	5											0.3	5						
Bare Ground			25		50		45		45		38		50		45		55		54		60		60		65		60		65		70		70		51		65		60			

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

(Contiuous) 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							
			Stream								Stream								Stream								Stream								Stream							
			Sep-16								Oct-16								Nov-16								Dec-16								Jan-17							
Transect	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										
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)	%									
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																																								
Fabaceae	<i>Pueraria lobata</i>	野葛	0.5	5				0.4	5	0.5	5					0.4	5	0.5	5								0.4	5	0.5	5			0.4	5								
Poaceae	<i>Pennisetum purpureum</i>	象草																																								
Araceae	<i>Alocasia odora</i>	海芋	0.3	5	0.2	5	0.3	5	0.3	5	0.3	5	0.3	5	0.3	5	0.4	5	0.2	5	0.3	5	0.4	5	0.4	5	0.2	5	0.3	5	0.4	5	0.4	5								
Caesalpiniaceae	<i>Cassia alata</i>	翅葉決明																																								
Magnoliaceae	<i>Michelia alba</i>	白蘭																																								
Poaceae	<i>Brachiaria mutica</i>	巴拉草	0.5	10	0.5	20	0.5	25	0.5	5	0.5	10	0.5	20	0.5	25	0.5	5	0.5	10	0.5	20	0.5	25	0.5	5	0.5	10	0.5	20	0.5	25	0.5	5								
Moraceae	<i>Ficus hispida</i>	對葉榕																																								
Asteraceae	<i>Mikania micrantha</i>	蕺甘菊	0.3	5	0.3	5	0.3	10	0.4	5	0.4	5	0.4	10	0.4	5	0.4	5	0.4	5	0.4	10	0.4	5	0.4	5	0.4	5	0.4	5	0.4	5	0.4	10	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>	芋麻																																								
Asteraceae	<i>Bidens alba</i>	白花鬼針草			0.3	5	0.4	5										0.5	5	0.4	5												0.5	5								
Poaceae	<i>Coix lacryma-jobi</i>	薏苡	1	5						1	5							1.1	5														1.1	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							1.1	7														1.1	7								
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐																																								
Asteraceae	<i>Wedelia chinensis</i>	密蟻菊	0.4	5						0.4	5							0.4	5													0.4	5									
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.3	10	0.2	15	0.2	10	0.4	15	0.3	10	0.2	15	0.2	10	0.4	15	0.3	10	0.2	15	0.2	10	0.4	15	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>	馬纒丹																																								
Mimosaceae	<i>Leucaena leucocephala</i>	銀合歡																																								
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜					0.2	5																																		
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																																								
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草				1.5	10																											1.5	10							
Amaranthaceae	<i>Celosia argentea</i>	青葙				0.4	5																											0.4	5							
Acanthaceae	<i>Dicliptera chinensis</i>	狗肝菜	0.3	5						0.3	5																						0.3	5								
Bare Ground				43		50		45		60		43		50		45		65		43		50		45		65		43		50		45		65								

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				Post construction monitoring																											
			Feb-17				Mar-17				Apr-17				May-17				Jun-17				Jul-17																											
			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																				
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	0.4	5	0.2	5	0.3	5	0.4	5	0.4	5	0.2	10	0.3	10	0.4	5	0.4	5	0.2	10	0.3	10	0.4	5	0.4	5	0.2	5	0.3	5	0.4	5	0.4	5	0.3	5	0.4	5	0.5	5								
Caesalpiniaceae	<i>Cassia alata</i>	翅葉決明																																																
Magnoliaceae	<i>Michelia alba</i>	白蘭																																																
Poaceae	<i>Brachiaria mutica</i>	巴拉草	0.5	10	0.5	20	0.6	25	0.5	5	0.6	10	0.6	25	0.6	25	0.6	10	0.5	10	0.7	35	0.7	35	0.5	10	0.6	10	0.8	35	0.7	35	0.7	10	0.6	5	0.8	20	0.7	20	0.7	10	0.6	5	0.8	20	0.7	20	0.7	10
Moraceae	<i>Ficus hispida</i>	對葉榕																																																
Asteraceae	<i>Mikania micrantha</i>	蕺甘菊	0.4	5	0.5	5	0.5	10	0.5	5	0.4	5	0.5	5	0.5	10	0.5	5	0.4	5	0.5	5	0.5	10	0.5	5	0.4	5	0.6	5	0.6	10	0.6	5	0.4	5	0.6	5	0.6	10	0.6	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>	芋麻																																																
Asteraceae	<i>Bidens alba</i>	白花鬼針草			0.5	5							0.5	10	0.4	10					0.5	10	0.4	10					0.5	10	0.4	10					0.5	8	0.4	5										
Poaceae	<i>Coix lacryma-jobi</i>	薏苡	1.1	5							1.1	5							1.1	5							1.3	5							1.3	5														
Solanaceae	<i>Solanum nigrum</i>	龍葵																																																
Cyperaceae	<i>Cyperus flabelliformis</i>	風車草																																																
Poaceae	<i>Miscanthus floridulus</i>	五節芒	1.1	7							1.1	7							1.1	7							1.3	7							1.3	7														
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐																																																
Asteraceae	<i>Wedelia chinensis</i>	樹蜆菊	0.4	5							0.4	5							0.4	5							0.4	5							0.4	5														
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.3	10	0.2	15	0.2	10	0.4	15	0.3	10	0.2	15	0.2	10	0.4	15	0.3	10	0.3	15	0.3	10	0.4	15	0.3	10	0.3	15	0.3	10	0.3	15	0.4	15	0.3	10	0.5	15	0.5	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>	馬纒丹																																																
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			1.5	10							1.5	10											1.5	10							1.5	10																
Amaranthaceae	<i>Celosia argentea</i>	青葙			0.4	5							0.4	5											0.4	5							0.4	5																
Acanthaceae	<i>Dicliptera chinensis</i>	狗肝菜	0.3	5							0.3	5							0.3	5							0.3	5							0.3	5														
Bare Ground				43		50		45		65		43		35		35		60		43		25		25		60		43		25		25		60		48		47		50		60								

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

(Contiuous) 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											
			Stream		Aug-17				Sep-17				Stream		Aug-17				Sep-17			
			Transect		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					0.5	5	0.6	5						0.6	5			
Poaceae	<i>Pennisetum purpureum</i>	象草																				
Araceae	<i>Alocasia odora</i>	海芋	0.4	5	0.3	5	0.4	5	0.5	5	0.5	5	0.3	5	0.5	5	0.6	5				
Caesalpiniaceae	<i>Cassia alata</i>	翅葉決明																				
Magnoliaceae	<i>Michelia alba</i>	白蘭																				
Poaceae	<i>Brachiaria mutica</i>	巴拉草	0.7	5	0.8	20	0.7	20	0.7	10	0.7	5	0.8	20	0.7	20	0.7	10				
Moraceae	<i>Ficus hispida</i>	對葉榕																				
Asteraceae	<i>Mikania micrantha</i>	蕺甘菊	0.5	5	0.6	5	0.6	10	0.6	5	0.5	5	0.6	5	0.7	10	0.6	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			0.5	8	0.4	5					0.5	8	0.5	5						
Poaceae	<i>Coix lacryma-jobi</i>	薏苡	1.3	5							1.3	5										
Solanaceae	<i>Solanum nigrum</i>	龍葵																				
Cyperaceae	<i>Cyperus flabelliformis</i>	風車草																				
Poaceae	<i>Miscanthus floridulus</i>	五節芒	1.3	7							1.3	7										
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐																				
Asteraceae	<i>Wedelia chinensis</i>	密蟻菊	0.4	5							0.4	5										
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.3	10	0.5	15	0.5	10	0.4	15	0.3	10	0.5	15	0.5	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>	馬纒丹																				
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					1.5	10							1.5	10						
Amaranthaceae	<i>Celosia argentea</i>	青葙					0.5	5							0.5	5						
Acanthaceae	<i>Dicliptera chinensis</i>	狗肝菜	0.3	5	0.2	5					0.3	5	0.2	5								
Bare Gound			48		47		50		60		48		47		50			60				

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

Table 4.3 Avifauna recorded along survey transects and at four selected point count locations of Lam Tsuen River.

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

Common Name	Species name	Chinese name	Status	Commonness	Action monitoring				Post construction monitoring			
					Mar-15				Apr-15			
					T2	T3	T4	C	T1	T2	T3	T4
Barn Swallow	<i>Hirundo rustica</i>	家燕	PM	C	2	4	2	++	4	3	3	2
Black Drongo	<i>Dicrurus macrocercus</i>	黑卷尾	Sv	C								
Black Kite	<i>Milvus lineatus</i>	黑鷹	R, RC, Cap.586	C				+			1	
Black-faced bunting	<i>Emberiza spodocephala</i>	灰頭鵪	WV&PM	C				+			1	
Black-necked Starling	<i>Sturnus nigricollis</i>	黑領椋鳥	R	C		2		+		2		2
Black-winged Cuckoo-shrike	<i>Coracina melaschistos</i>	暗灰鶇鵙	PM	C								
Blue Whistling Thrush	<i>Myophonus caeruleus</i>	藍鶇鵙	R	C								
Brown Shrike	<i>Lanius cristatus</i>	紅尾伯勞	PM	C								
Buzzard (Common Buzzard)	<i>Buteo buteo</i>	普通鵟	WV,Cap.586	C								
Chinese Bulbul	<i>Pycnonotus sinensis</i>	白頭鵪	R	C		2		++	2		2	
Chinese Pond Heron	<i>Ardeola bacchus</i>	池鷺	R,RC	C	1	2	1	+				1
Common Kingfisher	<i>Alcedo atthis</i>	普通翠鳥	R	C	1			+	1			
Common Koel	<i>Eudynamys scolopacea</i>	噪鵲	R	C		1	1	+			1	1
Common Sandpiper	<i>Actitis hypoleucos</i>	磯鵞	WV&PM	C				+				
Common Tailorbird	<i>Orthotomus sutorius</i>	長尾縫葉鶯	R	C		2	1	+	2		1	
Crested bulbul	<i>Pycnonotus jocosus</i>	紅耳鵪	R	C	4			+++	4	3	5	2
Crested Goshawk	<i>Accipiter trivirgatus</i>	鳳頭鷹	R, CR, Cap.586	U								
Crested Myna	<i>Acridotheres cristatellus</i>	八哥	R	C	2	3	2	+++	3	4	2	3
Crested Serpent Eagle	<i>Spilornis cheela</i>	蛇鵟	R, VU, LC	U								
Daurian redstart	<i>Phoenicurus auroreus</i>	北紅尾鶇	WV	C								
Domestic pigeon	<i>Columba sp.</i>	鴿	R	C								
Dusky Warbler	<i>Phylloscopus fuscatus</i>	褐柳鶯	WV	C				+		1		
Eurasian tree sparrow	<i>Passer montanus</i>	麻雀	R	C			1	++	2	2	1	3
Great Coucal	<i>Centropus sinensis</i>	褐翅鴉鵂	R,VU	C	1	1		+		1	1	
Great Tit	<i>Parus major(commixtus)</i>	大山雀	R	C				+	2			
Green Sandpiper	<i>Tringa ochropus</i>	白腰草鶻	PM&WV	C								
Grey Heron	<i>Ardea cinerea</i>	蒼鷺	WV,PRC	C								
Grey Wagtail	<i>Motacilla cinerea</i>	灰鶇鵙	WV	C		1	2	+		1	1	2
Japanese White Eye	<i>Zosterops japonica(simplex)</i>	暗綠繡眼鳥	R	C		4	3	++			3	3
Jungle Crow	<i>Corvus macrorhynchos</i>	大咀烏鴉	R	C								
Large Hawk Cuckoo	<i>Cuculus sparverioideus</i>	鷹鵒	SV	C				+			1	1
Lesser Coucal	<i>Centropus bengalensis</i>	小鴉鵂	R, VU	C								
Little Egret	<i>Egretta garzeta</i>	小白鷺	R, RC	C	2	3	2	+		2	1	
Great Egret	<i>Ardea alba</i>	大白鷺	R,WV, RC	C	1			+		1		
Little Swift	<i>Apus affinis</i>	小白腰雨燕	R,SpM	C		2						
Maggie	<i>Pica pica</i>	喜鵲	R	C								
Maggie Robin	<i>Copsychus saularis</i>	鶇鵙	R	C	1	2		++	2		1	2
Mandarin Duck	<i>Aix galericulata</i>	藍鵲	WV	U								
Masked Laughing Thrush	<i>Garrulus perspicillatus</i>	黑臉噪鶇	R	C				++		2		
Night Heron	<i>Nycticorax nycticorax</i>	夜鷺	R&WV, LC	C								
Northern Shoveler	<i>Anas clypeata</i>	琵嘴鴨	WV	C								
Olive Backed Pipit	<i>Anthus hodgsoni</i>	樹鶇	WV	C								
Oriental Dollarbird	<i>Eurystomus orientalis</i>	三寶鳥	PM	U								
Plaintive Cuckoo	<i>Cacomantis merulinus</i>	八聲杜鵑	SV	U								
Red-billed Blue Magpie	<i>Urocissa erythrorhyncha</i>	紅咀藍鶇	R	C								
Red-flanked Bluetail	<i>Tarsiger cyanurus</i>	紅腦藍尾鶇	PM&WV	C								
Rufous Turtle Dove	<i>Streptopelia orientalis</i>	山斑鳩	R	C								
Rufous-backed Shrike	<i>Lanius schach</i>	棕背伯勞	R	C				+		1		
Rufous-capped Babbler	<i>Stachyridopsis ruficeps</i>	紅頭穗鶇	R	C				+				
Scarlet Minivet	<i>Pericrocotus flammeus</i>	赤紅山椒鳥	R	C								
Siberian Stonechat	<i>Saxicola maurus</i>	黑喉石鶇	WV	C	1	1						
Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>	白喉紅臀鵪	R	U								
Spotted Dove	<i>Streptopelia chinensis</i>	珠頸斑鳩	R	C	3	2	2	++	4	2	3	2
Spotted Munia	<i>Lonchura punctulata</i>	斑文鳥	R	C				+			2	
Velvet-fronted Nuthatch	<i>Sitta frontalis</i>	絨額鶇	R	C				+		1		
White Wagtail	<i>Motacilla alba</i>	白鶇鵙	WV	C	1	2	2	+	1	2	1	2
White-breasted Waterhen	<i>Anaearornis phoenicurus</i>	白胸苦惡鳥	R	C		1		+		1		
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	白胸翡翠	R, LC	C								
White-rumped Munia	<i>Lonchura striata</i>	白腰文鳥	R	C								
Yellow Bellid Prinia	<i>Prinia flaviventris</i>	黃腹鶇鶇	R	C	1	1	1	+		1	1	1
Yellow Wagtail	<i>Motacilla flava</i>	黃鶇鵙	WV&PM	U								
Zitting cisticola	<i>Cisticola juncidis</i>	棕扇尾鶇	WV&PM	C								
Number of birds					21	36	20		28	29	32	27
No. of species					13	18	12	31	12	16	18	14

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

SpM – Spring migrant; Sv-Summer Visitor ; C – transect survey;

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

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

Commonness and status were decided according to AFCD biodiversity website (www.hkbiobiodiversity.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 onver 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 four selected point count locations of Lam Tsuen River.
(T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

Common Name	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																		
					Aug-16				Sep-16				Oct-16				Nov-16				Dec-16				Jan-17				Feb-17				Mar-17														
					Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance																		
					C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4			
Barn Swallow	<i>Hirundo rustica</i>	家燕	PM	C	++		5	5		++		5	2		++				6																												
Black Drongo	<i>Dicurus macrocerus</i>	黑卷尾	Sv	C																																											
Black Kite	<i>Milvus lineatus</i>	黑鷹	R, RC, Cap.586	C																																											
Black-faced bunting	<i>Emberiza spodocephala</i>	灰頭鵪	WV&PM	C																																											
Black-necked Starling	<i>Sturnus nigricollis</i>	黑領椋鳥	R	C	+		3	2		+		4	2		+		3	3		+		3	2		+		2	2	2	+	2	3	2	+	3	3	+	3	3								
Black-winged Cuckoo-shrike	<i>Coracina melaschistos</i>	暗灰鶇鶇	PM	C																																											
Blue Whistling Thrush	<i>Myophonus caeruleus</i>	紫嘯鶇	R	C																																											
Brown Shrike	<i>Lanius cristatus</i>	紅尾伯勞	PM	C																																											
Buzzard (Common Buzzard)	<i>Buteo buteo</i>	普通鵟	WV,Cap.586	C																+																											
Chinese Bulbul	<i>Pycnonotus sinensis</i>	白頭鶇	R	C	++	3	3		2	++	4	2		2	++	3	2	2	2	++	3	4			++	2	3	3	++	4	2	3	++	2	2	3	++	5	4	2							
Chinese Pond Heron	<i>Ardeola bacchus</i>	池鷺	R,RC	C	+			1	1	+				1	+					+	1	1			+	1	1	1	+	1	1			+	3	1	+	2	2								
Common Kingfisher	<i>Alcedo atthis</i>	普通翠鳥	R	C						+					+					+					+	1				+				+													
Common Koel	<i>Eudynamis scolopacea</i>	噪鶇	R	C																																											
Common Sandpiper	<i>Actitis hypoleucos</i>	磯鶇	WV&PM	C																																											
Common Tailorbird	<i>Orthotomus sutorius</i>	長尾縫紉鶇	R	C	+	1	1	1	1	+					+					+	1	1			+	1	1	1	+	1	1			+	1	1	+	1	1								
Crested bulbul	<i>Pycnonotus jocosus</i>	紅耳鶇	R	C	+++	8	6	9	4	+++	10	3	2	7	+++	6	5	5		+++	7	8	2	2	+++	8	5	6	3	+++	5	8	6	5	+++	8	3	5	2	+++	8	7	6	1			
Crested Goshawk	<i>Accipiter trivirgatus</i>	鳳頭鷹	R, CR, Cap.586	U																																											
Crested Myna	<i>Acridotheres cristatellus</i>	八哥	R	C	+		2	2		+		5			+		3	2		+	3	3			+	2	3			+	5	3		+	2	5		+	2	2							
Crested Serpent Eagle	<i>Spilornis cheela</i>	蛇鶇	R, VU, LC	U																																											
Daurian redstart	<i>Phoenicurus auroreus</i>	北紅尾鶇	WV	C																+	1				+																						
Domestic pigeon	<i>Columba sp.</i>	鴿	R	C																																											
Dusky Warbler	<i>Phylloscopus fuscatus</i>	褐柳鶇	WV	C	+					+					+					+					+					+				+				+									
Eurasian tree sparrow	<i>Passer montanus</i>	麻雀	R	C	++	5	3	4	5	++	4	4	4	3	++	3	3	2	3	++	4	3	3	3	++	5	3		2	++	4	3	2	2	++	5	4	2	5	++	3			2			
Great Coucal	<i>Centropus sinensis</i>	褐翅鴉鶇	R,VU	C	+					+					+					+					+					+				+				+									
Great Tit	<i>Parus major(commixtus)</i>	大山雀	R	C																																											
Green Sandpiper	<i>Tringa ochropus</i>	白腰草鶇	PM&WV	C																																											
Grey Heron	<i>Ardea cinerea</i>	蒼鶇	WV,PRC	C																																											
Grey Wagtail	<i>Motacilla cinerea</i>	灰鶇鶇	WV	C	+				1	+				1	+				1	+	1	1	1	1	+	1			1	+	1			+	1			+	1								
Japanese White Eye	<i>Zosterops japonica(simplex)</i>	暗綠繡眼鳥	R	C	+		3			+		3	2		+		4			+	3				+	2	3			+	3	3		+	2			+									
Jungle Crow	<i>Corvus macrorhynchos</i>	大咀烏鶇	R	C																																											
Large Hawk Cuckoo	<i>Cuculus sparverioideus</i>	鷹鶇	SV	C																																											
Lesser Coucal	<i>Centropus bengalensis</i>	小鴉鶇	R, VU	C																																											
Little Egret	<i>Egretta garzeta</i>	小白鶇	R, RC	C	+		1	1	1	+		1	1		+		1	1		+	1	1			+	5	2			+	6	3		+	3	1											
Great Egret	<i>Ardea alba</i>	大白鶇	R,WV, RC	C																																											
Little Swift	<i>Apus affinis</i>	小白腰雨燕	R,SpM	C	+																																										
Maggie	<i>Pica pica</i>	喜鶇	R	C																																											
Maggie Robin	<i>Copsychus saularis</i>	鶇鶇	R	C	+		2	1	1	+	1	2	1	1	+	1				+	1				+	2	2	1	+	2	2			+	1	2	2	1	+	2	1	1	2				
Mandarin Duck	<i>Aix galericulata</i>	藍鶇	WV	U																																											
Masked Laughing Thrush	<i>Garrulus perspicillatus</i>	黑臉噪鶇	R	C																																											
Night Heron	<i>Nycticorax nycticorax</i>	夜鶇	R&WV, LC	C																																											
Northern Shoveler	<i>Anas clypeata</i>	琵嘴鶇	WV	C																																											
Olive Backed Pipit	<i>Anthus hodgsoni</i>	樹鶇	WV	C																																											
Oriental Dollarbird	<i>Eurystomus orientalis</i>	三寶鳥	PM	U																																											
Plaintive Cuckoo	<i>Cacomantis merulinus</i>	八聲杜鶇	SV	U																																											
Red-billed Blue Magpie	<i>Urocissa erythrorhyncha</i>	紅咀藍鶇	R	C																																											
Red-flanked Bluetail	<i>Tarsiger cyanurus</i>	紅腦藍尾鶇	PM&WV	C																																											
Rufous Turtle Dove	<i>Streptopelia orientalis</i>	山斑鶇	R	C																																											
Rufous-backed Shrike	<i>Lanius schach</i>	棕背伯勞	R	C	+					+																																					
Rufous-capped Babbler	<i>Stachyridopsis ruficeps</i>	紅頭鵪鶇	R	C																																											
Scarlet Minivet	<i>Pericrocotus flammeus</i>	赤紅山椒鳥	R	C																																											
Siberian Stonechat	<i>Saxicola maurus</i>	黑喉石鶇	WV	C																																											
Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>	白喉紅鶇	R	U																																											
Spotted Dove	<i>Streptopelia chinensis</i>	珠頸斑鶇	R	C	++	4	5	2	4	++	4	5	2	4	++	5		4		++	3	3	3	2	++																						

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						Post construction monitoring							
					Apr-15	May-15	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	Nov-16	Dec-16
<i>Acisoma panorpoides panorpoides</i>	Asian Pintail	雅腹蜻	NP	VC				+																	
<i>Brachythemis contaminata</i>	Asian Amberwing	黃翅蜻	NP	VC																					
<i>Ceragrion auranticum ryukyuanum</i>	Orange-tailed Sprite	琉球橘黃蟬	NP	VC	+	+	+	+	+	+						+	+	+	+	+	+	+			
<i>Coelicia cyanomelas</i>	Blue Forest Damselfly	黃紋長腹蟬	NP	VC																					
<i>Coptera marginipes</i>	Yellow Featherlegs	黃紋扇蟬	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>Ictinogomphus pertinax</i>	Common Flangetail	霸王葉春蜓	NP	C		+	+	+	+	+							+	+	+	+	+				
<i>Ischnura senegalensis</i>	Common Blue Jewel	褐斑異痣蟬	NP	VC																					
<i>Mnais lacteola</i>	Indochinese Copperwing	樟翅綠色蟬	P, LC	C																					
<i>Nannophya pygmaea</i>	Scarlet Dwarf	朱紅小蜻	P, LC	C																					
<i>Neurobasis chinensis</i>	Chinese Greenwing	華綠色蟬	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	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	UC		+	+																		
<i>Rhinocypha perforata perforata</i>	Common Blue Jewel	三斑鼻蟬	NP	VC			+	+	+	+								+	+	+	+	+	+		
<i>Rhyothemis variegata arria</i>	Variegated Flutterer	斑羅翅蜻	NP	C																					
<i>Trithemis aurora</i>	Crimson Dropwing	曉靛蜻	NP	VC	+	+	+	+	+	+	+					+	+	+	+	+	+	+	+	+	
<i>Trithemis festiva</i>	Indigo Dropwing	靛靛蜻	NP	VC		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Zygonyx iris insignis</i>	Emerald Cascader	彩須紅蜻	P,PGC	VC																					
No. of species					9	11	13	14	15	13	9	7	2	3	1	3	7	11	14	14	13	13	10	7	2

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.lkkbiodiversity.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									
					Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17	
<i>Acisoma panorpoides panorpoides</i>	Asian Pintail	維腹蜻	NP	VC										
<i>Brachythemis contaminata</i>	Asian Amberwing	黃翅蜻	NP	VC										
<i>Ceragrion auranticum ryukyuanum</i>	Orange-tailed Sprite	琉球橘黃蜻	NP	VC				+	+	+	+	+	+	+
<i>Coelicia cyanomelas</i>	Blue Forest Damselfly	黃紋長腹蜻	NP	VC										
<i>Copera marginipes</i>	Yellow Featherlegs	黃紋扇翅	NP	VC					+	+	+	+	+	+
<i>Crocothemis servilia servilia</i>	Crimson Darter	紅蜻	NP	VC					+	+	+	+	+	+
<i>Euphaea decorata</i>	Black-banded Gossamerwing	方帶幽蜻	NP	VC							+	+	+	+
<i>Ictinogomphus pertinax</i>	Common Flangetail	霸王葉春蜓	NP	C										
<i>Ischnura senegalensis</i>	Common Blue Jewel	褐斑異志蜻	NP	VC										
<i>Mnais lacteola</i>	Indochinese Copperwing	煙翅綠色蜻	P, LC	C										
<i>Nannophya pygmaea</i>	Scarlet Dwarf	珠紅小蜻	P, LC	C										
<i>Neurobasis chinensis</i>	Chinese Greenwing	華藍色蜻	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	蒼尾蜻	P, LC	C										
<i>Prodasineura autumnalis</i>	Black Threadtail	烏齒原蜻	NP	VC				+	+	+	+	+	+	+
<i>Pseudagrion rubriceps rubriceps</i>	Orange-faced Sprite	丹頂斑蜻	NP	UC										
<i>Rhinocypha perforata perforata</i>	Common Blue Jewel	三斑鼻蜻	NP	VC					+	+	+	+	+	+
<i>Rhyothemis variegata arria</i>	Variegated Flutterer	斑羅翅蜻	NP	C										
<i>Trihemis aurora</i>	Crimson Dropwing	曉靛蜻	NP	VC			+	+	+	+	+	+	+	+
<i>Trihemis festiva</i>	Indigo Dropwing	靛靛蜻	NP	VC	+	+	+	+	+	+	+	+	+	+
<i>Zygonyx iris insignis</i>	Emerald Cascader	彩翅紅蜻	P,PGC	VC										
No. of species					2	2	4	8	12	14	15	15	14	

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.lkkbiodiversity.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	Chinese name	Status	Commonness	Baseline monitoring		Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Post construction monitoring				Post construction monitoring																													
				Jul-08		Aug-08		Jan-09				Jul-09				Jan-10				Jul-10				Jan-11				Jul-11				Jan-12				Jul-12				Aug-13				Dec-13				Jan-14				Feb-14															
				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	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4																				
Molluscs																																																																			
<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>Sinotaita quadrata</i>	田螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																									
Insects																																																																			
<i>Baetis sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																									
<i>Caenis sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																									
<i>Chironomus sp.</i>	孑孓	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>Orithtrum sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																									
Crustaceans																																																																			
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																									
<i>Cryptopotamon anacoluthon</i>	棘刺溪蟹	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																										
<i>Macrobrachium hainanense</i>	海南沼蝦	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																										
<i>Somanniathelphusa 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	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

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
 Reference point was the sampling location outside the works 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				Post construction monitoring																																		
				Mar-14				Apr-14				May-14				Jun-14				Jul-14				Aug-14				Sep-14				Oct-14				Nov-14				Dec-14				Jan-15				Feb-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																															
Molluscs																																																																										
<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>Sinotia quadrata</i>	田螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																																			
Insects																																																																										
<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>Orithrum sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																																			
Crustaceans																																																																										
<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>Somanniathelphusa zanklon</i>	東瀾蟹	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+																																			
No. of species				16	14	14	12	11		17	15	16	13	12		13	15	10	10	10		11	12	11	10	9		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

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
Reference point was the sampling location outside the works 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											
				Mar-15				Apr-15				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	Reference point	T1	T2	T3	T4
Molluscs																																											
<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>Sinotaita quadrata</i>	田螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+				
Insects																																											
<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	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+				
Crustaceans																																											
<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>	東莞蟹	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+				
No. of species				11	13	13	12	12		11	9	12	15	12		11	9	11	13	12		11	9	11	13	12		11	9	11	13	12		11	9	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
 Reference point was the sampling location outside the works 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
Molluscs																																											
<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	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
Insects																																											
<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																																								
Crustaceans																																											
<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				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
 Reference point was the sampling location outside the works 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)

				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring									
				Nov-16				Dec-16				Jan-17				Feb-17				Mar-17									
Sampling point				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	
Species name	Chinese name	Status	Commonness																										
Molluscs																													
<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	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Insects																													
<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			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+	
Crustaceans																													
<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	10	12	14	14		13	10	12	14	14		13	10	12	14	14		13	10	12	14	14		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

Reference point was the sampling location outside the works 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)

		Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring																
		Apr-17					May-17					Jun-17					Jul-17					Aug-17					Sep-17											
Sampling point		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							
Species name	Chinese name	Status	Commonness																																			
Molluscs																																						
<i>Biomphalaria sp.</i>	--	NP	VC					+																										+				
<i>Brotia hainanensis</i>	--	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>	羅白螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+				
<i>Sinotaia quadrata</i>	田螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+				
Insects																																						
<i>Baetis sp.</i>	--	NP	VC	+				+	+	+																								+	+			
<i>Caenis sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Chironomus sp.</i>	孿幼虫	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>Orthetrum sp.</i>	--	NP	VC			+	+	+																												+	+	
Crustaceans																																						
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	
<i>Cryptopotamon anacolutho</i>	鯉刺溪蟹	NP	VC					+	+																											+	+	
<i>Macrobrachium hainanense</i>	海南沼蝦	NP	VC	+		+		+	+																											+	+	
<i>Somaniathelphusa zanklo</i>	束腰蟹	NP	VC																																		+	+
No. of species				13	10	12	14	14	13	10	12	14	14	13	10	12	14	14	13	10	12	14	14	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
 Reference point was the sampling location outside the works 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				Impact monitoring				Impact monitoring				Impact monitoring																							
				Jul-08		Aug-08		Jan-09				Jul-09				Jan-10				Jul-10				Jan-11				Jul-11				Jan-12				Jul-12				Aug-13				Dec-13													
				Upper stream	Lower stream	Upper stream	Lower stream	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																																																									
<i>Acrossocheilus parrellens</i>	副鱗光唇魚	P, PGC	R		+		+																																																		
<i>Channa maculate</i>	斑鱧	NP	C				+																																																		
<i>Cirrhina mottorella</i>	鯪魚	NP	C																																																						
<i>Clarias fuscus</i>	胡子鯪	NP	C																																																						
<i>Cyprinus carpio var. viridiviolaceus</i>	錦鯪	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>	尼羅口鱒非鯽	NP	C			+																																																			
<i>Parazacco spilurus</i>	異鱧	V and	C		+		+																																																		
<i>Poecilia reticulata</i>	孔雀花魚	NP	VC																																																						
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰕	NP	C			+	+	+	++	++	++	+																																													
<i>Pterocryptis cochinchinensis</i>	黃鰪	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>	寬鱮	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	6	3	1	0	0	8	5	2	0	0	5	2	3	2	3	5	2	3	2	3
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	12	8	6	4	3	14	10	10	4	3	14	11	11	6	4	14	9	12	8	6
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	1	0	1	1	1	1	0	1	1	1	0	0	0	0	1	0	0	1	1	0	0	0	0	0	1	0	0	1	1	0	0	0	1	0	1	1	0	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 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																							
				Jan-14					Feb-14					Mar-14					Apr-14					May-14					Jun-14					Jul-14					Aug-14																		
				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																																																									
<i>Acrossocheilus parallens</i>	副鱖光唇魚	P, PGC	R	+	+	+	+			+	+	++	+++	+		+	++	++	+++	++		++	++	+++	++		+	+	+	+		+	+	+	+		+	++	++	+		++	++	++	+												
<i>Channa maculate</i>	斑鱧	NP	C																																																						
<i>Cirrhina mottorella</i>	鯪魚	NP	C																																																						
<i>Clarias fuscus</i>	胡子鯪	NP	C	+		+				+		+				+		+				+		+				+		+				+		+				+		+															
<i>Cyprinus carpio var. viridiviolaceus</i>	銀鯪	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>	尼羅口孵非鯪	NP	C	+	+	+	+	+		+	+	+	+	+		+	+	+	+	+		+	+	+	+	+		+	+	+	+	+		+	+	+	+	+		+	+	+	+	+													
<i>Parazacco spilurus</i>	黑鰱	V and	C	+	+	+	+			+	+	+	+			+	+	+	+			+	+	+	+			+	+	+	+			+	+	+	+			+	+	+	+														
<i>Poecilia reticulata</i>	孔雀花魚	NP	VC																																																						
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰕	NP	C	+						+	+	+				+	+	+				+	+	+				+	+	+				+	+	+				+	+	+															
<i>Pterocryptis cochinchinensis</i>	黃鰱	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	6	20	60	20	10		16	40	70	40	30		60	70	80	90	80		40	50	60	60	50		20	30	30	20	20		6	12	10	6	8		8	16	15	5	10		10	12	18	10	12		10	12	13	13	11	
No. of species				14	10	13	11	6		14	10	15	11	7		15	11	16	14	11		11	12	16	14	12		13	13	13	12	11		10	12	13	11	11		11	12	13	12	11		10	12	13	13	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		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 arc
 -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 Treated 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									
				Sep-14					Oct-14					Nov-14					Dec-14					Jan-15					Feb-15					Mar-15					Apr-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	Reference	T1	T2	T3	T4
Fish																																											
<i>Acrossocheilus parrellens</i>	副綠光唇魚	P, PGC	R		++	++	++	+		++	++	++	+		++	++	++	++		++	++	++	++		++	++	++	++		++	++	++	++		++	++	++	++					
<i>Channa maculate</i>	斑鱧	NP	C																																								
<i>Cirrhina moltorella</i>	鱮魚	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>	擬平鰲	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>	黑鱧	V and	C		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+					
<i>Poecilia reticulata</i>	孔雀花魚	NP	VC		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+					
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰕	NP	C		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+					
<i>Pterocryptis cochinchinensis</i>	黃魮	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>	橫紋南鰍	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>	寬鰭鱮	NP	C		+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++						
2x2m fish counting			No. of fish	20	30	30	20	20	30	40	40	30	30	50	70	70	60	60	60	60	60	60	50	50	50	50	60	60	60	40	50	60	60	60	40	40	50	55	50	40			
No. of species				11	13	14	15	13	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	13	12	14	15	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	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 arc
 -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 Treated 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															
				May-15					Jun-15					Jul-15					Aug-15					Sep-15					Oct-15					Nov-15					Dec-15					Jan-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																																																	
<i>Acrossocheilus parrellens</i>	副條光唇魚	P, PGC	R		+	+	++	++			+	+	++	++			+	+	+	+			+	+	+			+	+	+			+	+	+			+	+	++									
<i>Channa maculate</i>	斑鱧	NP	C					+						+																																			
<i>Cirrhina mottorella</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>Limparhomaloptera disparis</i>	擬平鰲	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>	黑鰱	V and	C		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+								
<i>Poecilia reticulata</i>	孔雀花魚	NP	VC		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+								
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰍	NP	C		+	+					+	+				+	+					+	+				+	+																					
<i>Pterocryptis cochinchinensis</i>	黃鰱	NP	C		+						+					+						+					+																						
<i>Puntius semifasciolatus</i>	十星魚	NP	C		+	+	++	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+								
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C/UN/R		+	++	++	++	++	+	+	++	++	++	++	+	+	++	++	++	++	+	+	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++								
<i>Schistura fasciolata</i>	橫紋南鰍	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>	寬鰱	NP	C		+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	++									
2x2m fish counting		No. of fish		20	30	30	20	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	40	35	40	35	40	55	40	45	45	40	60	50	50	50	40
No. of species				13	12	14	12	13	12	12	13	13	13	12	12	12	13	12	12	12	10	13	13	12	12	10	13	13	12	12	10	13	13	12	12	12	10	13	12	12	12	10	13	12	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	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 study arc
 -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					Post construction monitoring					Post construction monitoring														
				Feb-16					Mar-16					Apr-16					May-16					Jun-16					Jul-16					Aug-16					Sep-16					Oct-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																																																
<i>Acrossocheilus parallens</i>	副鱖光唇魚	P, PGC	R			+	+	+	++																																							
<i>Channa maculate</i>	斑鱧	NP	C																																													
<i>Cirrhina mottorella</i>	鱮魚	NP	C																																													
<i>Clarias fuscus</i>	胡子鯪	NP	C																																													
<i>Cyprinus carpio var. viridiviolaceus</i>	綠鰱	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>	尼羅口鯪非鯪	NP	C																																													
<i>Parazacco spilurus</i>	黑鰱	V and	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>	黃鰱	NP	C																																													
<i>Puntius semifasciolatus</i>	七星魚	NP	C																																													
<i>Rhinogobius spp.</i>	鯽虎魚	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>	寬鰱	NP	C																																													
2x2m fish counting		No. of fish		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	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	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	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 study arc
 -V - Listed as vulnerable in China Fish Red Data Book
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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						
				Nov-16					Dec-16					Jan-17					Feb-17					Mar-17						
				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																														
<i>Acrossocheilus parallens</i>	副鱗光唇魚	P, PGC	R			+	+	++				+	+	++			+	+	++			+	+	++			+	+	++	
<i>Channa maculate</i>	斑鱧	NP	C																											
<i>Cirrhina mottorella</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>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>	黑鰱	V and	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>	黃鰱	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	30	30	30	25	45	40	40	35	35	50	45	45	35	35	55	50	50	40	40	60	55	55	50	50		
No. of species				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		

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 arc
 -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

Species	Chinese name	Status	Sampling point	Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring														
				Apr-17					May-17					Jun-17					Jul-17					Aug-17					Sep-17									
				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																																						
<i>Acrossocheilus parallens</i>	側條光唇魚	P, PGC	R		+	+	++				+	+	++				+	+	++				+	+	++				+	+	++				+	+	++	
<i>Channa maculate</i>	斑鱧	NP	C																																			
<i>Cirrhina moliorella</i>	鱧魚	NP	C																																			
<i>Clarias fuscus</i>	胡子鯰	NP	C				+						+																									
<i>Cyprinus carpio var. sinensis</i>	錦鯉	NP	C				+						+																									
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Lipiphomaloptera disparis</i>	擬平鰻	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Misgurnus anguillicaudatus</i>	泥鰻	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Oreochromis niloticus</i>	肥羅口非鯽	NP	C	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	
<i>Parazacco spilurus</i>	鱧鱺	V and NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Poecilia reticulata</i>	孔雀花魚	NP	VC																																			
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰻	NP	C	+	+					+	+						+	+																				
<i>Pterocryptis cochinchinensis</i>	黃鰷	NP	C	+						+							+																					
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	
<i>Rhinogobius spp.</i>	鰻形魚	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>	寬鰭鱮	NP	C	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	++	++	++	+	+	++	++	++	++	++	++	++	++		
2x2m fish counting	No. of fish			55	50	50	45	40	50	40	40	40	30	30	40	20	20	20	20	20	15	15	15	20	20	20	20	20	20	20	20	25	30	30	30	25	25	
No. of species				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	12	10	14	11	
Amphibian																																						
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P (Cap 170, NT,	R	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Fajeryarya limocharis</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		

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
 Cap 170 - List in Wild Animals Protection Ordinance (Cap.170)
 NT - Near Treated in IUCN Red List Status
 PGC - Potential Golar Concern by Fellowes *et al* (2002)

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							
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							
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 Abiotic 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				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						
	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	T1	T2	T3
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	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			
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	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			
Nitrate (mg N/L)	0.13	0.67	0.62	0.82	0.74	0.72	0.83	0.79	0.48	0.57	0.82	0.77	0.89	0.9	0.8	1.3	1.26	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			
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	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			
Salinity (ppt)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0.02	0.03			
Conductivity (µS/cm)	41	38	73	86	67	77	74	75	62	64	90	110	72	78	88	108	78	87	118	119	120	123	125	123	96	114	120	122	82	80	72	66			
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				0.01-0.2				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				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	5	5	5	5	5	5	5	5	5	5	5	10	5	5	5	10			
Stone (%)	60	60	60	60	75	75	75	75	90	85	85	85	90	85	85	85	90	85	85	85	90	85	85	80	90	85	85	75	90	85	85	75			
Mud (%)	30	30	30	30	15	15	15	15	5	10	10	10	5	10	10	10	5	10	10	10	5	10	10	15	5	10	10	15	5	10	10	15			

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			
	Aug-17				Sep-17			
Replicate	T1	T2	T3	T4	T1	T2	T3	T4
DO (mg/L)	8.0	8.1	7.9	7.9	8.0	8.0	7.9	7.9
pH	7.7	7.6	7.6	7.7	7.7	7.6	7.7	7.7
Nitrate (mg N/L)	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.9
Ammonia (mg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Conductivity (µS/cm)	22.0	23.0	28.0	32.0	23.0	23.0	25.0	32.0
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.03-0.2				0.03-0.2			
Water flow at riffle (m/s)	0.2-0.5				0.2-0.5			
Sand (%)	5	5	8	10	5	5	8	10
Stone (%)	93	90	90	75	93	90	90	75
Mud (%)	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.45)
She Shan River

September 2017



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11 October, 2017

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11 October, 2017

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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.45) She Shan River

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FIGURES

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 : Avifauna – *Motacilla alba*

Photo 5 : Avifauna – *Egretta garzetta*

Photo 6: Odonata – *Trithemis aurora*

Photo 7 : Kick sampling

Photo 8 : Aquatic sample

Photo 9 : Aquatic sample

Photo 10: Fish – *Tilapia joko*

Photo 11 : Fish – *Hemiculter leucisculus*

TABLES

Table 4.1: Flora species recorded along the She Shan River including riparian habitat.

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

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

Table 4.4: Odonata species recorded at the She Shan River.

Table 4.5: Aquatic Macro invertebrates recorded at She Shan River.

Table 4.6: Fish species and Hong Kong Newt recorded at She Shan River.

Table 4.7: Abiotic data for She Shan 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 from December 2014.
- 1.4 This is the number 45 post-construction ecological monitoring report for the project conducted **on 31st of September 2017**. 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 13th of September 2017**;
- Fauna and flora along the drainage project sections is in a process of re-establishing or restoration;
- Fish's abundance increased in this month ;
- Bird diversity and abundance was in natural fluctuation;
- Odonata abundance decreased; and
- Hong Kong Newt was not 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) 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), 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), 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.hkbiobiodiversity.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, 79 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 0.3m to 0.8m as observed along survey transect. Abundant 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, and 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, 16 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 *Motacilla alba* (Photo 4) , *Ardeola bacchus*, *Egretta garzetta* (Photo 5), *Tringa ochropus* and *Motacilla cinerea*. 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) respectively. 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**. High abundance of odonata was recorded in wet season. Most of the odonata species in Hong Kong has the peak emergence from spring to late summer. (Wilson *et al.*, 2004 & Tam *et al.*, 2011). A total of 13 species was recorded, those recorded species were mostly common species in Hong Kong (Photo 6). The result of this month was similar to approximate period of last year. Mating behavior was noticed during the survey. Sampling location was shown on **Figure 1**.

4.2.3 Aquatic Macro-invertebrates

Survey of aquatic marco-invertebrates was carried out (Photo 7). The river benthic fauna collected was mainly comprised of insects, mollusks and crustaceans (Photos 8-9). 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 7). Hong Know Newt was not recorded in this month. 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 14 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 current fish's abundance increased comparing with last month. Two species were first recorded including *Tilapia joko* and *Hemiculter leucisculus*. *Tilapia joko* is classified as "Vulnerable" in IUCN Red List and *Hemiculter leucisculus* is an uncommon species in Hong Kong. These two species were recorded with low abundance at the middle section of the river. 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. The water colour has turned into yellowish because of increase in suspended solid as a result of flooding. 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 were collected according to project specification and EM & A Manual. Hong Kong New was not recorded during the survey. High abundance of odonata was observed in this month due to seasonality. Fish's abundance increased when comparing to the record of last month. 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.

Water was not polluted and nutrient levels were low to moderate.

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FIGURE

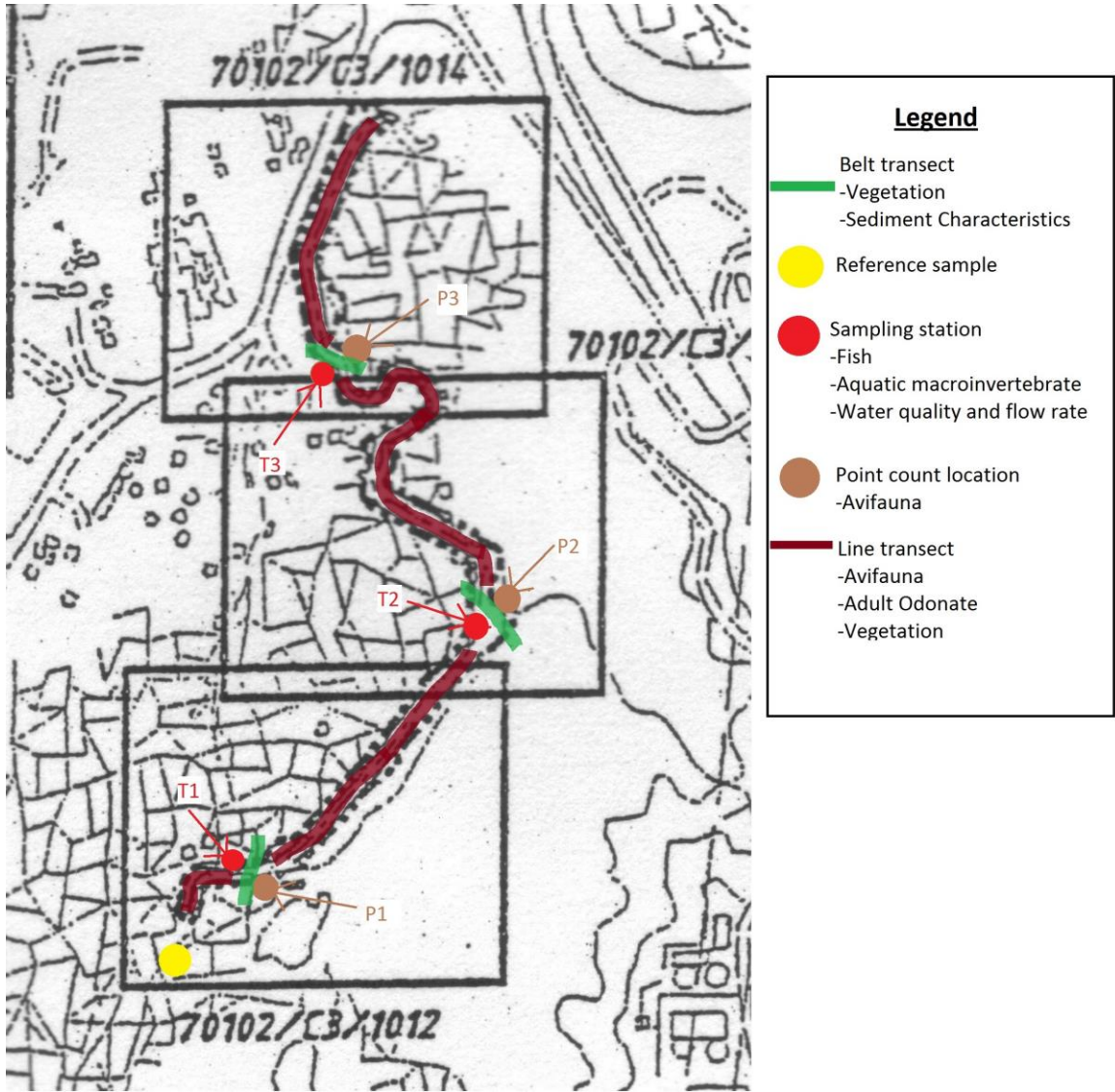


Figure 1. Sampling Location of Ecological Survey and Monitoring at She Shan River, Tai Po.

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 : Avifauna – *Motacilla alba*



Photo 5 : Avifauna – *Egretta garzetta*



Photo 6: Odonata – *Trithemis aurora*



Photo 7 : Kick sampling



Photo 8 : Aquatic sample



Photo 9 : Aquatic sample



Photo 10: Fish – *Tilapia joko*



Photo 11 : Fish – *Hemiculter leucisculus*

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	Chinese 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														
			P1	P3		P1	P3		T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3												
Comelinaceae	<i>Commelina diffusa</i>	蘭前草		0.2	20		10	6	0.2	2	0.1	5	0.2	5		0.2	10	0.3	60				0.5	50	0.5	50	0.2	45	0.2	10			0.2	5	0.8	40		
Poaceae	<i>Panicum repens</i>	枯骨草	0.3	5								0.2	5				0.6	5				0.6	25									0.3	30			0.5	20	
Asteraceae	<i>Mikania micrantha</i>	蕨甘菊				0.2	7																		1	20	0.3	5					0.3	30				
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜																									0.2	5										
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																1.5	30											1.5	15		
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			0.5	5													0.5	2			
Poaceae	<i>Pennisetum purpureum</i>	象草	3	50	1	60	3	80	2	60			4	40																					1.5	15		
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 Ground									98	75	30	##	95	10	15	70	##	80	15	25	15	40	93	30	10											##		

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	Impact monitoring																								Post construction monitoring																										
				Jan-12						Jul-12						Jul-13						Dec-13						Jan-14						Feb-14						Mar-14						Apr-14								
				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)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%								
Comelinaceae	<i>Commelina diffusa</i>		蘭前草	0.3	25	0.3	40			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	0.3	20	0.5	35	0.3	6	0.5	30									
Poaceae	<i>Panicum repens</i>		粘骨草																	0.2	1					0.2	1																											
Asteraceae	<i>Mikania micrantha</i>		燕甘菊	0.2	15															0.1	10					0.2	1	0.1	10											0.1	10			0.3	10	0.3	10	0.3	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	1	45	0.8	5																																															
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	5					0.3	10									0.3	1					0.3	1													0.4	1			0.4	1			0.3	5	0.8	1			
Poaceae	<i>Pennisetum purpureum</i>		象草	2.5	5	2.5	25													1.5	10	1.5	10			1.5	10	1.5	10																									
Poaceae	<i>Coix lacryma-jobi</i>		薏苡	2.5	2																																																	
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																																																			
Onagraceae	<i>Ludwigia hyssopifolia</i>		草龍	0.2	2																																																	
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	60	0.8	20		1.5	55	0.8	25		1.5	60	0.8	30		1.5	50	1	50											
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																																			
Convolvulaceae	<i>Ipomoea cairica</i>		五爪金龍																																																			
Bare Gound					3		15			100			93		20			50		65		5		94		10		10		94		5		10		94		5		5		91		5		5		90		0		5		84

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						Post construction monitoring						Post construction monitoring											
			May-14			Jun-14			Jul-14			Aug-14			Sep-14			Oct-14			Nov-14			Dec-14			Dec-14			Dec-14			Dec-14			Dec-14														
			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															
Comelinaceae	<i>Commelina diffusa</i>	蘭蘭草		0.5	20				0.5	25				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>	結骨草																																																
Asteraceae	<i>Mikania micrantha</i>	燕甘菊	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10	0.3	10								
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜	0.3	5			0.3	5			0.3	5			0.3	5			0.3	5			0.3	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																																																
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	1			0.3	5	0.8	1			0.3	5	0.8	1			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									
Poaceae	<i>Pennisetum purpureum</i>	象草																																																
Poaceae	<i>Coix lacryma-jobi</i>	薏苡				0.8	1			0.8	1			0.8	1			1.2	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	40	1	40		1.5	45	1	45		1.5	45	1	45		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	15			2	15			2	12			2	10			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			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	1			N.A	1			N.A	1			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				1	2			1	2			1	4			1	6			1	6			1.5	1			2	5	1.5	1			2	5	1.5	1			2	5							
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍																																																
Bare Ground				30		25		84		25		15		84		31		15		87		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									Post construction monitoring									Post construction monitoring								
			Jan-15			Feb-15			Mar-15			Apr-15			May-15			Jun-15			Jul-15			Aug-15			Jan-15			Feb-15			Mar-15			Apr-15			May-15			Jun-15			Jul-15			Aug-15																	
			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	T1	T2	T3																											
Commelinaceae	<i>Commelina diffusa</i>	蘭蘭草	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	0.3	5	0.7	50	0.5	25	0.3	5	0.7	50	0.5	25			0.3	25			0.3	15																									
Poaceae	<i>Panicum repens</i>	結骨草																																																															
Asteraceae	<i>Mikania micrantha</i>	蕪荊菊	0.4	10	0.5	15			0.4	10	0.5	15			0.4	10	0.5	15																																															
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	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															
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 involucreatus</i>	風車草		1.5	5				1.5	5					1.5	5																																																	
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香				2	10					2	10																																																				
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍																																																															
Bare Ground				0		5		25		0		5		25		0		5		25		0		5		25		50		30		55		45		25		50		13		10		38		13		40		38															

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			Post construction monitoring			Post construction monitoring			Post construction monitoring																						
			Stream			Stream			Stream			Stream			Stream			Stream			Stream			Stream																						
			T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3																				
Comelinaceae	<i>Commelina diffusa</i>	蘭蘭草		0.3	17			0.3	17	0.2	10			0.3	17	0.2	10			0.3	17	0.2	10			0.3	17	0.2	10																	
Poaceae	<i>Panicum repens</i>	結骨草																																												
Asteraceae	<i>Mikania micrantha</i>	燕片菊	0.5	10	0.4	5			0.5	10	0.4	20			0.5	10	0.5	10			0.5	10	0.5	5			0.5	10	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	0.9	15		0.5	2	0.9	30					0.9	30			1	30							1	30																			
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	0.9	60	1	38	0.9	10	0.3	30	1	15	0.9	1	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			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			1.2	5	0.4	2					
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香				1.5	50			0.3	15					0.3	15					0.3	15											0.3	15					0.3	15					
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍		0.3	5			0.3	5					0.3	5			0.3	5			0.3	5			0.3	5			0.3	5			0.3	5			0.3	5							
Bare Gound				13		35		38		28		43		72		28		43		72		28		43		72		28		43		70		87		43		70		83		43		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					
			May-16						Jun-16					
			T1		T2		T3		T1		T2		T3	
Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%			
Commelinaceae	<i>Commelina diffusa</i>	蘭前草			0.3	5	0.2	8			0.3	5	0.2	8
Poaceae	<i>Panicum repens</i>	結骨草												
Asteraceae	<i>Mikania micrantha</i>	燕甘菊	0.5	10	0.5	8			0.5	10	0.5	8		
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜			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	15					1	15				
Poaceae	<i>Pennisetum purpureum</i>	象草												
Poaceae	<i>Coix lacryma-jobi</i>	薏苡	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	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	5			1.2	5	0.4	5
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香					0.3	5					0.3	5
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍			0.3	5					0.3	5		
Bare Gound				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	Transect	Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring														
			Jul-16			Aug-16			Sep-16			Oct-16			Nov-16			Dec-16																							
			T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3																					
Comelinaceae	<i>Commelina diffusa</i>	箭筈草																																							
Poaceae	<i>Panicum repens</i>	枯骨草		0.3	5	0.2	8																																		
Asteraceae	<i>Mikania micrantha</i>	微甘菊																																							
Brassicaceae	<i>Nasturtium officinale</i>	西洋菜																																							
Moraceae	<i>Ficus microcarpa</i>	細葉榕		0.3	5																																				
Moraceae	<i>Ficus hispida</i>	野茉莉																																							
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹		0.3	5	0.3	15																																		
Fabaceae	<i>Pueraria lobata</i>	野葛																																							
Araceae	<i>Colocasia esculenta</i>	芋																																							
Urticaceae	<i>Boehmeria nivea</i>	芋麻																																							
Asteraceae	<i>Bidens alba</i>	白花鬼針草																																							
Poaceae	<i>Pennisetum purpureum</i>	象草	1	15																																					
Poaceae	<i>Coix lacryma-jobi</i>	薏苡																																							
Amaranthaceae	<i>Alternanthera philoxeroides</i>	空心蓮子草	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																																		
Blechnaceae	<i>Blechnum orientale</i>	烏毛蕨	0.3	15	1	5	1	10	0.3	15	1	10	0.3	15	1	10	0.4	15	1	10	0.5	15	1	10	0.1	15	0.1	10	0.1	10	0.1	15	0.1	10	0.1	10	0.1	10	0.1	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 catrica</i>	五爪金龍		0.2	5	0.3	5																																		
Bare Gound				0.3	5																																				
				60		65		37		57		50		42		60		45		42		60		45		42		60		45		42		75		60		65			

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					
			Jul-17						Aug-17						Sep-17					
			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>	箭筈草																		
Poaceae	<i>Panicum repens</i>	枯骨草																		
Asteraceae	<i>Mikania micrantha</i>	薇甘菊																		
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	10	0.5	5		0.8	10	0.5	5		0.8	10	0.5	5			
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		0.7	5				0.8	5				0.8	5					
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	0.6	5				0.6	5				0.6	5						
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		0.7	30	0.7	25		0.7	30	0.7	25		0.7	30	0.7	25			
Blechnaceae	<i>Blechnum orientale</i>	烏毛蕨	0.4	10	0.5	10	0.5	15	0.4	10	0.5	10	0.5	15	0.4	10	0.5	15		
Poaceae	<i>Pennisetum alopecuroides</i>	狼尾草																		
Araceae	<i>Alocasia macrorrhizos</i>	海芋		0.5	5	0.3	5		0.5	5	0.3	5		0.5	5	0.4	5			
Lemnaceae	<i>Lemna minor</i>	浮萍																		
Polygonaceae	<i>Polygonum hydropiper</i>	水蓼																		
Cyperaceae	<i>Cyperus involucratus</i>	風車草		0.3	5	0.3	5		0.4	5	0.3	5		0.5	5	0.3	5			
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香																		
Convolvulaceae	<i>Ipomoea catrica</i>	五爪金龍		0.4	5	0.3	5		0.4	5	0.3	5		0.5	5	0.4	5			
Bare Gound				0.3	5				0.3	5				0.3	5					
			85		30		40		85		30		40		85		30		40	

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)

Table with columns for species name, Chinese name, status, commonness, and abundance across 12 months (Mar-14 to Feb-15) at three transect points (T1, T2, T3). Includes a summary row for 'No. of species' at the bottom.

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 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							Post construction monitoring							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	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 varicularis</i>	Dog-legged Clubtail	雞紋扁春蜓	P, LC	C																									
<i>Ceriaagrion auranticum ryukyuanum</i>	Orange-tailed Sprite	琉球橘黃蠅	NP	VC						+	+		+	+	+	+								+	+	+	+		
<i>Coperia ciliata</i>	Black-knees Featherleg	白狹扇蠅	NP	VC																									
<i>Coperia 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	朱紅小蜻	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 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>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	靛褐蜻	NP	VC	+	+																							
<i>Zygonyx iris insignis</i>	Emerald Cascader	彩紅蜻	P,PG	VC																									
No. of Species					11	7	2	2	1	5	10	12	13	13	13	12	9	7	2	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
 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

Species name	Common name	Chinese name	Status	Commonness	Post construction monitoring										
					Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17	Aug-17	Sep-17
<i>Agriocnemis pygmaelis</i>	Wandering Midget	黃尾小蠅	NP	VC											
<i>Brachythemis contaminata</i>	Asian Amberwing	黃翅蜻	NP	VC											
<i>Burmagomphus varicollis</i>	Dog-legged Clubtail	雞紋扁春蜓	P, LC	C											
<i>Ceragrion auranticum ryukyuanum</i>	Orange-tailed Sprite	琉球橘黃蠅	NP	VC	+						+	+	+	+	+
<i>Coperia ciliata</i>	Black-knees Featherleg	白狹扇蠅	NP	VC											
<i>Coperia 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	朱紅小蜻	NP	C											
<i>Neurobasis chinensis chinensis</i>	Chinese Greenwing	華藍色蠅	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	靛褐蜻	NP	VC	+	+	+	+	+	+	+	+	+	+	+
<i>Zygonyx iris insignis</i>	Emerald Cascader	彩紅蜻	P,PG	VC											
No of Species					8	2	2	3	6	9	11	13	14	15	13

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 “+++” – Species abundance in the study area
 Commonness and status were decided according to AFCD biodiversity website
 LC- Local Concern - Fellowes *et al* (2002)
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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			Impact monitoring			Impact monitoring			Post construction monitoring																					
		Status	Common-ness	Upper stream	Lower stream	Upper stream	Lower stream	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															
Mollusks																																																		
<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>	縮螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+															
<i>Pomacea canaliculata</i>	福寿螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+															
<i>Radix plicatulus</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+															
<i>Sinotia quadrata</i>	田螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+															
Insects																																																		
<i>Baetis sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+															
<i>Caenis sp.</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+															
<i>Chironomus sp.</i>	孑孓	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	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+															
Crustaceans																																																		
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC																																															
<i>Cryptopotamon amicolathon</i>	細刺溪蟹	NP	VC																																															
No of Species				12	12	12	12	9	0	7	11	9	0	12	10	0	11	0	10	8	14	4	10	9	9	8	10	10	9	7	11	7	6	5	9	8	7	5	11	8	7	6	11	8	8	7	11	8	8	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 River.

(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							
				Feb-14				Mar-14				Apr-14				May-14				Jun-14				Jul-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
Mollusks																															
<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>	縮螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Pomacea canaliculata</i>	福果螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Radix plicatulus</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Sinotia quadrata</i>	田螺	NP	VC	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+
Insects																															
<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	+				+	+	+		+	+	+		+				+				+				+			
Crustaceans																															
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC																												
<i>Cryptopotamon amicolathon</i>	鯉刺溪蟹	NP	VC																												
No of Species				13	10	9	8	14	12	12	9	14	12	13	9	11	11	13	8	10	12	13	8	10	11	14	7				

Note: NP – Not protected in Hong Kong;
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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 River.

(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				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			
				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	Reference	T1	T2	T3	Reference	T1	T2	T3				
Mollusks																																																			
<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>	河蚶	NP	VC																																																
<i>Melanoides tuberculata</i>	縮螺	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+					
<i>Pomacea canaliculata</i>	福寿螺	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+					
<i>Radix plicatulus</i>	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+					
<i>Sinotia quadrata</i>	田螺	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+					
Insects																																																			
<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>Orithetrum spp.</i>	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+					
<i>Pseudagrion spp.</i>	--	NP	UC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+					
<i>Pseudocloeon sp.</i>	--	NP	VC																																																
<i>Serratella sp.</i>	--	NP	VC																																																
Crustaceans																																																			
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC																																																
<i>Cryptopotamon amicoluthon</i>	刺刺溪蟹	NP	VC																																																
No of Species				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	9	12	13	6	9	12	13	6	9	12	13	6	9	12	14	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 River.

(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				Post construction monitoring															
				Aug-15				Sep-15				Oct-15				Nov-15				Dec-15				Jan-16				Feb-16				Mar-16				Apr-16				May-16				Jun-16				Jul-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	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3								
Mollusks																																																			
<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>	河蚶	NP	VC																																																
<i>Melanoides tuberculata</i>	縮螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+				
<i>Pomacea canaliculata</i>	福果螺	NP	VC	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++				
<i>Radix plicatulus</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+				
<i>Sinotia quadrata</i>	田螺	NP	VC	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++				
Insects																																																			
<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>Odonata 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			+				+				+				+				+				+				+				+				+				+				+					
Crustaceans																																																			
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC			+				+				+				+				+				+				+				+				+				+				+					
<i>Cryptopotamon amicolathon</i>	細刺溪蟹	NP	VC																																																
No of Species				9	12	15	6	9	13	15	6	9	13	15	6	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				

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 River.

(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											
				Aug-16				Sep-16				Oct-16				Nov-16				Dec-16				Jan-17				Feb-17				Mar-17				Apr-17			
				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		
Mollusks																																							
<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>	河蚶	NP	VC																																				
<i>Melanoides tuberculata</i>	縮螺	NP	VC	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+
<i>Pomacea canaliculata</i>	福寿螺	NP	VC	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+
<i>Radix plicatulus</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Sinotia quadrata</i>	田螺	NP	VC	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++
Insects																																							
<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>Odonata 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			+				+				+				+				+				+				+				+				+	
Crustaceans																																							
<i>Caridina cantanensis</i>	廣東米蝦	NP	VC		+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+	
<i>Cryptopotamon anacoluthon</i>	刺刺溪蟹	NP	VC			+				+				+				+				+				+				+				+				+	
No of Species				9	14	16	6	9	14	16	6	9	14	16	6	9	14	16	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 River.

(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			
				May-17				Jun-17				Jul-17				Aug-17				Sep-17			
				Status	Common -ness	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1
Mollusks																							
<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>	河蚶	NP	VC			+				+				+				+				+	
<i>Melanoides tuberculata</i>	縮螺黑螺	NP	VC	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+
<i>Pomacea canaliculata</i>	福果螺	NP	VC	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+
<i>Radix plicatulus</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Sinotia quadrata</i>	田螺	NP	VC	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++
Insects																							
<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		+				+				+				+				+		
Crustaceans																							
<i>Caridina cantanensis</i>	廣東水蝦	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	9	14	16	6	9	14	16	6

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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 4.6 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	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	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>	革胡子鮰	NP	VC																															
<i>Gambusia affinis</i>	食蚊魚	NP	VC			++	++	+		+	+	+					+		+		+	+	+		+		+	+	+					
<i>Hemiculter leucisculus</i>	藍刀	NP	UC																															
<i>Misgurnus anguillicaudatus</i>	泥鯮	NP	C														+																	
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C			+	++			+	+			+	+					+		++	+				+							
<i>Parazacco spilurus</i>	異鰻	NP, V	C	+	++	+	++	+	+	+	++	+	+				+	+			+	+					+							
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			++	++			+	+						+	+			+	+					+	+	+					
<i>Pterocryptis cochinchinensis</i>	越南隱鱒	NP	C																															
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+++	++	+++	+++	++		+	+	+					+	+			+	+	+	+	+									
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C			+	+	+									+				+	+	+	+	+		+							
<i>Tilapia jola</i>	喬克非鯽	NP, VU																																
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C		+	++	++	+		+	+	+			+++	+				+		+	+	+	+		+							
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C			+	+																											
<i>Zacco platypus</i>	寬鰭鱖	NP	C	++	+	+	+	+		+	+	+					+	+			+	+	+	+	+									
	2x2m fish number			80	60	80	60	30			15	45	30	0	0	300	30	0	13		20	5	20	200	22	16	3	0	6	4	2	3		
	No of Species			4	4	9	9	6	1	6	9	7	1	0	5	7	1	6	0	7	3	9	8	8	6	1	0	8	0	2	1			
Amphibian																																		
<i>Paramesotriton hongkongensis</i>	香港摩螈	P, Cap 170, NT,	R																															

Note: NP – Not protected in Hong Kong
“VC” – Very Common; “UC” – Uncommon; “C” - Common
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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.
“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
“VU” - Vulnerable - in IUCN Red List

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				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				
			Reference	T1	T2	T3	Referenc	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>	革胡子鮠	NP	VC																																
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Hemiculter leucisculus</i>	藍刀	NP	UC																																
<i>Misgurnus anguillicaudatus</i>	泥鯮	NP	C	+				+				+				+				+				+				+				+			
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Parazacco spilurus</i>	異鱮	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</i> spp.	鰻虎魚	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
<i>Tilapia jola</i>	喬克非鯽	NP, VU	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>	寬鰭鱮	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
			2x2m fish number	4	2	2	0	5	3	4	2	5	3	4	2	12	16	30	40	30	40	50	60	60	60	70	70	40	40	50	40	20	10	20	10
			No of Species	9	7	7	3	9	8	8	3	8	8	7	6	8	8	7	7	12	8	7	7	12	11	11	8	12	11	12	9	10	10	13	9
Amphibian																																			
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P, Cap 170, NT, 1972	R													+				+		+												+	

Note: NP – Not protected in Hong Kong
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“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
“VU” - Vulnerable - in IUCN Red List

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				Post construction monitoring							
				Jun-14				Jul-14				Aug-14				Sep-14				Oct-14				Nov-14				Dec-14				Jan-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
<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>Hemiculter leucisculus</i>	藍刀	NP	UC																																
<i>Misgurnus anguillicaudatus</i>	泥鯮	NP	C	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Parazacco spilurus</i>	異鱮	NP, V	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC	+			+					+							+														+		
<i>Pterocryptis cochinchinensis</i>	越南隱鱮鯰	NP	C			+						+							+														+		
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Tilapia jola</i>	喬克非鯽	NP, VU																																	
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C			+						+							+														+		
<i>Zacco platypus</i>	寬鰭鱮	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
			2x2m fish number	12	5	8	6	16	8	10	10	12	10	16	12	20	20	30	16	40	30	40	30	50	50	60	50	60	50	50	40	50	40	50	
			No of Species	10	9	11	9	9	8	11	10	9	9	12	10	9	9	12	10	8	9	11	10	8	9	12	8	7	6	11	9	7	8	11	8
Amphibian																																			
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P, Cap 170, NT, 2002	R			+						+				+																	+		

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“Cap 170” - List in Wild Animals Protection Ordinance (Cap.170)
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“PGC”-Potential Global Concern by Fellowes *et al* (2002)
“V” - Vulnerable - in Red China Data Book
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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-15				Mar-15				Apr-15				May-15				Jun-15				Jul-15				Aug-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>	革胡子鮠	NP	VC			+				+		+							+						+						
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Hemiculter leucisculus</i>	藍刀	NP	UC																												
<i>Misgurnus anguillicaudatus</i>	泥鯮	NP	C		+	+			+	+	+			+	+	+			+	+	+			+	+	+					
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C	+	+	+	+	+	+	++	+	+	+	+	+	++	+	+	+	++	++	+	+	++	++	+	++	++			
<i>Parazacco spilurus</i>	異鱮	NP, V	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			+	+			+	+			+	+				+	+				+	+			+			
<i>Pterocryptis cochinchinensis</i>	越南隱鱮鮠	NP	C				+			+				+					+					+				+			
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Tilapia jola</i>	喬克非鯽	NP, VU																													
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C			+			+	+				+	+				+	+				+	+			+			
<i>Zacco platypus</i>	寬鰭鱮	NP	C	+	++	++	+	+	++	++	+	+	+	+	+	++	++	+	+	+	+	+	+	+	+	+	+	+			
			2x2m fish number	40	30	40	40	40	40	50	30	35	55	45	20	10	20	10	20	10	20	10	15	8	15	8	20	10	20	10	
			No of Species	7	9	12	8	8	10	12	9	8	10	12	9	8	9	13	10	8	8	13	10	8	8	13	10	8	8	13	7
Amphibian																															
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P, Cap 170, NT, 1992	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				Post construction monitoring							
				Sep-15				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	Reference	T1	T2	T3
<i>Channa maculata</i>	斑鱧	NP	C			+				+						+							+							+					
<i>Clarias gariepinus</i>	革胡子鮠	NP	VC			+	+			+	+				+	+						+	+					+	+						
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+	+	+			+	+	+			+	+	+				+	+	+				+	+	+						
<i>Hemiculter leucisculus</i>	藍刀	NP	UC																																
<i>Misgurnus anguillicaudatus</i>	泥鯮	NP	C	+	+	+				+	+	+			+	+	+				+	+	+				+	+	+						
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C	+	++	++				+	++	++			+	++	++				+	++	++				+	++	++						
<i>Parazacco spilurus</i>	異鱮	NP, V	C	+	+	+				+	+	+			+	+	+				+	+	+				+	+	+						
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			+	+					+	+			+	+						+	+				+	+						
<i>Pterocryptis cochinchinensis</i>	越南隱鱮鮠	NP	C			+						+				+																			
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	+				+	+	+			+	+	+				+	+	+				+	+	+						
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C	+	+	+	+			+	+	+			+	+	+				+	+	+				+	+	+						
<i>Tilapia jola</i>	喬克非鯽	NP, VU																																	
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	+				+	+	+			+	+	+				+	+	+				+	+	+						
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C			+	+					+	+			+	+					+	+				+	+							
<i>Zacco platypus</i>	寬鰭鱮	NP	C	+	+	++	+			+	++	++			+	++	++				+	++	++				+	++	++						
			2x2m fish number	20	12	23	12	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	8	8	12	7
Amphibian																																			
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P, Cap 170, NT, 1992	R																																

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 - 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 4.6 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>Hemibarbus leucisculus</i>	藍刀	NP	UC																								
<i>Misgurnus anguillicaudatus</i>	泥鯮	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+			
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++		
<i>Parazacco spilurus</i>	異鱮	NP, V	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+			
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			+	+			+	+			+	+					+	+			+			
<i>Pterocryptis cochinchinensis</i>	越南隱鰭鯰	NP	C																								
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+			
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
<i>Tilapia jola</i>	喬克非鯽	NP, VU																									
<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		
			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		
Amphibian																											
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P, Cap 170, NT, 2002	R																	+				+			

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“+” – Species exists in the study area
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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 4.6 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				
				Nov-16				Dec-16				Jan-17				Feb-17				Mar-17				Apr-17				
				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
<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>Hemiculter leucisculus</i>	藍刀	NP	UC																									
<i>Misgurnus anguillicaudatus</i>	泥鯮	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+
<i>Parazacco spilurus</i>	異鱮	NP, V	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			+				+					+						+						+	
<i>Pterocryptis cochinchinensis</i>	越南隱鱮鯰	NP	C																									
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Tilapia jola</i>	喬克非鯽	NP, VU																										
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C			+				+			+			+					+				+		+	
<i>Zacco platypus</i>	寬鱮鱮	NP	C	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+
			2x2m fish number	35	35	30	20	45	40	40	20	45	45	45	20	50	50	50	30	55	55	50	20	35	30	40	40	15
			No of Species	8	8	12	5	8	8	12	5	8	8	12	5	8	8	12	5	8	8	12	5	8	8	12	5	
Amphibian																												
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P, Cap 170, NT, 2002	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			
				May-17				Jun-17				Jul-17				Aug-17				Sep-17			
				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>Hemiculter leucisculus</i>	藍刀	NP	UC																			+	
<i>Misgurnus anguillicaudatus</i>	泥鯮	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
<i>Oreochromis niloticus</i>	尼羅口孵非鯽	NP	C	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+
<i>Parazacco spilurus</i>	異鱮	NP, V	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Poecilia reticulata</i>	孔雀花魚將	NP	VC			+					+					+						+	
<i>Pterocryptis cochinchinensis</i>	越南隱鱮鯰	NP	C																				
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Tilapia jola</i>	喬克非鯽	NP, VU																				+	
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C			+					+			+		+				+		+	
<i>Zacco platypus</i>	寬鰭鱮	NP	C	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+
			2x2m fish number	20	20	15	10	15	10	10	5	15	8	8	5	20	10	10	5	30	25	20	8
			No of Species	8	8	12	5	8	8	12	5	8	8	12	5	8	8	12	5	8	8	14	5
Amphibian																							
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P, Cap 170, NT, 1992	R			+							+										

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Table 4.7 Abiotic 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			Impact monitoring			Impact monitoring			Post construction monitoring			Post construction monitoring						
	Aug-08	Jan-09			Jul-09			Jan-10			Jul-10			Jan-11			Jul-11			Jan-12			Jul-12			Jul-13			Dec-13			Jan-14			Feb-14			
		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	T1	T2	T3	
Replicate																																						
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	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	
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	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	
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	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	
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	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	
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	0.03	0.04	0.07	0.03	0.03	0.04	0	0	0	0	0	0	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	121	120	160	94	97	97	116	116	134	124	118	132	128	113	132	
BOD (mg/L)	<2	--	<2	4	<2	<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	<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	0.2	0.05	0.1	0.2	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	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	0.2	0.1	0.1	0.2	0.1	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	
Sand (%)	55	65	23	65	23	23	65	5	23	--	5	30	5	5	30	2	5	30	2	10	25	5	10	25	5	15	25	5	15	10	5	15	10	5	15	10	5	
Stone (%)	25	30	75	30	75	75	30	40	75	--	40	65	80	40	65	2	40	65	2	45	65	5	45	65	5	65	65	15	65	80	20	65	80	20	65	80	20	
Mud (%)	30	5	2	5	2	2	5	5	2	--	5	5	5	5	5	1	5	5	1	5	10	10	5	10	10	10	10	10	10	10	10	5	10	10	10	10	5	
Concrete (%)	0	0	0	0	0	0	0	50	0	100	50	0	10	50	0	95	50	0	95	40	0	80	40	0	80	10	0	70	10	0	70	10	0	70	10	0	70	

**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. 45)
Upper Tai Po River**

September 2017



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11 October, 2017

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11 October, 2017

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.45)
Upper Tai Po River**

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1 Introduction

- 1.1 The current post-construction ecological monitoring programme is under 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. 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 45 post-construction ecological monitoring report for the project conducted **on 15th September 2017**. It contains the following subsections:
 - Summary of major points
 - Monitoring Methods and Results
 - Summary and Comments

2 Summary of Major Points

- Fauna and flora along the drainage project sections is in a process of re-establishing or restoration;
- Bird abundance was similar to those recorded during baseline survey;
- The abundance of target river fauna, i.e., fish *Parazacco spilurus* recorded was lower than those recorded during baseline monitoring (before fish capture/relocation took place). The reason for low fish population of *Parazacco spilurus* was due to river bed modification. The rare fish *Pseudobagrus trilineatus* was consistently recorded in the river during recent monitoring. The other target species, Hong Kong Newt *Paramesotriton hongkongensis*, was not found within works area during baseline, impact monitoring and it was recorded in the river during post construction monitoring. Apart from fauna species, 55 flora species was recorded within the survey transects along the river course. Some common herbs were observed generating on the embankment, which indicating that vegetation was recovering. Flora species of *Tibouchina semidecandra* and *Ipomoea pes-caprae* were planted on the gabion along the river for landscape purpose;
- The abundance of fish was similar to last month with slight increase;
- Lower abundance of odonata was recorded in this month; and
- Hong Kong Newt was not recorded during the survey.

3 Monitoring Methodology

3.1 Riparian Vegetation

Riparian vegetation including aquatic and emergent was sampled by line transects along the affected river channel and riparian habitat. Species, relative abundance and average heights were recorded. Vegetation surveys were conducted at three selected belt transects with one located at the upper portion of the river channel (T1) and another one at the middle section of the river (T2), as well as reference site (**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 along line transect, e.g., species inventory, relative abundance. Nomenclature and protection status of the species has 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 survey was 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 sections 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 AFCDD website (www.hkbbiodiversity.net) and Carey *et al.* (2001).

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

3.3 Adult Odonata Survey

Adult Odonata surveys were 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 AFCDD website (www.hkbbiodiversity.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 in three sampling sites with two located at upper (T1) and middle (T2) proportion of the river respectively and one reference site. It aims to collect necessary macro-invertebrate fauna for ecological monitoring programme (**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) and other literatures such as Dudgeon (1994).

3.5 Fish and Newt

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

Sampling was conducted at three sampling locations with one located at upper section (T1) and one located at middle section (T2), as well as reference site. The selected sampling site 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 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 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 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 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) in a measured distance. The sampling sites for surveys were given in **Figure 1**.

4 Monitoring Results

4.1 Vegetation

Major proportion of river bed and bank was concrete and without plant colonizing (Photos 1-4). Vegetation has sparsely covered the gabion wall along the upper Tai Po River and the river bed with some common plants (Photo 4) including invasive species *Mikania micrantha*, and native species *Commelina diffusa*. Most of the plants on the river bed along the river have been removed from the clearance work. In total, 55 flora species were recorded within the survey transects along the river course. Abundant native species *Commelina diffusa* was the dominant species established in the river bed. Vegetation coverage in upper section was still low. Flooding was observed in this month, which washed out most of the plants of the river. The flora were generally in good health, and the height of the dominated riparian grass and herb species were in a range from 0.3m to 1.7m as observed along survey transect. Abundant flora species were shown in **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 two defined point count locations. In total, 13 species of birds were recorded during bird survey. Among them, 5 species were wetland dependant birds observed feeding and roosting in the river channel including *Alcedo atthis* (Photo 5), *Ardeola bacchus*, *Egretta garzetta*, *Motacilla alba* and *Motacilla cinerea*. A common species *Pycnonotus jocosus* was the dominant species of most of the proportion of the river. All the birds in Hong Kong are under protection of Wild Animals Protection Ordinance (Cap. 170). Some of the wetland dependent species recorded are classified as Regional Concern by Fellowes *et al.* (2002) including *Egretta garzetta* and *Ardeola bacchus*, which were usually observed feeding in the river. Only foraging and roosting behaviour of some wetland dependent birds were 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 surveys were performed and a list of recorded odonata species at Upper Tai Po River is shown in **Table 4.4**. Number of odonata species recorded was similar to the previous surveys conducted in approximate period of last year. In total, 9 species odonata was found, the recorded odonata species was common species in Hong Kong (Photos 6-7). Comparing with the result of last month, less species of odonata were found in this month due to seasonality. Most of the odonata species in Hong Kong has the peak emergence from spring to late summer. It is expected that number of odonata will keep decreasing 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

Aquatic-net and kick sampling were performed at the river. The river benthic fauna collected was mainly comprised of insects, molluscs and crustaceans (Photo 8). 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

Survey of Hong Kong Newt was conducted at Upper Tai Po River. Adult Hong Kong Newt was not recorded in this month at reference site. 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 Tai Po River during surveys. In total, 12 species freshwater fish were recorded within project area. Fish abundance was low along the modified river channel. The *Parazacco spilurus*, *Glyptothorax pallozonum* and *Pseudobagrus trilineatus* (Photo 8), which have conservation interest, were restricted in the upper section of the surveyed river outside the works boundary where the habitat was not affected by construction works, while *Parazacco spilurus* is listed in China Red Data Book Status as Vulnerable and *Pseudobagrus trilineatus* is classified as Global Concern by Fellowes *et al.* (2002). The data showed that fish abundance was similar to the record of last month with slight decrease in reference site due to flooding. Details of records 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 substratums of upper and lower sections were comprised of 40% stone and 60% concrete, 20% stone and 80% concrete respectively. Moderate water flow up to 0.3m/second at pool and 0.6m/second at riffle was measured.

5 **Summary and Commentary**

Post construction ecological monitoring was carried out in current month and relevant biotic and abiotic data were collected according to project specification and EM & A Manual. An adult Newt was not recorded during the survey. Fish’s abundance appears to be similar to last month. Bird abundance was similar to those recorded during baseline survey. Species richness of odonata was lower than last month’s result.

Aquatic and riparian vegetation along river channel was re-established compared to those recorded during baseline surveys. Vegetation has sparsely covered gabion wall and river bed along to the Upper Tai Po River.

The water quality of the surveyed river was not polluted as indicated by low nutrient concentration level of ammonium and nitrate although the river channel may receive discharge and runoff from the village areas.

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FIGURE

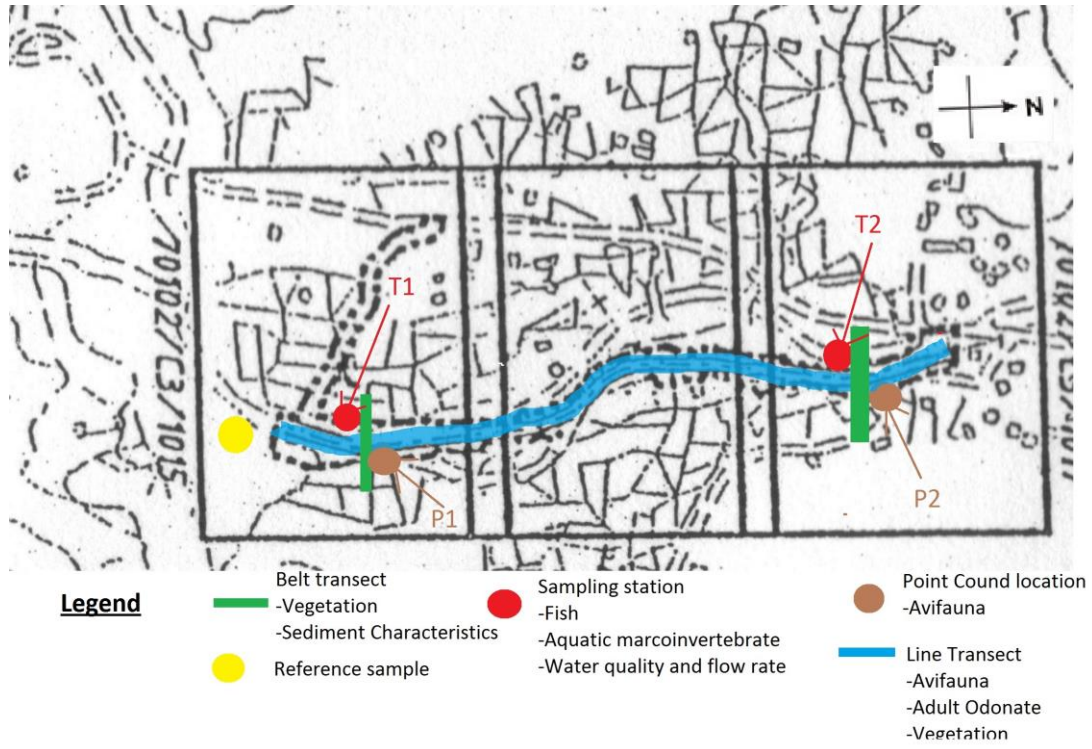


Figure 1. Sampling Location of Ecological Survey and Monitoring at Upper Tai Po River, Tai Po.

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 – *Alcedo atthis*

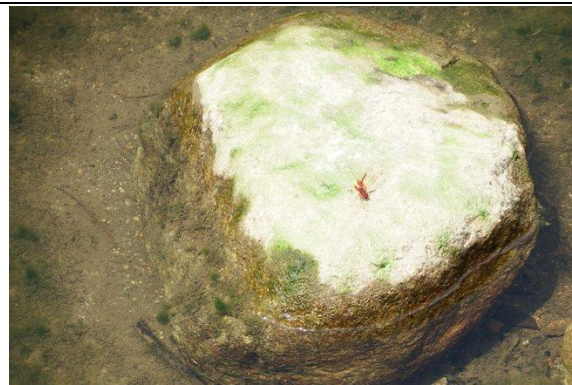


Photo 6 : Odonata – *Trithemis aurora*



Photo 7 : Odonata – *Neurobasis chinensis chinensis*



Photo 8: Aquatic sample

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				Impact monitoring				Impact monitoring				Impact monitoring																						
			Oct-07		Jan-09		Jul-09		Jan-10		Jul-10		Jan-11		Jul-11		Jan-12		Jul-12		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2																
			P1	P2	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																			
			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>	微甘菊	0.4	15	1	40	0.5	5	0.5	5	0.5	5	0.5	5	0.5	5	0.5	5	0.5	5	0.5	5	0.5	5	0.5	5	0.5	5	0.5	5	0.5	5	0.5	5																			
Moraceae	<i>Ficus hispida</i>	對葉榕	1	2			5	5			2	10	5	5			5	5																																			
Ulmaceae	<i>Celtis sinensis</i>	朴樹	5	2							6	15																																									
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹	1.2	45	1.2	30					0.8	10	0.5	12																																							
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐	2	2			5	5	3	5	1.5	4	5	5	3	5	1.5	5	5	5																																	
Araceae	<i>Alocasia odora</i>	海芋	1.5	23							1.5	25			2	30																																					
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																																			
Athyriaceae	<i>Callipteris esculenta</i>	菜蕨			0.6	1	0.8	10			0.4	10	0.8	10			0.8	6																																			
Poaceae	<i>Phragmites karka</i>	卡開蘆					1.5	51			1.5	51					1.5	53																																			
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨	0.4	10							0.4	10																																									
Equisetaceae	<i>Equisetum debile</i>	筆管草			0.6	<1	0.3	2							0.3	2																																					
Asteraceae	<i>Ageratum conyzoides</i>	勝紅菊					0.4	2							0.4	2																																					
Commelinaceae	<i>Commelina diffusa</i>	節節草													0.2	5	0.2	5	0.2	5																																	
Solanaceae	<i>Solanum nigrum</i>	龍葵																																																			
Euphorbiaceae	<i>Mallotus paniculatus</i>	白楸																																																			
Poaceae	<i>Eleusine indica</i>	牛筋草													0.3	5																																					
Poaceae	<i>Pennisetum purpureum</i>	象草																																																			
Asteraceae	<i>Wedelia chinensis</i>	蝴蝶菊																																																			
Asteraceae	<i>Bidens alba</i>	白花鬼針草																																																			
Poaceae	<i>Panicum repens</i>	結骨草																																																			
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 Ground							10		73		10		10		78		6		10		73		88		9		15		65		68		80		89		71		100		89		35		100		100		20		100		100

- 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						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring					
			Mar-13			Jul-13			Jan-14			Feb-14			Mar-14			Apr-14			May-14			Jun-14			Jul-14			Jul-14			Jul-14																	
			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															
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.4	60																																														
Moraceae	<i>Ficus hispida</i>	對葉榕																																																
Ulmaceae	<i>Celtis sinensis</i>	朴樹																																																
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹																																																
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐																																																
Araceae	<i>Alocasia odora</i>	海芋																																																
Araceae	<i>Colocasia esculenta</i>	芋				0.3	5					0.3	3						0.3	3																														
Myrtaceae	<i>Cleistocalyx operculatus</i>	水翁																																																
Athyriaceae	<i>Callipteris esculenta</i>	葉蕨																																																
Poaceae	<i>Phragmites karka</i>	卡開蘆				1.2	5					1.2	2						1.2	2																														
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																																																
Equisetaceae	<i>Equisetum debile</i>	筆管草																																																
Asteraceae	<i>Ageratum conyzoides</i>	勝紅菊																																																
Commelinaceae	<i>Commelina diffusa</i>	節節草	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					0.3	3					0.3	3						0.3	3																													
Poaceae	<i>Pennisetum purpureum</i>	象草																																																
Asteraceae	<i>Wedelia chinensis</i>	錦繡菊																																																
Asteraceae	<i>Bidens alba</i>	白花鬼針草	0.3	10			0.3	10					0.3	15	0.3	10				0.3	15	0.3	10																											
Poaceae	<i>Panicum repens</i>	結骨草	0.6	5									0.6	5						0.6	5	0.6	2																											
Poaceae	<i>Coix lacryma-jobi</i>	薏苡	1.5	3																																														
Convolvulaceae	<i>Ipomoea cairica</i>	五爪金龍																																																
Cucurbitaceae	<i>Benincasa hispida</i>	冬瓜																																																
Fabaceae	<i>Pueraria lobata</i>	野葛	0.2	10									0.2	10						0.2	10																													
Convolvulaceae	<i>Merremia hederacea</i>	魚黃草	0.2	5																																														
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				0.6	5						0.6	5						0.6	5																													
Cyperaceae	<i>Cyperus sp.</i>	莎草																																																
Balsaminaceae	<i>Impatiens walleriana</i>	非洲鳳仙																																																
Amaranthaceae	<i>Celosia argentea</i>	青葙																																																
Bare Ground				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)

Family	Species	Chinese name	Post construction monitoring				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				Jan-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							
Asteraceae	<i>Mikania micrantha</i>	微甘菊	0.5	10		0.3	3		0.5	10		0.3	3		0.5	10		0.5	10		0.5	10		0.5	10		0.5	10		0.5	5		0.5	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	5		1	5		1	5		1	5		1	5		1	3		1	5		1	3			
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐				0.5	1					0.5	1					1.5	5					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					0.5	5		1.2	10		0.5	5		1.2	5		0.5	5		1.2	2		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					1.5	10					1.5	10					1.5	7		1.5	7			
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																																						
Equisetaceae	<i>Equisetum debile</i>	筆管草	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		0.3	2				0.3	5																														
Commelinaceae	<i>Commelina diffusa</i>	節節草	0.3	10		0.5	35		0.3	10		0.4	40		0.4	10		0.2	20		0.4	30		0.4	10		0.2	15		0.4	30		0.4	10		0.2	20		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>	錦娘菊																																						
Asteraceae	<i>Bidens alba</i>	白花鬼針草	0.7	5		0.6	2		0.7	5		0.6	2		0.7	5		0.5	5		0.7	5		0.5	5		0.7	5		0.5	5		0.7	5		0.5	5			
Poaceae	<i>Panicum repens</i>	結骨草	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	7					2	7		2.5	20		2	30		2.5	5		2	20		2.5	5		2	20		2	10		2	20		2	10		
Poaceae	<i>Brachiaria mutica</i>	巴拉草																																						
Onagraceae	<i>Ludwigia erecta</i>	美洲水丁香		0.3	2				0.3	5																														
Malvaceae	<i>Hibiscus rosa-sinensis</i>	大紅花																																						
Cyperaceae	<i>Cyperus sp.</i>	莎草		0.2	3				0.2	5					0.2	5					0.2	2					0.2	2					0.2	2		0.2	2			
Balsaminaceae	<i>Impatiens walleriana</i>	非洲鳳仙				1	3					1	3																											
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		1.7	5		1.7	5		1.7	5		1.7	5		1.7	5			
Bare Ground			40		93	46		40		85	46		40		14	5	40		34	25	40		83	25	40		66	25	40		58	25	40		51	58	25	48	53	

- 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							
			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											
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)	%	Height (m)	%	Height (m)	%													
Asteraceae	<i>Mikania micrantha</i>	薇甘菊	0.5	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			1.2	5	1	3			1.2	5	1	3			1.2	5			1.2	5			1.2	5																				
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐			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			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	5			1.5	5			1.5	5																				
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																																																
Equisetaceae	<i>Equisetum debile</i>	筆管草	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	35	0.4	10	0.3	25	0.4	0	0.4	8	0.3	20	0.4	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>	錦麒麟																																																
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	8														
Poaceae	<i>Panicum repens</i>	結骨草	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	8	2	10			2	3			2	3			2	3			2	5															
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			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																																
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																				
Bare Ground			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	Chinese name	Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring											
			Aug-16		Sep-16		Oct-16		Nov-16		Dec-16		Jan-17		Aug-16		Sep-16		Oct-16		Nov-16		Dec-16		Jan-17		Aug-16		Sep-16		Oct-16		Nov-16		Dec-16		Jan-17	
			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			
Asteraceae	<i>Mikania micrantha</i>	蕨甘菊	0.6	5					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	1.2	5					1.5	10						1.5	10								1.5	10												
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐				1.5	10									1.5	10																	0.3	10			
Araceae	<i>Alocasia odora</i>	海芋							0.4	5						0.4	5								0.4	5												
Araceae	<i>Colocasia esculenta</i>	芋	0.5	5					0.5	5						0.5	5								0.5	5												
Myrtaceae	<i>Cleistocalyx operculatus</i>	水箭																																				
Althiaceae	<i>Callipteris esculenta</i>	菜蕨																																				
Poaceae	<i>Phragmites karka</i>	卡爾蘆	1.5	5												1.6	5								1.6	5												
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨														1.6	5								1.6	5												
Equisetaceae	<i>Equisetum debile</i>	雀管草	0.3	5					0.5	5						0.5	5								0.5	5												
Asteraceae	<i>Ageratum conyzoides</i>	勝紅箭																																				
Commelinaceae	<i>Commelina diffusa</i>	龍眼草	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	0.5	10	0.1	10	0.1	10	0.5	10	0.2	10	0.2	10	0.5	10	0.3	10	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	0.7	5			0.5	8	0.7	5						0.5	8	0.8	5					0.1	8	0.8	5					0.3	8	0.8	5		0.3	8
Poaceae	<i>Panicum repens</i>	結骨草	0.4	5					0.4	5						0.4	5								0.4	5												
Poaceae	<i>Coix lacryma-jobi</i>	蒺藜																																				
Convolvulaceae	<i>Ipomoea catrica</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																															
Poaceae	<i>Brachiaria mutica</i>	巴拉草			1.2	2					1.2	5	1.3	5			1.2	5	1.3	5			0.1	5	0.1	5			0.3	5			0.3	5			0.3	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 Ground				55		93		72		35		85		62		35		85		62		35		85		62		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 4.2. 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											
			Feb-17		Mar-17		Apr-17		May-17		Jun-17		Jul-17		Feb-17		Mar-17		Apr-17		May-17		Jun-17		Jul-17		Feb-17		Mar-17		Apr-17		May-17		Jun-17		Jul-17	
			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			
Asteraceae	<i>Mikania micrantha</i>	蕨甘菊	0.5	10				0.5	10					0.5	10					0.5	10					0.5	5					0.5	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	10				1.6	10					1.6	10					1.7	10					1.7	5					1.7	5					
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐			0.3	10						0.3	10									0.3	10						0.3	5				0.4	5			
Araceae	<i>Alocasia odora</i>	海芋	0.4	5				0.5	5					0.5	5					0.6	5					0.6	5					0.6	5					
Araceae	<i>Colocasia esculenta</i>	芋	0.5	5				0.5	5					0.5	5					0.6	5					0.6	5					0.6	5					
Myrtaceae	<i>Cleistocalyx operculatus</i>	水箭																																				
Althiaceae	<i>Callipteris esculenta</i>	菜蕨																																				
Poaceae	<i>Phragmites karka</i>	卡爾蘆	1.6	5				1.6	5					1.6	5					1.7	5					1.7	5					1.7	5					
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	華南毛蕨																																				
Equisetaceae	<i>Equisetum debile</i>	雀管草	0.5	5				0.5	5					0.5	5					0.5	5					0.5	5					0.5	5					
Asteraceae	<i>Ageratum conyzoides</i>	豚耳菊																																				
Commelinaceae	<i>Commelina diffusa</i>	龍眼草	0.6	10	0.4	10	0.3	10	0.6	10	0.5	10	0.3	10	0.6	10	0.5	10	0.3	10	0.6	10	0.5	10	0.3	10	0.6	5	0.5	10	0.3	5	0.6	5	0.5	10	0.3	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	0.8	5		0.4	8	0.8	5			0.4	8	0.8	5			0.4	8	0.8	5			0.4	8	0.8	5			0.4	3	0.8	5			0.4	3	
Poaceae	<i>Panicum repens</i>	結骨草	0.4	5					0.5	5					0.5	5					0.5	5					0.5	5					0.6	5				
Poaceae	<i>Coxis lacryma-jobi</i>	蕨草																																				
Convolvulaceae	<i>Ipomoea catrica</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			0.3	5					0.3	10					0.3	10				0.3	10						0.3	10					0.4	10		
Poaceae	<i>Brachiaria mutica</i>	巴拉草		0.3	5		0.3	5			0.5	10		0.3	5			0.5	10		0.3	5			0.5	10		0.3	5			0.5	10		0.3	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	1.5	5				1.5	5					1.5	5					1.5	5					1.5	5					1.5	5					
Bare Ground				35		85		62		35		80		57		35		80		57		35		80		57		35		80		57		35		80		57

- 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			
			Stream		Aug-17				Sep-17					
			Transect	Reference	T1		T2		Reference	T1		T2		
	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%		
Asteraceae	<i>Mikania micrantha</i>	蕨甘菊	0.5	5					0.5	5				
Moraceae	<i>Ficus hispida</i>	對葉榕												
Ulmaceae	<i>Celtis sinensis</i>	朴樹												
Poaceae	<i>Microstegium ciliatum</i>	剛秀竹	1.7	5					1.7	5				
Euphorbiaceae	<i>Macaranga tanarius</i>	血桐				0.5	5					0.5	5	
Araceae	<i>Alocasia odora</i>	海芋	0.6	5					0.7	5				
Araceae	<i>Colocasia esculenta</i>	芋	0.6	5					0.7	5				
Myrtaceae	<i>Cleistocalyx operculatus</i>	水翁												
Althiaceae	<i>Callipteris esculenta</i>	菜蕨												
Poaceae	<i>Phragmites karka</i>	卡爾蘆	1.7	5					1.7	5				
Thelypteridaceae	<i>Cyclosorus parasiticus</i>	雜草毛蕨												
Equisetaceae	<i>Equisetum debile</i>	雀管草	0.5	5					0.6	5				
Asteraceae	<i>Ageratum conyzoides</i>	勝紅箭												
Commelinaceae	<i>Commelina diffusa</i>	龍眼草	0.6	5	0.5	10	0.3	5	0.6	5	0.5	10	0.3	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>	蝴蝶菊												
Asteraceae	<i>Bidens alba</i>	白花鬼針草	0.8	5		0.4	3	0.8	5			0.4	3	
Poaceae	<i>Panicum repens</i>	結骨草	0.6	5					0.6	5				
Poaceae	<i>Coxis lacryma-jobi</i>	蕨苣												
Convolvulaceae	<i>Ipomoea catrica</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				0.4	10					0.4	10	
Poaceae	<i>Brachiaria mutica</i>	巴拉草			0.5	10	0.3	5			0.5	10	0.3	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	1.5	5					1.5	5				
Bare Ground				50		80		72		50		80		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 4.3 Avifauna recorded along survey transects and at two selected point count locations for Upper Tai Po River. (T1- Upper stream section and T2- Lower stream section)

Common Name	Species name	Chinese name	Status	Rarity	Post construction monitoring																								Post construction monitoring															
					Jul-16			Aug-16			Sep-16			Oct-16			Nov-16			Dec-16			Jan-17			Feb-17			Mar-17			Apr-17			May-17			Jun-17			Jul-17			
					Abundance	T1	T2	Abundance	T1	T2	Abundance	T1	T2	Abundance	T1	T2	Abundance	T1	T2	Abundance	T1	T2	Abundance	T1	T2	Abundance	T1	T2	Abundance	T1	T2	Abundance	T1	T2	Abundance	T1	T2	Abundance	T1	T2				
Barn Swallow	<i>Hirundo rustica</i>	家燕	SV, SpM	C	++		5	++		6	++		7	++		5									+		3	+		5	+		6	+		4	+		3	+		6		
Black-crown Night Heron	<i>Nycticorax nycticorax</i>	夜鷺	R,WV, PC	C																																								
Black Kite	<i>Milvus lineatus</i>	黑鸢	R, RC, Cap.586	C																																								
Black-collared Starling	<i>Sturnus nigricollis</i>	黑領椋鳥	R	C	+		2	+	2	2	+		2	+	2	3	+	2	2	+		2	+	2	1	+	2	2	+	3		+		2	+	2	2	+		2	+	1	2	
Chinese Bulbul	<i>Pycnonotus sinensis</i>	白頭鵲	R	C	++		5	++	3	3	++		7	++		5	++	3	2	++		5	4	++	3	2	++	4	5	++	5	2	++	3	3	++	2	3	++	2	2	++	3	2
Chinese Hwamei	<i>Garrulax canorus</i>	畫眉	R	C																																								
Chinese Pond Heron	<i>Ardeola bacchus</i>	池鷺	R,RC	C	+	1		+	1		+	1		+	1		+	1		+	1		+	1		+	1		+	1		+	1		+	1		+	1		+	1		
Common Blackbird	<i>Turdus merula</i>	烏鶇	WV, PM	C																																								
Common Kingfisher	<i>Alcedo atthis</i>	普通翠鳥	PM, WV	C																																								
Common Koel	<i>Eudynamis scolopacea</i>	噪鶇	R	C	+																																							
Common Sandpiper	<i>Actitis hypoleucos</i>	磯鷗	WV&P, M	C																																								
Common Snipe	<i>Gallinago gallinago</i>	扇尾沙雉	WV&P, M	C																																								
Common Tailorbird	<i>Orthotomus sutorius</i>	長尾縫葉鶯	R	C	+		+		+		1	+	1	1	+	2	2	+	1	1	+	1	1	+	1	1	+	1	1	+	1	1	+	1	1	+	1	1	+	1	1			
Crested bulbul	<i>Pycnonotus jocosus</i>	紅耳鵲	R	C	+++	5	3	+++	2	7	+++	6	2	+++	7	6	+++	5	7	+++	8	6	+++	9	5	+++	8	7	+++	9	8	+++	5	6	+++	7	8	+++	9	2	+++	8	7	
Crested Myna	<i>Acridotheres cristatellus</i>	八哥	R	C	+		+		2	+		+		2	+	2	2	+		2	+		1	+		+		2	+		2	+	1	2										
Daurian redstart	<i>Phoenicurus aureus</i>	北紅尾鶇	WV	U																																								
Domestic pigeon	<i>Columba sp.</i>	鴿	R	C																																								
Eastern Buzzard	<i>Buteo japonicus</i>	普通鵟	WV, Cap. 586	C																																								
Eurasian Tree Sparrow	<i>Passer montanus</i>	麻雀	R	C	++		5	++	4	6	++	5	6	++	4	3	++	3	3	++	5	5	++	4	3	++	3	3	++	3	2	++	5	4	++	3	2	++	5	1	++	3	4	
Great Coucal	<i>Centropus sinensis</i>	褐翅鴉鵂	R, VU	C	+		+		+		+		+		+		+		+		+		+		+		1	+		+		+		+		+		+						
Great Tit	<i>Parus major (commixtus)</i>	大山雀	R	C																																								
Green Sandpiper	<i>Tringa ochropus</i>	白腰草鷗	WV	U																																								
Grey Wagtail	<i>Motacilla cinerea</i>	灰鶇	WV	C	+		1	+		1	+		1	+	1	1	+	1	1	+	1	1	+	1	1	+	1	1	+	1	1	+	1	1	+	1	1	+	1	1	+	1	1	
Japanese White Eye	<i>Zosterops japonica</i>	暗綠繡眼鳥	R	C	+		2	+		2	+		2	+		4	+	2	3	+		3	+	2	2	+		2	+															
Large Hawk Cuckoo	<i>Hierococyx sparverioideus</i>	大鷹鴉	PM, SV	C																																								
Large-billed Crow	<i>Corvus macrorhynchos</i>	大嘴烏鶇	R	C																																								
Little Egret	<i>Egretta garzetta</i>	小白鷺	R, RC	C	+	1		+	1		+	1		+	1		+	1		+	1		+	1		+	1	1	+		1	+	1		+	1		+	1		+	2		
Little Swift	<i>Apus affinis</i>	小白腰雨燕	R, SpM	C																																								
Maggie	<i>Pica pica</i>	喜鵲	R	C																																								
Maggie Robin	<i>Copsychus saularis</i>	鶉鴉	R	C	+	2	1	+	2	2	+	1	2	+	1	1	+	2	2	+	2	2	+	1	1	+	2		+	2	2	+	1	1	+	1	1	+	2	1	+	2	2	
Olive Backed pipit	<i>Anthus hodgsoni</i>	樹鶇	WV	C																																								
Plaintive Cuckoo	<i>Cacomantis merulinus</i>	八聲杜鵑	SV	U																																								
Red-billed blud magpie	<i>Urocissa erythrorhyncha</i>	紅咀藍鶇	R	C																																								
Rufous-backed Shrike	<i>Lanius schach</i>	棕背伯勞	R	C																																								
Scaly-breasted Munia	<i>Lonchura punctulata</i>	斑文鳥	R	C																																								
Scarlet Minivet	<i>Pericrocotus flammeus</i>	赤紅山椒鳥	R	C			+																																					
Scarlet-backed Flowerpecker	<i>Dicaeum cruentatum</i>	朱背啄花鳥	R	C																																								
Siberian Stonechat	<i>Saxicola maurus</i>	黑喉石鶇	WV	C																																								
Silver-eared Mesia	<i>Leiothrix argenteauris</i>	銀耳相思鳥	R	C																																								
Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>	白喉紅鵲	R	C																																								
Spotted Dove	<i>Streptopelia chinensis</i>	珠頸斑鳩	R	C	++	3	4	++	4	5	++	3	4	++	4	5	++	4	2	++	3	2	++	5	2	++	3	3	++	3	2	++	5	4	++	5	5	++	2	4	++	3	5	
Violet Whistling Thrush	<i>Myiophonus caeruleus</i>	紫嘯鶇	R	C																																								
White Wagtail	<i>Motacilla alba</i>	白鶇	WV, R	C	+		1	+		1	+		1	+	1	1	+	1	1	+	2	1	+	1	1	+	2	1	+	1	1	+		+	1	1	+	1	1	+	1	1		
White-breasted Waterhen	<i>Amaurornis phoeniceus</i>	白胸苦惡鳥	R	C																																								
White-rumped Munia	<i>Lonchura striata</i>	白腰文鳥	R	C																																								

Table 4.3 Avifauna recorded along survey transects and at two selected point count locations for Upper Tai Po River. (T1- Upper stream section and T2- Lower stream section)

Post construction monitoring																			
		May-17			Jun-17			Jul-17			Aug-17			Sep-17					
		Abundance			Abundance			Abundance			Abundance			Abundance					
Common Name	Species name	Chinese name	Status	Rarity	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2
Barn Swallow	<i>Hirundo rustica</i>	家燕	SV, SpM	C	+		4	+		3	+		6						
Black -crown Night Heron	<i>Nycticorax nycticorax</i>	夜鷺	R,WV, P	C															
Black Kite	<i>Milvus lineatus</i>	黑鷹	R, RC, Cap.586	C															
Black-collared Starling	<i>Sturnus nigricollis</i>	黑領椋鳥	R	C	+	2	2	+		2	+	1	2	+	1		+	2	1
Chinese Bulbul	<i>Pycnonotus sinensis</i>	白頭鶇	R	C	++	2	3	++	2	2	++	3	2	++	2	1	++	3	2
Chinese Hwamei	<i>Garrulax canorus</i>	畫眉	R	C															
Chinese Pond Heron	<i>Ardeola bacchus</i>	池鷺	R,RC	C	+	1		+	1		+	1		+	1		+	1	1
Common Blackbird	<i>Turdus merula</i>	烏鶇	WV, PM	C															
Common Kingfisher	<i>Alcedo atthis</i>	普通翠鳥	PM, WV	C														+	
Common Koel	<i>Eudynamis scolopacea</i>	噪鶇	R	C	+														
Common Sandpiper	<i>Actitis hypoleucos</i>	磯鶇	WV&P	C															
Common Snipe	<i>Gallinago gallinago</i>	扇尾沙雉	WV&P	C															
Common Tailorbird	<i>Orthotomus sutorius</i>	長尾縫紉鶇	R	C	+		1	+		1	+		1	+		1	+		1
Crested bulbul	<i>Pycnonotus jocosus</i>	紅耳鶇	R	C	+++	7	8	+++	9	2	+++	8	7	+++	9	3	+++	8	2
Crested Myna	<i>Acridotheres cristatellus</i>	八哥	R	C	+	1	2				+			+			+		1
Daurian redstart	<i>Phoenicurus aureus</i>	北紅尾鶇	WV	U															
Domestic pigeon	<i>Columba sp.</i>	鴿	R	C															
Eastern Buzzard	<i>Buteo japonicus</i>	普通鵟	WV, Cap.586	C															
Eurasian Tree Sparrow	<i>Passer montanus</i>	麻雀	R	C	++	3	2	++	5	1	++	3	4	++	5	2	++	4	3
Great Coucal	<i>Centropus sinensis</i>	褐翅鴉鶇	R,VU	C	+			+			+								
Great Tit	<i>Parus major (commixtus)</i>	大山雀	R	C	+														
Green Sandpiper	<i>Tringa ochropus</i>	白腰草鶇	WV	U															
Grey Wagtail	<i>Motacilla cinerea</i>	灰鶇鶇	WV	C	+		1	+		1							+		
Japanese White Eye	<i>Zosterops japonica</i>	暗綠繡眼鳥	R	C															
Large Hawk Cuckoo	<i>Hierococcyx sparverioides</i>	大鷹鴉	PM, SV	C				+		1									
Large-billed Crow	<i>Corvus macrorhynchos</i>	大嘴烏鶇	R	C															
Little Egret	<i>Egretta garzetta</i>	小白鶇	R, RC	C	+	1		+	1		+	2		+	1		+	1	
Little Swift	<i>Apus affinis</i>	小白腰雨燕	R, SpM	C	++			++		5	++								
Maggie	<i>Pica pica</i>	喜鵲	R	C															
Maggie Robin	<i>Copsychus saularis</i>	鶇鶇	R	C	+	1	1	+	2	1	+	2	2	+	1	2	+	2	2
Olive Backed pipit	<i>Anthus hodgsoni</i>	樹鶇	WV	C															
Plaintive Cuckoo	<i>Cacomantis merulinus</i>	八聲杜鶇	SV	U															
Red-billed blud magpie	<i>Urocissa erythrorhyncha</i>	紅咀藍鶇	R	C															
Rufous-backed Shrike	<i>Lanius schach</i>	棕背伯勞	R	C							+								
Scaly-breasted Munia	<i>Lonchura punctulata</i>	斑文鳥	R	C															
Scarlet Minivet	<i>Pericrocotus flammeus</i>	赤紅山椒鳥	R	C															
Scarlet-backed Flowerpecker	<i>Dicaeum cruentatum</i>	朱背啄花鳥	R	C															
Siberian Stonechat	<i>Saxicola maurus</i>	黑喉石鶇	WV	C															
Silver-eared Mesia	<i>Leiothrix argenteauris</i>	銀耳相思鳥	R	C															
Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>	白喉紅臀鶇	R	C															
Spotted Dove	<i>Streptopelia chinensis</i>	珠頸斑鶇	R	C	++	5	5	++	2	4	++	3	5	++	5	2	++	3	3
Violet Whistling Thrush	<i>Myiophonus caeruleus</i>	紫嘯鶇	R	C															
White Wagtail	<i>Motacilla alba</i>	白鶇鶇	WV, R	C	+	1	1	+	1	1	+	1	1	+	1	1	+	2	
White-breasted Waterhen	<i>Amaurornis phoeniceus</i>	白胸苦惡鳥	R	C															
White-rumped Munia	<i>Lonchura striata</i>	白腰文鳥	R	C															
Yellow Bellid Prinia	<i>Prinia flaviventris</i>	灰頭鶇鶇	R	C															
Yellow Wagtail	<i>Motacilla flava</i>	黃鶇鶇	WV&PM	C															
Number of birds						24	30		23	24		24	30		26	12		26	16
No. of species					17	10	11	15	8	12	15	9	9	11	9	7	13	9	9

Note: R – Resident; WV – Winter visitor; SV–Summer Visitor; PM – Passage migrant; C – Common; U – Uncommon; SpM – Spring migrant; C – transect count; P1 – Point count location 1; P2 – Point count location 2

Abundance indication: +, No. of indiv. 1 – 3; ++, No. of indiv. 4 – 10; +++, No. of indiv. >10; 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 onver 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 UpperTai Po River

Species	Common name	Chinese name	Status	Commonness	Post construction monitoring												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	Nov-16	Dec-16	Jan-17	Feb-17	Mar-17	Apr-17	May-17	Jun-17	Jul-17
<i>Aethriamanta brevipennis brevipennis</i>	Elusive Adjutant	短腹異蜻	NP	U												+	+	+												
<i>Macrodiplax cora</i>	Coastal Glider	高翔滑蜻	NP	C	+	+																								
<i>Ceriatrion auranticum ryukyuanum</i>	Orange-tailed Sprite	琉球橘黃蜻	NP	VC	+	+	+	+								+	+	+	+											
<i>Copera marginipes</i>	Yellow Featherlegs	黃夾尾蜻	NP	VC	+	+	+	+																						
<i>Crocothemis servilia servilia</i>	Crimson Dart	紅蜻	NP	VC		+	+	+	+							+	+	+	+	+				+	+	+	+	+		
<i>Euphaea decorata</i>	Black-banded Gossamerwing	方帶幽蜻	NP	VC																										
<i>Neurobasis chinensis</i>	Chinese Greenwing	華麗色蜻	NP	C					+	+					+	+	+	+	+	+	+									
<i>Neurothemis fulvia</i>	Russet Percher	網脈蜻	NP	VC			+	+	+																					
<i>Orithetrum chrysis</i>	Red-faced Skimmer	華麗灰蜻	NP	VC					+	+			+		+	+	+	+	+	+	+									
<i>Orithetrum glaucum</i>	Common blue skimmer	黑尾灰蜻	NP	VC					+	+																				
<i>Orithetrum luzonicum</i>	Marsh Skimmer	呂宋灰蜻	NP	VC	+	+	+								+	+	+	+	+	+	+									
<i>Orithetrum pruinatum neglectum</i>	Common Red Skimmer	赤褐灰蜻	NP	VC	+	+	+								+	+	+	+	+	+	+									
<i>Palpopleura sexmaculata sexmaculata</i>	Asian Widow	六斑曲線蜻	NP	C	+	+																								
<i>Pantala flavescens</i>	Wandering Glider	黃蜻	NP	VC						+	+		+		+	+	+	+	+	+	+									
<i>Paracercion calamorum dyeri</i>	Dusky Lily'squatter	華尾蜻	P, LC	C																										
<i>Prodiasineura autumnalis</i>	Black Threadtail	烏齒原蜻	NP	VC				+																						
<i>Pseudagrion rubriceps rubriceps</i>	Orange-faced Sprite	丹頂斑蜻	NP	C	+	+																								
<i>Rhinocypha perforata</i>	Common Blue Jewel	三斑鼻蜻	NP	VC	+	+	+	+	+																					
<i>Trithemis aurora</i>	Crimson dropwing	曉曙蜻	NP	VC					+	+						+	+	+	+	+	+									
<i>Trithemis festiva</i>	Indigo Dropwing	縹曙蜻	NP	VC	+	+	+	+	+						+	+	+	+	+	+	+									
<i>Urothemis signata signata</i>	Scarlet Basket	赤斑曲鈎脈蜻	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	5	1	1	2	3	6	9	10	10

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 UpperTai Po River

Species	Common name	Chinese name	Status	Commonness	Aug-17	Sep-17
<i>Aethriamanta brevipennis brevipennis</i>	Elusive Adjutant	短腹異蜻	NP	U		
<i>Macrodiplax cora</i>	Coastal Glider	高翔滑蜻	NP	C		
<i>Ceriatrigon auranticum ryukyuanum</i>	Orange-tailed Sprite	琉球橘黃蝶	NP	VC		
<i>Copera marginipes</i>	Yellow Featherlegs	黃夾尾蝶	NP	VC	+	
<i>Crocothemis servilia servilia</i>	Crimson Darter	紅蜻	NP	VC	+	+
<i>Euphaea decorata</i>	Black-banded Gossamerwing	方帶幽蝶	NP	VC	+	
<i>Neurobasis chinensis</i>	Chinese Greenwing	華鸞色蝶	NP	C	+	+
<i>Neurothemis fulvia</i>	Russet Percher	網脈蜻	NP	VC		
<i>Orithetrum chrysis</i>	Red-faced Skimmer	華麗灰蜻	NP	VC	+	+
<i>Orithetrum glaucum</i>	Common blue skimmer	黑尾灰蜻	NP	VC		
<i>Orithetrum luzonicum</i>	Marsh Skimmer	呂宋灰蜻	NP	VC	+	+
<i>Orithetrum pruinosum neglectum</i>	Common Red Skimmer	赤褐灰蜻	NP	VC		
<i>Palpopleura sexmaculata sexmaculata</i>	Asian Widow	六斑曲線蜻	NP	C		
<i>Pantala flavescens</i>	Wandering Glider	黃蜻	NP	VC	+	+
<i>Paracercion calamorum dyeri</i>	Dusky Lilysquatter	葦尾蝶	P, LC	C		
<i>Prodasineura autumnalis</i>	Black Threadtail	烏齒原蝶	NP	VC	+	+
<i>Pseudagrion rubriceps rubriceps</i>	Orange-faced Sprite	丹頂斑蝶	NP	C		
<i>Rhinocypha perforata</i>	Common Blue Jewel	三斑鼻蝶	NP	VC	+	+
<i>Trithemis Aurora</i>	Crimson dropwing	曉曙蜻	NP	VC	+	+
<i>Trithemis festiva</i>	Indigo Dropwing	靛曙蜻	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					11	9

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 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		Impact monitoring		Impact monitoring		Impact monitoring		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		Jan-14		Feb-14		Jan-14		Feb-14		Jan-14		Feb-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				
Mollusca																																									
<i>Biomphalaria sp.</i>	--	NP	VC																																						
<i>Brotia hainanensis</i>	--	NP	VC	++	+	++																																			
<i>Melanoides tuberculata</i>	縮螺	NP	VC																																						
<i>Physella acuta</i>	尖形旋螺	NP	VC																																						
<i>Pomacea canaliculata</i>	福果螺	NP	VC																																						
<i>Radix plicatulus</i>	羅白螺	NP	VC																																						
<i>Sinoia quadrata</i>	田螺	NP	VC																																						
Insects																																									
<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>	蠅幼虫	NP	VC	+	+	+																																			
<i>Ephemera sp.</i>	--	NP	VC																																						
<i>Indobaetis 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																																						
Crustacea																																									
<i>Caridina cantonensis</i>	廣東米蝦	NP	VC			+																																			
<i>Cryptopotamon anacoluthon</i>	螺刺蚤蟹	NP	C																																						
<i>Eriochetr japonica</i>	日本蟻蟹	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

Note:
 "NP" – Not protected in Hong Kong
 "L" - Listed in Wildlife 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																						
			Mar-14			Apr-14			May-14			Jun-14			Jul-14			Aug-14			Sep-14			Oct-14			Nov-14			Dec-14			Jan-15			Feb-15			Mar-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			
Mollusca																																								
<i>Biomphalaria sp.</i>	--	NP VC	+		+				+						+						+																+			
<i>Brotia hainanensis</i>	--	NP VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Melanoides tuberculata</i>	縮螺	NP VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Physella acuta</i>	尖唇蜆螺	NP VC																																						
<i>Pomacea canaliculata</i>	福果螺	NP VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Radix plicatulus</i>	羅白螺	NP VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
<i>Sinothaia quadrata</i>	田螺	NP VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		
Insects																																								
<i>Anisocentropus sp.</i>	--	NP VC	+						+						+						+																			
<i>Arctoptora sp.</i>	--	NP VC	+						+						+						+																			
<i>Aulocodes sp.</i>	--	NP VC																																						
<i>Baetis sp.</i>	--	NP VC	+						+						+						+																	+		
<i>Chironomus sp.</i>	孑孓	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																																						
Crustacea																																								
<i>Caridina cantonensis</i>	廣東米蝦	NP VC	+	+	+	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+	++	+	+	++	+	+	++	+	+	++	+	+	++	+	+	++	+			
<i>Cryptopotamon anacoluthon</i>	雙刺溪蟹	NP C	+			+															+															++	++			
<i>Eriocheir japonica</i>	日本蟬蟹	NP C																																						
<i>Macrobrachium hainanense</i>	海南沼蝦	NP VC	+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+			
No of Species			17	11	9	18	13	9	15	9	7	15	9	5	18	10	6	18	9	8	19	12	8	19	13	7	19	11	6	16	10	5	19	10	5	18	7	4	19	7

Note:
 "NP" - Not protected in Hong Kong
 "+" - Listed in WHA 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														
			Jun-16			Jul-16			Aug-16			Sep-16			Oct-16			Nov-16			Dec-16			Jan-17			Feb-17			Mar-17					
			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		
Mollusca																																			
<i>Biomphalaria sp.</i>	--	NP	VC	+			+			+			+			+			+			+			+			+			+				
<i>Brotia hainanensis</i>	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Melanoides tuberculata</i>	縮螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Physella acuta</i>	尖唇蜆	NP	VC																																
<i>Pomacea canaliculata</i>	福果螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Radix plicatulus</i>	羅白螺	NP	VC	+			+			+			+			+			+			+			+			+			+				
<i>Sinotaia quadrata</i>	田螺	NP	VC	+	+			+	+				+	+			+	+			+	+			+	+			+	+					
Insects																																			
<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>	蠅幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Ephemera sp.</i>		NP	VC																																
<i>Indobaetis sp.</i>	--	NP	VC		+			+			+			+			+			+			+			+			+			+			
<i>Mnais sp.</i>	--	NP	VC		+			+			+			+			+			+			+			+			+			+			
Odonate Larvae	--	NP	VC		+			+			+			+			+			+			+			+			+			+			
<i>Orithetrum sp.</i>	--	NP	VC		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		
<i>Perla sp.</i>	--	NP	VC		+			+			+			+			+			+			+			+			+			+			
<i>Rhaphium sp.</i>	--	NP	VC																																
<i>Tipulidae spp.</i>	--	NP	VC																																
Crustacea																																			
<i>Caridina cantonensis</i>	廣東米蝦	NP	VC		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		
<i>Cryptopotamon anacoluthon</i>	雙刺溪蟹	NP	C																																
<i>Eriocheir japonica</i>	日本蟳蟹	NP	C																																
<i>Macrobrachium hainanense</i>	海南沼蝦	NP	VC																																
No of Species				3	15	6	3	15	6	3	15	6	3	17	6	3	17	6	3	17	6	3	18	6	3	18	6	3	18	6	3	18	6	3	

Note:
 "NP" – Not protected in Hong Kong
 "+" - Listed in WHA 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)

Post construction monitoring																					
Species	Chinese name	Sampling point	Apr-17			May-17			Jun-17			Jul-17			Aug-17			Sep-17			
			Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	
Mollusca																					
<i>Biomphalaria sp.</i>	--	NP VC	+			+			+			+			+			+			
<i>Brotia hainanensis</i>	--	NP VC	+	+		+	+		+	+		+	+		+	+		+	+		
<i>Melanoides tuberculata</i>	縮螺	NP VC	+		+	+		+	+		+		+		+		+		+	+	
<i>Physella acuta</i>	尖唇蜆	NP VC																			
<i>Pomacea canaliculata</i>	福果螺	NP VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Radix plicatulus</i>	羅白螺	NP VC	+			+			+			+			+			+			
<i>Sinoia quadrata</i>	田螺	NP VC	+	+		+	+		+	+		+	+		+	+		+	+		
Insects																					
<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>	蠅幼虫	NP VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
<i>Ephemera sp.</i>		NP VC																			
<i>Indobaetis sp.</i>	--	NP VC	+			+			+			+			+			+			
<i>Mnais sp.</i>	--	NP VC	+			+			+			+			+			+			
Odonate Larvae	--	NP VC	+			+			+			+			+			+			
<i>Orithetrum sp.</i>	--	NP VC	+	+		+	+		+	+		+	+		+	+		+	+		
<i>Perla sp.</i>	--	NP VC	+			+			+			+			+			+			
<i>Rhaphium sp.</i>	--	NP VC																			
<i>Tipulidae spp.</i>	--	NP VC																			
Crustacea																					
<i>Caridina cantonensis</i>	廣東米蝦	NP VC	+	+		+	+		+	+		+	+		+	+		+	+		
<i>Cryptopotamon anacoluthon</i>	雙刺溪蟹	NP C	+			+			+			+			+			+			
<i>Eriocheir japonica</i>	日本蟳蟹	NP C	+			+			+			+			+			+			
<i>Macrobrachium hainanense</i>	海南沼蝦	NP VC	+			+			+			+			+			+			
No of Species			18	6	3	18	6	3	18	6	3	18	6	3	18	6	3	18	6	3	

Note:

- "NP" – Not protected in Hong Kong
- "L" - 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 site)

Species	Status	Commonness	Impact monitoring																																						
			Baseline survey		Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Post construction monitoring									
			Oct-07	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						
<i>Cyprinus carpio var. viridiviolaceus</i>	錦鯉	NP	C																																						
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	++			+	+			+	++			+	+	+	+	+	+																				
<i>Glyptothorax pallozonum</i>	白線紋胸鮠	NP	R																																						
<i>Limparhomaloptera disparis</i>	擬平鰲	NP	C																																						
<i>Misgurnus anguillicaudatus</i>	泥鰌	NP	C			+																																			
<i>Oreochromis niloticus</i>	尼羅口非鯽	NP	C	+																																					
<i>Parazacco spilurus</i>	異鰱	V and	C	++		+	+																																		
<i>Poecilia reticulata</i>	孔雀花魚	NP	C	++	+			++																																	
<i>Pseudobagrus trilineatus</i>	三線擬鱧	NP,GC	R																																						
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰍	NP	C	+																																					
<i>Pterocryptis cochinchinensis</i>	越南隱鱧	NP	C																																						
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+		+	+																																		
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C	+		+																																			
<i>Schistura fasciolata</i>	橫紋南鰍	NP	C	+																																					
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	++																																					
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C	+																																					
		2x2m fish		70	60	15	8	25	10	20	100	10	2	8	10	7	100	10	5	20	6	2	4	6	2	5	5	2	2	5	2	1	5	2	1	12	8	6	10	12	10
		No of Speices		10	2	7	3	2	7	4	4	7	5	5	7	9	7	8	5	3	11	2	7	10	3	5	8	2	2	9	2	1	9	4	1	9	4	3	8	5	4
Amphibian																																									
<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 4.6 Fish species and Hong Kong Newt recorded at Upper Tai Po River (T1 - Upper stream sampling site and T2 - Lower stream sampling site)

Species	Status	Commonness	Post construction monitoring															Post construction monitoring															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											
			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												
<i>Cyprinus carpio var. viridiviolaceus</i>	錦鯉	NP	C																																												
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+	+																																										
<i>Glyptothorax pallozomum</i>	白線紋胸鮡	NP	R																																												
<i>Limparhomaloptera disparis</i>	麗平鰻	NP	C	+																																											
<i>Misgurnus anguillicaudatus</i>	泥鰻	NP	C																																												
<i>Oreochromis niloticus</i>	尼羅口非鯽	NP	C	+																																											
<i>Parazacco spilurus</i>	黑鰻	V and	C	+	+																																										
<i>Poecilia reticulata</i>	孔雀魚	NP	C																																												
<i>Pseudobagrus trilineatus</i>	三線擬鮠	NP.GC	R	+																																											
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰻	NP	C	+																																											
<i>Pterocryptis cochinchinensis</i>	越南隱鱗鮡	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	10	5	35	15	10	45	20	5	50	15	5	45	20	5	45	20	5	40	15	5	25	10	5	25	10	5	20	7	2	22	5	2	22	2	2								
		No of Speices		12	4	1	12	4	1	12	4	1	11	4	1	11	4	1	11	4	1	11	4	1	12	2	1	11	2	1	12	2	1	12	2	1	12	1	1								
Ambibian																																															
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P	UC	+																																											

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- Reference point was the sampling location outside the works area used to compare 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 site)

Species	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			
			Oct-16			Nov-16			Dec-16			Jan-17			Feb-17			Mar-17			Apr-17			May-17			Jun-17			
			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	
<i>Cyprinus carpio var. viridiviolaceus</i>	錦鯉	NP	C																											
<i>Gambusia affinis</i>	食蚊魚	NP	VC	+			+			+			+			+			+			+			+			+		
<i>Glyptothorax pallozomus</i>	白線紋胸鮡	NP	R	+			+			+			+			+			+			+			+			+		
<i>Limparhomaloptera disparis</i>	麗平鰍	NP	C	+			+			+			+			+			+			+			+			+		
<i>Misgurnus anguillicaudatus</i>	泥鰍	NP	C																											
<i>Oreochromis niloticus</i>	尼羅口非鯽	NP	C	+			+			+			+			+			+			+			+			+		
<i>Parazacco spilurus</i>	黑鰱	V and	C	+			+			+			+			+			+			+			+			+		
<i>Poecilia reticulata</i>	孔雀花魚	NP	C																											
<i>Pseudobagrus trilineatus</i>	三線擬鱮	NP.GC	R	+			+			+			+			+			+			+			+			+		
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰍	NP	C	+			+			+			+			+			+			+			+			+		
<i>Pterocryptis cochinchinensis</i>	越南隱鱮	NP	C	+			+			+			+			+			+			+			+			+		
<i>Puntius semifasciolatus</i>	七星魚	NP	C	+			+			+			+			+			+			+			+			+		
<i>Rhinogobius spp.</i>	鰻虎魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
<i>Schistura fasciolata</i>	橫紋南鰍	NP	C	+			+			+			+			+			+			+			+			+		
<i>Xiphophorus hellerii</i>	劍尾魚	NP	C	+			+			+			+			+			+			+			+			+		
<i>Xiphophorus variatus</i>	雜色劍尾魚	NP	C																											
		2x2m fish		25	2	2	30	2	2	35	2	2	40	2	2	45	2	2	45	2	2	40	2	2	30	2	2	20	2	2
		No of Speices		12	1	1	12	1	1	12	1	1	12	1	1	12	1	1	12	1	1	12	1	1	12	1	1	12	1	1
Amphibian																														
<i>Paramotriton hongkongensis</i>	香港瘰螈	P	UC	+																										

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

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- Reference point was the sampling location outside the works area used to compare 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 site)

Species	Status	Commonness	Post construction monitoring			Post construction monitoring			Post construction monitoring			
			Jul-17			Aug-17			Sep-17			
			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 pallozomum</i>	白線紋胸鮠	NP	R	+			+			+		
<i>Limpartholoptera disparis</i>	擬平鰻	NP	C	+			+			+		
<i>Misgurnus anguillicaudatus</i>	泥鰍	NP	C									
<i>Oreochromis niloticus</i>	尼羅口鱒非鱒	NP	C	+			+			+		
<i>Parazacco spilurus</i>	黑鰻	V and	C	+			+			+		
<i>Poecilia reticulata</i>	孔雀花魚鱒	NP	C									
<i>Pseudobagrus trilineatus</i>	三線擬鱮	NP.GC	R	+			+			+		
<i>Pseudogastromyzon myersi</i>	麥氏擬腹吸鰻	NP	C	+			+			+		
<i>Pterocryptis cochinchinensis</i>	越南隱鱮鯪	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		15	1	1	20	1	1	25	1	1
		No of Speices		12	1	1	12	1	1	12	1	1
Amphibian												
<i>Paramesotriton hongkongensis</i>	香港瘰螈	P	UC					+			+	

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

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

Parameters/ Date	Post construction monitoring										
	-17	May-17		Jun-17		Jul-17		Aug-17		Sep-17	
Replicate	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
DO (mg/L)	8.0	7.9	8.0	8.0	8.0	7.9	8.0	8.0	8.0	7.9	8.0
pH	7.7	7.7	7.8	7.7	7.7	7.7	7.7	7.7	7.8	7.7	7.8
Nitrate (mg N/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Ammonia (mg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Conductivity (mS/cm)	31	29	27	22	21	19	20	23	25	18	23
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.3	0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3	
Water flow at riffle (m/s)	0.6	0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6	
Sand (%)	0	0	0	0	0	0	0	0	0	0	0
Stone (%)	20	40	20	40	20	40	20	40	20	40	20
Mud (%)	0	0	0	0	0	0	0	0	0	0	0
Concrete (%)	80	60	80	60	80	60	80	60	80	60	80