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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 ANNUAL REPORT 2014

Prepared By:

ALLIED ENVIRONMENTAL CONSULTANTS LTD.

For:

**Drainage Services Department** 



Acousticians & Environmental Engineers

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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**

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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

2014 Annual Report Upper Lam Tsuen River

January 2015



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January 8, 2015

January 8, 2015

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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)

# 2014 Annual Report 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. An annual report is required to be prepared for 2014 by using the collected data from surveys of January to November conducted by Contract NO. DC/2007/06 River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River and survey of December conducted under the 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. This report aims to summaries and present findings of the post construction ecological monitoring carried out during 2014.
- 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 1 annual report for the project summarising monitoring results collected from January to December of 2014. It contents the following subsections:
  - Summary of major points
  - Monitoring Methods
  - Monitoring Results
  - Summary and Comments

### 2 Summary of Major Points

- Field ecological monitoring was undertaken during January to December 2014;
- Presentation of species abundance and species richness for fauna and flora using graphs;
- Aquatic and riparian vegetation re-established quickly after completion of drainage works;
- Adult, juvenile and eggs of Hong Kong Newt were commonly found during monitoring survey. Capture and release survey was undertaken in November 2014, the result showed that the abundance of Hong Kong Newt is increasing as better feeding and breeding habitats established;
- The collected data of the number of fish species did not show significant seasonal change. Whilst fish population or density/ numerical abundance were recorded as comparative low during wet season because the fishes were washed out by heavy rain and flood. However fish populations recovered quickly in late 2014;
- A big difference of species diversity of odonata between wet and dry season was due to seasonality;

- The species diversity and abundance of bird, and marco-invertebrate was in natural fluctuation; and
- Measured water quality and physical characteristics showed no apparent change, overall water quality is defined as clean and retain in an acceptable level to fauna and flora in Lam Tsuen River.

#### 3 Monitoring Methodology

#### 3.1 Avifauna

Avifauna survey was conducted during post construction monitoring period. Special attention was given to the river channel and corridor area which birds use 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 follows the protection status of the species 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 and the other two located at the upper section of the river. 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.

#### 3.2 **Fish and Newt**

Fish community including target species Gobies fish *Rhinogobius* spp. and Hong Kong Newt Paramesotriton hongkongensis at the specified river channel was monitored by live trapping, hand netting and direct observation methods.

Sampling was conducted at four sampling locations along river channel, and covered major type of river habitats, e.g. river pool and riffle (Figure 1). The number of the captured or 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 Virginia et al (2004).

#### 3.3 **Aquatic Macro-invertebrates**

Macro-invertebrates in the river channel were surveyed. Four sampling sites were designed 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 main 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 will follow those documented in the AFCD website (www.hkbiodiversity.net) and other 7/20/2015 4 literatures such as Dudgeon (1994).

#### 3.4 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 behaviour were recorded. Nomenclature and protection status of the species followed those documented in the AFCD website (www.hkbiodiversity.net) and Keith (2003&2011). Adult Odonata survey was conducted along line transects in parallel with river channel within the works area where access was permitted.

### 3.5 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 of the river channel and another two at the upper section 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 the AFCD website (http://herbarium.gov.hk/) and Hong Kong Herbarium (2012).

#### **3.6** Abiotic Data Collection

#### 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.

#### **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.

#### 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 wall/retaining wall along the Upper Lam Tsuen River and part of the river bed. Over 90 flora species were recorded within the survey transects along the river course in 2014. Most were wetland species with a few floating aquatic species such as *Lemna minor* 浮萍, *Pistia stratiotes* 大薸 and submerged plants such as *Hydrilla verticillata* 黑藻.

An aquatic plant, also a vegetable, Watercress *Nasturtium officinale* 西洋菜 was very abundant during the dry season when there was no flooding (see photograph below). The recorded floras were generally in good health indicating that the vegetation of the riverbed and banks was re-established quickly, and the height of the dominated riparian grass and herb species were in a range from 0.1m to over 2m as observed along survey transect. Dominant flora species were shown in the **Table 4-1** marked with relative abundance sign "+++". Results of vegetation survey and belt transect survey were presented in **Table 4-1** and **Table 4-2**. **Figure 1** shows the transect line for the flora surveys.



Photograph showing general view of Lam Tsuen River in March.



Photograph showing general view of Lam Tsuen River in June. In the wet season, most of the riverbed plants had been washed away by flood.



Photograph showing general view of Lam Tsuen River in September.

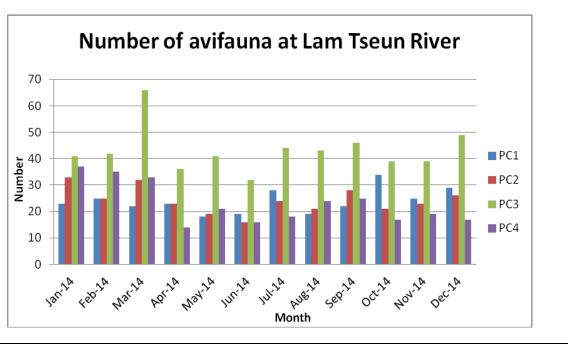


Photograph showing general view of Lam Tsuen River in January. An aquatic plant, also a vegetable, *Nasturtium officinale* 西洋菜 was very abundant during dry season in Upper Lam Tsuen River.

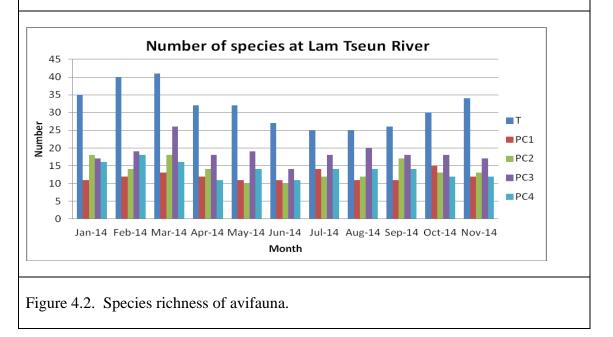
#### 4.2 Fauna

### 4.2.1 Avifauna

Avifauna surveys were undertaken from January to December 2014 along survey transects and at four selected point count locations. Transect and Point Count locations were shown on **Figure 1**. Result of bird survey was presented in the **Table 4-3**. There is no apparent change in the pattern or trend in bird abundance when comparing data recorded from the four bird count sites (PC1 to PC4) as shown in **Figure 4.1**. As most of the birds were foraging and feeding along riparian habitats can tolerate human disturbance, such as bulbuls, doves. There is no oblivious change in the species richness of avifauna recorded at the four point count sites during 2014. In total, over 50 species of birds were recorded from the bird surveys. The most common birds recorded included wetland birds found in the river include *Egretta garzetta* 小白鷺, *Egretta garzetta* 池鷺, *Motacilla alba* 白鶺鴒 and *Hirundo rustica* 家燕. Some commonly seen birds found in the upper Lam Tsuen River are shown in the photographs below.









Streptopelia chinensis 珠頸斑鳩

Copsychus saularis 鵲鴝



Amaurornis phoenicurus 白胸苦惡鳥



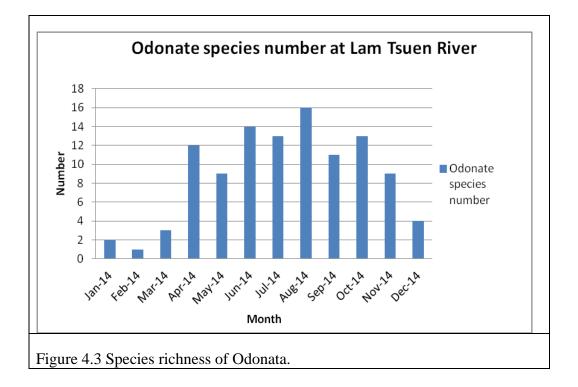
Motacilla cinerea 灰鶺鴒

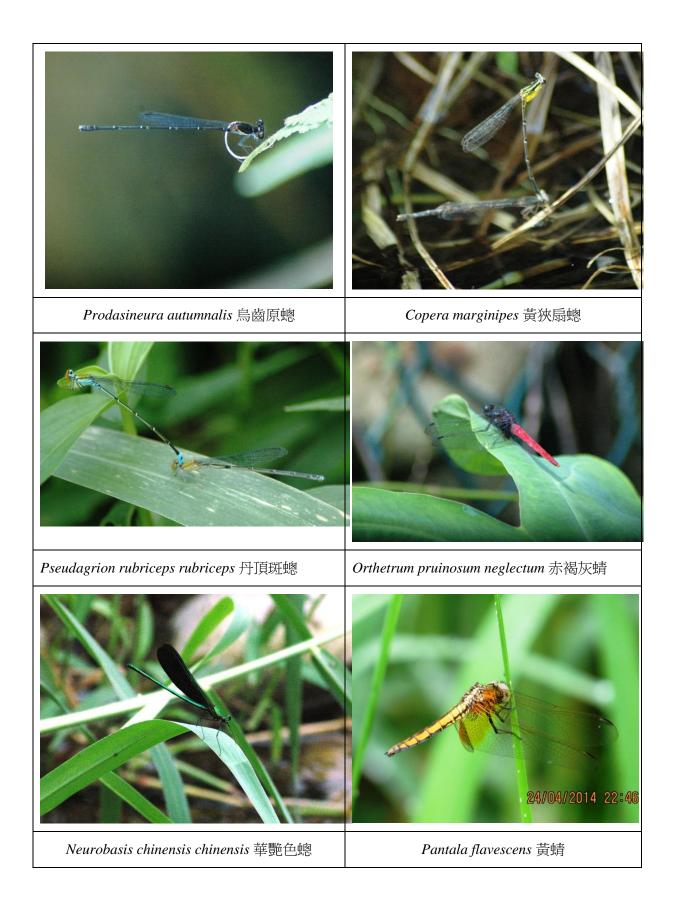




#### 4.2.2 Adult Odonata Survey

Records of Odonate along the Upper Lam Tsuen River from January to December of 2014 are presented in **Table 4-4**. A graph of odonatas species richness is shown in **Figures 4.3**, it indicates that species number of odonate was fluctuating along with different season. The maximum number of odonata species was recorded during wet season and a big contrast that significant low number of species was recorded during dry season. However, it was a normal phenomenon that most of dragonflies and damselflies were more likely reproducing during wet season. More species and higher abundance observed in wet season was due to seasonality (Keith, 2003&2011). In total, over 25 species of donate were recorded in the year. Sampling location was shown in **Figure 1**. Photographs of some of the recorded dragonfly and damselfly species are presented below.

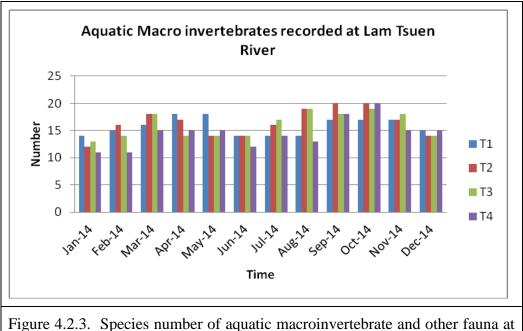






#### 4.2.3 Aquatic Macro-invertebrates

Aquatic-net and kick sampling were performed at the Upper Lam Tseun River. Over 20 species were found during the ecology surveys undertaken in 2014 and no significant changes were observed on species composition, shown as **Figure 4.2.3**. The river benthic fauna collected was mainly comprised of insects, mollusks and crustaceans. Details of recorded of river benthic fauna refers to **Table 4-5**. Sampling location was shown on **Figure 1**.



# Lam Tsuen River during 2014.

#### 4.2.4 Hong Kong Newt

Surveys of Hong Kong Newt were conducted at Upper Lam Tsuen River from January to December of 2014. Adults, juveniles, larvae and eggs of Hong Kong Newt *Paramesotriton hongkongensis* 香港瘰螈 was observed at the Lam Tsuen River where the habitat consisted of riparian vegetation during the survey (see photograph below). This amphibian species is commonly seen and captured by hand nets and the abundance was higher recorded in November 2014 than those recorded during the previous surveys. Riparian vegetation grown along the channel especially along water margin could provide shelter and breeding habitat for Hong Kong Newt. Record of Hong Kong Newts can be referred to **Table 4-6**. The surveys data show that the Newts were breeding and sustaining a viable population since construction work had stopped, refer to **Figure 4.2.4**.

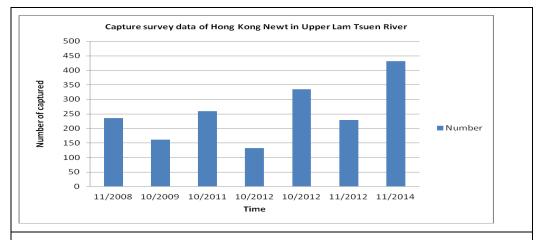
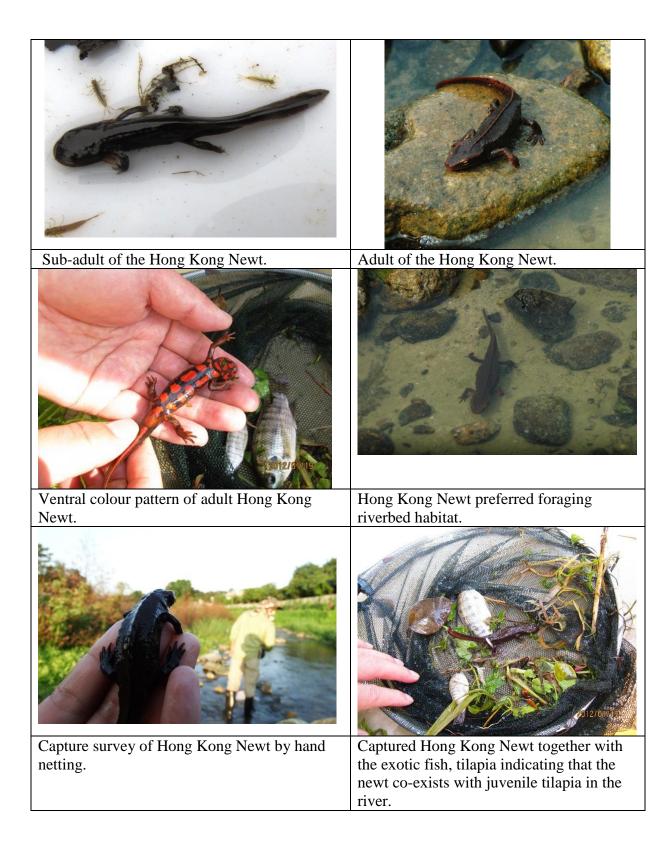


Figure 4.2.4. Capture survey data of Hong Kong Newt in Upper Lam Tsuen River 2008-2014.





### 4.2.5 <u>River Fish Fauna</u>

Fish surveys were performed at Upper Lam Tsuen River during field monitoring in 2014. At least 19 species of freshwater fish, including species recorded from reference site, were recorded. Details of recorded of fish fauna refers to **Table 4-6**. *Oreochromis niloticus* 羅非魚 and *Zacco platypus* 寬鰭鱲 were the dominated species in the river (see below photograph). *Acrossocheilus parallens* 側條光唇魚 were recorded at upper, middle and lower river sections. File: 808-R1-annual R14-LT-150224 150114 7/20/2015 16

A. parallens is a rare freshwater fish species in Hong Kong (see hkbiodiversity website) and it was observed a dominant species at a few locations along the surveyed river. The trend of the number of fish species are shown in **Figure 4.2.5a**. The data shows that there is no significant change on species composition of fish at Lam Tsuen River. Target species of Goby fish *Rhinogobius* spp. was found along the river with increasing abundance. Fish abundance in the 2x2 meter recording areas was significantly low during June to August 2014, it is assumed that low abundance of fish was caused by heavy rainfall and floods, fish population started to recovery following October 2014 (see **Figure 4.2.5b**). Sampling location was shown on **Figure 1**.

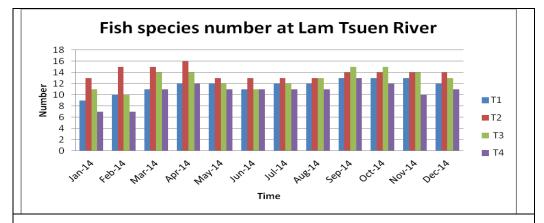
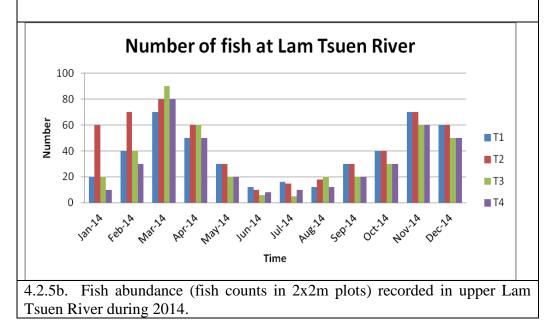
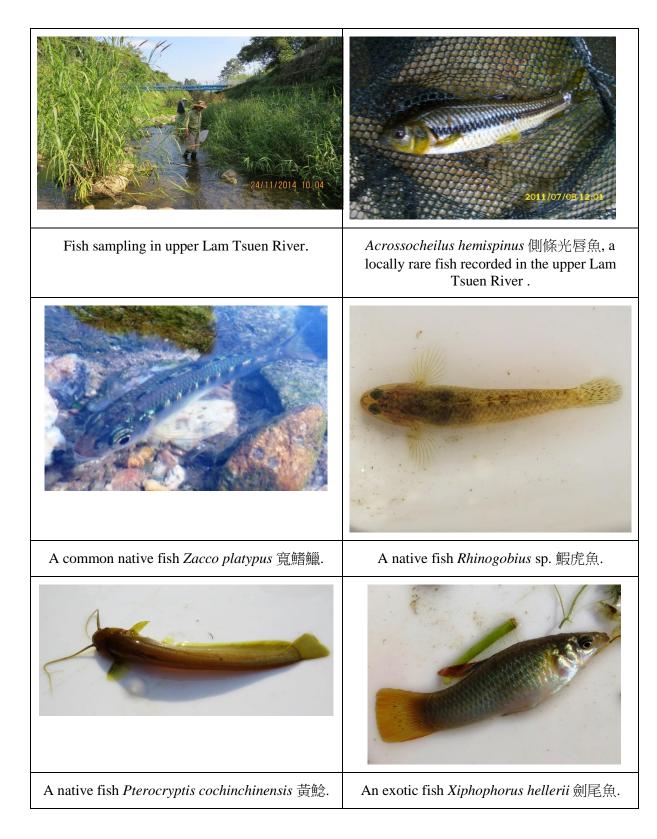


Figure 4.2.5a. Number of fish species recorded in upper Lam Tsuen River during 2014.



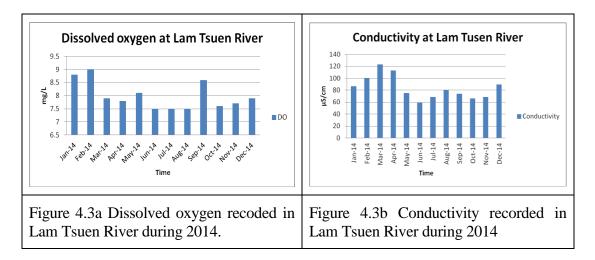


### 4.3 Abiotic Data

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**.

Dissolved oxygen and conductivity measured in Lam Tsuen River shows a slightly fluctuation along a year, shown as Figure 4.3a-b. However, the ranges of these two parameters were still satisfied to the river health. The rest of parameters were recorded in a stable level within a year that would not pose any adverse impact to the river.

The river substratum was comprised of over 75% stones or rocks in most of the river sections with moderate water flow (up to 0.2m/second at pool and 0.6m/second at riffle).



### 5 Summary and Commentary

- 5.1 Data presented and analyzed in this report were derived from ecology surveys conducted during 2014. The post-construction ecological monitoring will be continued and it is expected that long term monitoring will reveal even more information on ecological recovery and habitat improvement.
- 5.2 Aquatic and riparian vegetation re-established quickly after the completion of the drainage works as demonstrated by the photographs in this report. Aquatic and marsh plants growing on the riverbed and along the water margins provide breeding and feeding habitat for a variety of aquatic life including insects, shrimps, fish and the Hong Kong Newt.
- 5.3 Records of the Hong Kong Newt *Paramesotriton hongkongensis* 香港瘰螈 through the capture and translocation programme showed that ecological mitigation was successful and that adverse impacts on this species was reduced. The adults, juveniles and eggs of the Hong Kong Newt were frequently recorded along the new river channel. Higher number of Newt was recorded during survey in November 2014 than those recorded in previous surveys as improved river channel provided better habitat to the Newt.
- 5.4 The fish species is recorded in a stable level during 2014. However, the fish abundance was observed significant low during wet season, it was assumed that fishes were affected by heavy rain and floods, and the population recovery was observed in late 2014. *Acrossocheilus parallens* 側條光唇魚, a rare freshwater fish species in Hong Kong, was the dominant species at a few locations in the river channel.
- 5.5 Abundance of the aquatic marco-invertebrates and avifauna were stable with no apparent seasonal change.
- 5.6 The data showing a big difference of species number of odonate recorded between wet and dry season was a normal phenomena of odonate life-cycle.

5.7 Measured water quality and physical characteristics showed no apparent change, however it is predicted the water quality will improve over the long term as flora and fauna continues to establish in the river channel .The water quality of the surveyed river was not polluted although low concentration of nutrients will discharge to the river from the nearby agriculture lands and resident houses.

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Hong Kong Biodiversity Website : http://www.afcd.gov.hk/english/conservation/hkbiodiversity/hkbiodiversity.html FIGURES

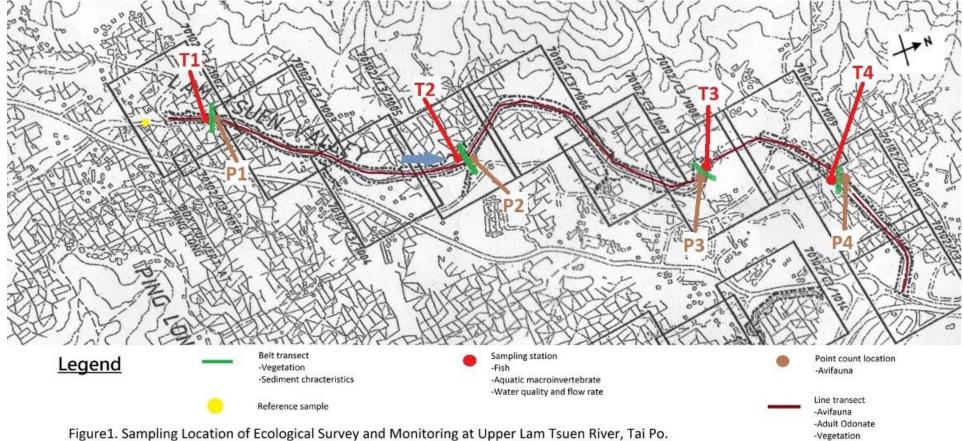


Figure 1. Sampling Location of Ecological Survey and Monitoring at Upper Lam Tsuen River, Tai Po.

# TABLE

Contract No. DC2007.06 River Impovement Works in Upper Lam Tusen River, She Shan River and Upper Tai Po River Post-Construction Ecological Monitoring Report - Upper Lam Tsuen River

Table 4.1. Flora species recorded along the Lam Tsuen River including riparian habitat.

	Species name	Species name in Chinese	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	4 Dec-14
tiparian Plant	1	Chinese	1									-		-
Acanthaceae	Ruellia coerulea	葡花苹	+	+	+	+	+	÷	÷	+	+	+	÷	+
Amaranthaceae	Celosia argentea Amaranthus viridis	青葙	++	+	+	+	+	+	++	++	++	++	**	++
Amaranthaceae	Amaranthus viriais Alternanthera philoxeroides	野莧 空心莲子草	++	++	++	++	++	++	++	++	++	++	+++	+
Amaranthaceae	Alternanthera sessilis	並子草 道子草			-		-		-					+
Anacardiaceae	Rhus hypoleuca	白背漆												
Annonaceae	Uvaria macrophylla	紫玉盤				+	+	÷	÷	+	+	÷	÷	+
Apiaceae	Oenanthe javanica	水芹				++	+	÷	÷	+	+	+		
Apiaceae Araceae	Centella asiatica Alocasia odora	崩大碗 海芋	+	+	+	+	+	+	+	+	+	+	+	+
Araceae	Colocasia esculenta	芋	+	+	+	+	+	+	+	+	+	+	÷	+
Araceae	Pistia stratiotes	大漢		+	÷				÷	+	÷	÷	÷	+
Arecaceae	Rhapis excelsa	棕竹			÷	+	+	÷	÷	+	+	÷	÷	+
Asteraceae	Bidens alba Mikania micrantha	白花鬼針草	++++	+++	++++	+++	++++	+++	***	++++	++++	**	**	+++
Asteraceae	Ageratum conyzoides	微甘菊 勝紅蓟	+	+	+	+	+	+	+	+	+	+	+	+
Asteraceae	Emilia sonchifolia	一點紅	+	+	+	+	+	+	+	+	+	+	+	+
Asteraceae	Wedelia chinensis	蟛蜞菊	+	+	÷	+	+	÷	÷	**	++	++	**	++
Asteraceae	Erechtites hieracifolia	革命菜	+	+	+	+	+	÷	÷	+	+	÷	÷	+
Asteraceae	Conyza canadensis	小莲草	+	+	÷	+	+	+	+	+	+	+	÷	+
Asteraceae Asteraceae	Youngia japonica Eclipta prostrata	黄鹌菜 鳢肠				+	+	+	+	+	+	+	+	+
Asteraceae	Spilanthes paniculata	金細扣				+	+	+	+	+	+	+	÷	+
Athyriaceae	Callipteris esculenta	栗蕨						÷	÷	+	+	÷	÷	+
Blechnaceae	Blechnum orientale	烏毛蕨	+	+	÷	+	+	÷	÷	+	÷	÷	÷	+
Brassicaceae	Cardamine flexuosa	碎米菁	+	+	÷	+	+	÷	÷	+	+	÷	÷	+
Brassicaceae Brassicaceae	Nasturtium officinale Rorippa indica	西洋菜	++++	++++	++++	+	+	+	+	+	+++	++	++	++
Brassicaceae Brassicaceae	Rorippa indica Capsella bursa-pastoris	塘葛菜 齊菜	1.1	f	Ľ	+	+	+	+	+	+	• +	+	+
Buddlejaceae	Buddleja asiatica	□ 二 二 二 二 二 二 二 二 二 二 二 二 二	1	1		+	+	+	+	+	+	+	+	+
Caesalpiniaceae	Cassia alata	翅荚決明	+	+	+	+	+	÷	+	+	+	÷	÷	+
Caryophyllaceae	Drymaria cordata	荷蓮豆				+	+	+	+	+	+	÷	÷	÷
Caryophyllaceae	Myosoton aquaticum	鹅腸菜		1	<u> </u>	+	+	+	+	+	+	÷	÷	+
Commelinaceae	Commelina diffusa Inomosa cairica	節節草 エポム曲	+	+	+	+ ++	+	+	+	+++	++	**	++	++
Convolvulaceae	Ipomoea cairica Pharbitis nil	五爪金龍 牽牛	+	+	++	+	++	+	+	+	+	+ +	+	++
Convolvulaceae	Ipomoea aquatica	華栄	+	+	+	+	+	+	+	+	+	+	+	+
Cucurbitaceae	Solena amplexicaulis	茅瓜		L		+	+	+	+	+	+	÷	÷	+
Cuscutaceae	Cuscuta australis	南方菟絲子												
Cyperaceae	Cyperus flabelliformis	風車草			+	+	+	÷	÷	+	+	÷	÷	+
Cyperaceae	Cyperus sp.	<b>莎草</b>	_		+	+	+	+	÷	+	+	+	÷	+
Euphorbiaceae Euphorbiaceae	Macaranga tanarius Bischofia javanica	血桐 秋楓	+	+	+	+	+	+	+	+	+	+	+	+
Fabaceae	Pueraria lobata	新菇	+	+	+	+	+	+	+	+	+	+	+	+
Fabaceae	Crotalaria pallida	猪屎豆	+	+	+	+	+	÷	÷	+	+	+	÷	+
Fabaceae	Sesbania cannabina	田菁	+	+	÷	+	+	÷	÷	+	÷	÷	÷	+
Fabaceae	Pueraria lobata var.thomsonii	粉葛												+
Magnoliaceae	Michelia alba	白蘭		+	+	+	+	÷	÷	+	+	+	÷	+
Malvaceae Mimosaceae	Hibiscus rosa-sinensia Acacia confusa	大紅花 台灣相思		+	+	+	+	+	+	+	+	+	+	+
Mimosaceae	Leucaena leucocephala	銀合数	+	+	+	+	+	+	+	+	+	+	÷	+
Mimosaceae	Mimosa pudica	含差草	+	+	+	+	+	÷	+	+	+	+	÷	+
Mimosaceae	Calliandra haematocephala	紅絨球	+	+	+	+	+	÷	÷	+	÷	÷	÷	+
Moraceae	Ficus hispida	對葉榕	+	+	+	+	+	÷	÷	+	+	÷	÷	+
Moraceae Musaceae	Ficus variegata Musa paradisiaca	青果榕 大瓶												
Musaceae Myrtaceae	Musa paraaisiaca Cleistocalyx nervosum	大焦水翁	+	÷	÷	+	+	+	+	+	+	+	+	+
		物杜鹃			+	+	+	+	+	+	+	+	÷	+
				-	-									
Nyctaginaceae Oleaceae	Bougainvillea spectabilis Ligustrum sinense	山指甲										1		
Nyctaginaceae Oleaceae Onagraceae	Bougainvillea spectabilis Ligustrum sinense Ludwigia erecta	山指甲 美洲水丁香	++	+	+	+	+	÷	++	++	++	++	++	++
Nyctaginaceae Oleaceae Onagraceae Oxalidaceae	Bougainvillea spectabilis Ligustrum sinense Ludwigia erecta Oxalis corniculata	山指甲 美洲水丁香 酢栗草	++ +	+ +	+ +	+ +	+ +	+	++	++	++ +	++ +	++ +	++
Nyctaginaceae Oleaceae Onagraceae Oxalidaceae Plantaginaceae	Bougainvillea spectabilis Ligustrum sinense Ludwigia erecta Oxalis corniculata Plantago major	山指甲 美洲水丁香 酢浆草 車前草	++ +	+ +	+	+ + +	+ + +	* * *	++ + +	++ + +	++ + +	++ + +	** * *	++ +
Nyctaginaceae Deaceae Onagraceae Oxalidaceae Plantaginaceae Poaceae	Bougainvillea spectabilis Ligustrum sinense Ludwigia erecta Oxalis corniculata Plantago major Panicum repens	山指甲 美洲水丁香 酢栗草 車前草 枯骨草	++ + + + +	+ + + + + +	+ + + +	+ + + +	+ + + + + + +	+ + + +	++ + + +	++ + + +	++ + + +	++ + + +	++ + + + +	++ + + +
Nyctaginaceae Oleaceae Onagraceae Oxalidaceae	Bougainvillea spectabilis Ligustrum sinense Ludwigia erecta Oxalis corniculata Plantago major	山指甲 美洲水丁香 酢浆草 車前草	+++++++++++++++++++++++++++++++++++++++	+ + + + +	+ + + + + +	+ + + + +	+ + + + +	+ + + +	++ + + + +	++ + + + + +	++ + + + +	++ + + + +	++ + + + +	++ + + +
Nyctaginaceae Oleaceae Onagraceae Oxalidaceae Plantaginaceae Poaceae Poaceae	Bougainvillea spectabilis Ligustrum sinense Ludvigja erecta Osalis corniculata Plantago major Plantago major Panicum repens Pennisetum purpureum	山指甲 美洲水丁香 酢漿草 車前草 枯骨草 象草	++ + + +	+ + + + + + +	+ + + +	+ + + + +	+ + + + + +	+ + + + +	++ + + + + + + + +	++ + + + + + +	++ + + + + +	++ + + + +	++ + + + + +	++ + + + +
Nyctaginaceae Oleaceae Onagraceae Onalidaceae Plantaginaceae Poaceae Poaceae Poaceae Poaceae Poaceae	Bongainvillea speciabills Legistrum sinense Ladostja erectua Otalis corniculana Plantago major Planicam repens Pennistem alopecarridas Byrachelytrum repens Microategium cilintum	山指甲 美洲水丁香 酢炭草 車崩草 枯骨草 象草 狼尾草 紅毛草 剛秀竹	+++ + + + + + + + + +	+ + + + + + + + + + + + +	+ + + + + + + + +	+ + + + + + + + + + + +	+ + + + + + + + + +	* * * * * * * * *	++ + + + + + + + + + + + +	+++ + + + + + + + + +	+ + + + + +	** * * * * * * * * * * *	*+ * * * * * * * * * * *	+ + + + + + + + + +
Nyctaginaceae Oleaceae Doalidaceae Plantaginaceae Poaceae Poaceae Poaceae Poaceae Poaceae Poaceae	Boogninrilloa spectabilis Labaiga erectabilis Labaiga erecta Otalis corriculata Plantago major Panicam popos Paniseum propos Pensiseum parpaream Pensiseum alopecaroldes Rityachelytum repors Microstergium cellitatum Brachtaria matica	山指甲 美洲水丁香 酢栗卓 車前草 粘骨草 象草 数尾草 紅毛草 剛秀竹 巴拉草	++ + + + + + + + + + +	+ + + + + + + + + + + +	+ + + + + + + + + + + + +	+ + + + + + + + + + + + + +	+ + + + + + + + + + + + +	+ + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + +	+++ + + + + + + + + + + + +	*** * * * * * * *	*** * * * * * * *	+++ + + + + + + + + + + + +	+++ + + + + + + + + + + + + + +
Nyctaginaceae Oleaceae Onagraceae Onalidaceae Palataginaceae Poaceae Poaceae Poaceae Poaceae Poaceae	Inspiritilles speciabilis Ligistrim sinense Labeligia erectos Datis corraciatas Pantago najor Pantago najor Pantag	山指甲 美洲水丁香 酢繁草 車前草 熱行草 象尾毛草 削汚竹 巴拉草 五部芒	+++ + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + +	+ + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + +	+++ + + + + + + + + + + + + + + + +	+ + + + + +	++ + + + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + +	+ + + + + + + + + +
Nyctaginaceae Olagraceae Onagraceae Obalidaceae Poacaeae Poaceae Poaceae Poaceae Poaceae Poaceae Poaceae Poaceae Poaceae	Impointillee operabilis Ligarama inease Laborgia ereca Dattis conscionta Pattange major Pattange	山指甲 美洲水丁香 郵票卓 車前章卓 粘骨章 象尾毛 和雪子 数尾毛 和雪子 和雪子 和雪子 和雪子 和雪子 和雪子 和雪子 和雪子	+++ + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + +	+++ + + + + + + + + + + + + + + + + +	+ + + + + +	++ + + + + + + + + + + + +	+++ + + + + + + + + + + + + + + + + +	+ + + + + + + + + +
Nyctaginaceae Oleaceae Onagraceae Onalidaceae Palataginaceae Poaceae Poaceae Poaceae Poaceae Poaceae	Inspiritilles speciabilis Ligistrim sinense Labeligia erectos Datis corraciatas Pantago najor Pantago najor Pantag	山指甲 美洲水丁香 酢繁草 車前草 熱行草 象尾毛草 削汚竹 巴拉草 五部芒	+++ + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + +	+++ + + + + + + + + + + + + + + + + +	+ + + + + +	++ + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + +	+ + + + + + + + + +
Nyctaginaceae Ohagraceae Dhagraceae Dhagraceae Dhalidaceae Noaceae Noaceae Poaceae Poaceae Poaceae Poaceae Poaceae Poaceae Poaceae Poaceae	Benguinvillea spectabilis Ligaritam innase Labakgia eresta Daulis correctuata Mantago major Penisciana repara Penisciana apopera Penisciana apoperarida Beynehofram repara Microategiam edilatam Microategiam edilatam Microategiam edilatam Microategiam edilatam Microategiam edilatam Atandantila ngodostia Panicam masianam Cach Jaryang-jobi	山指甲 美麗草 華蘭常草 華蘭常草 製 転	+++ + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + +	+++ + + + + + + + + + + + + + + + + +	+ + + + + +	++ + + + + + + + + + + + +	+++ + + + + + + + + + + + + + + + + +	+ + + + + + + + + +
Nyctaginaceae Oleaceae Oxalidaceae Phantaginaceae Poaceae Poaceae Poaceae Poaceae Poaceae Poaceae Poaceae Poaceae Poaceae Poaceae Poaceae Poaceae	Impointilles spectabilis Liguitami inense Labrigia retores Datis corraciatais Pantago major Pantago	山指甲	++ + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + +	+++ + + + + + + + + + + + + + + + + +	+ + + + + +	++ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + +
Nystaginaceae Oleaceae Doublaceae Plantaghaceae Phaceae Phaceae Phaceae Phaceae Phaceae Phaceae Phaceae Phaceae Phaceae Phaceae Phaceae Phaceae Phaceae Phaceae Phaceae Phaceae Phaceae Phaceae Phaceae	Bengainviller operabilis Ligarinn inense Laborgia erecka Daulis conscioutan Daulis conscioutan Panisam repeas Panisam operariale Panisam operariale Panisam operariale Risynchrynan repeas Benscharte untics Risynchrynan repeas Benscharte untics Massanhan flordalas Anadhurlla nepaleosis Panisam nasileum Cast larvynaj Armede danas Calaris virgan	山指甲 共興次丁帝 希察察草 私情章章章 氣尾毛章 開房竹草 已至章 天春 五章 大春 五章 長元章 大春 五章 長元章 大春 章 章 月 月 十 章 月 章 八章 十 章 月 章 二章 十 章 月 章 二章 十 章 章 章 章 章 章 章 章 章 章 章 章 章 章 章 章	+++ + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + +	+++ + + + + + + + + + + + +	+ + + + + +	++ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + +
Nyciagharna Deascae Dealadacae Dealadacae Phateagharce Ph	Impaintillea spectabilis Ligatum innase Ligatum innase Labdigia eretea Dathis correladata Pintaga major Panisam apparea Pennisam alapparea Pennisam alapparea Pennisam alapparea Martentagian ciliana Bascharia muica Martentagian ciliana Bascharia muica Masantaka fortidaka Fandama fanasa Pantean masant Cali taryanjabi Annas Anasa Chalosi sepana Immes criseifer Palogomin cikoreae	出版甲 克興東京 東南市 東南市 動音章 動音章 動音章 起電亭 和 和 和 和 和 和 和 和 和 和 和 和 和	++ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + +	++ + + + + + + + + + + + +	+ + + + + +	++ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + +
Nyetajhakana Olasocala Douklacona Pinatajhakena Pinatajhak	Inopointillos spectabilis Liguitam inense Labrigia retora Dalis cornecidans Pantago najor Pantago najor Pantago najor Pantagon papo Pantagon p	由指甲甲 其两次丁膏 整成草 整成草 整成草 整成草 整成草 整成草 整成草 整成草	++ ++ + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + +	++ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + +
Nyciagharna Deascae Dealadacae Dealadacae Phateagharce Ph	Impaintillea spectabilis Ligatum innase Ligatum innase Labdigia eretea Dathis correladata Pintaga major Panisam apparea Pennisam alapparea Pennisam alapparea Pennisam alapparea Martentagian ciliana Bascharia muica Martentagian ciliana Bascharia muica Masantaka fortidaka Fandama fanasa Pantean masant Cali taryanjabi Annas Anasa Chalosi sepana Immes criseifer Palogomin cikoreae	出版甲 克興東京 東南市 東南市 動音章 動音章 動音章 起電亭 和 和 和 和 和 和 和 和 和 和 和 和 和	++ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + +	+++ + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + +	+ + + + + + + + + +
Nystajausea Okaacaa Okaacaa Dailakeen Paacaa	Impaintillea spectabilis Ligatum inneus Ligatum inneus Labatgia ereca Jualis conscitatas Panticam repens Panticam papireram Panticam papireram Panticam papireram Panticam papireram Reportabatio malecan Brachtaris malecan Brachtaris malecan Brachtaris malecan Brachtaris malecan Caix Incerpangion Caix Incerpangion Caix Incerpangion Caix Incerpangion Caix Incerpangion Caix Incerpangion Charise signat	山街中 契約水丁市 契約水丁市 整次、 整水 電力 整次 電力 電力 四方 四方 三方 四方 三方 三方 三方 三方 三方 三方 三方 三方 三次要 三 三 三 三 三 三 三 三 三 三 三 三 三	++ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + +	+++ + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + +
Nystephasene Okaceae Okaceae Davidseou Praceae	Impaintillea spectabilis Ligarismi minuse Ligarismi minuse Laboligia erecta Daulis corriculata Ministry major Pennistrum appaream Pennistrum appaream Hennistrum Appaream Pentiseum periodiatum Perlogenum periodiatum Perlogenum periodiatum	出指甲甲 支訊來丁帝 整成來丁帝 整成來 整成來 整成來 整成不 整成不 整成不 整成不 整 整 和 是 和 二 和 日 月 竹 四 七 思 元 5 中 二 5 中 二 5 中 二 5 十 二 5 二 5 十 二 5 十 二 5 十 二 5 十 二 5 十 二 5 十 二 5 十 二 5 十 二 5 十 二 5 十 二 5 十 二 5 二 5 十 二 5 二 5 二 5 二 5 十 二 5 二 二 二 5 二 二 二 二 二 二 二 二 二 二 二 二 二	++           +	+ + + + + + + + + + + + + + + + + + - -	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + +	++++++++++++++++++++++++++++++++++++++	++ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + +
Nyetafanene  Cleaceae	Inopointillos spectabilis Ligurinte incense Ladorgia erectos Otalis correlcadati Plantago major Pantago major Panticane report Pentistema adoptorendo Pentistema adoptorendo Resentargun ciliatane Braccharia mateca Miscanthas aforeitades Miscanthas floridades Arradicadas efectionis Cesis Largua-John Miscanthas floridades Arradicadas Arradicadas Arradicadas Colores virguta Calares etargita Polygonum kalterato Polygonum kydrospiper Polygonum kydrospiper Polygonum kydrospiper Polygonum kydrospiper Polygonum kydrospiper Polygonum kydrospiper Polygonum kydrospiper Polygonum kydrospiper Polygonum kydrospiper	山田中 支援水丁市 教授卒 東京本 東京本 東京本 東京本 東京本 東京本 東京本 東京本	++           +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + +	++++++++++++++++++++++++++++++++++++++	++ ++ + + + + + + + + + + +	+ + + + + + + + + +
Vystajansen Visetajansen Dalidacen Vangrose Vangrose Vancen Vanov Vancen	Impaintillea spectabilis Ligatum inneus Ligatum inneus Labatgia ereca Jualis contraktata Pantaga mgire Pantaga mgire Pantaga mgire Pantaga mgire Pantaga mgire Raynchofaram repons Barontagian eclitatam Brachtaria matea Brachtaria matea Brachtaria matea Brachtaria matea Brachtaria matea Brachtaria matea Brachtaria matea Brachtari Brachtaria Brachtaria Brachtaria Brachtaria Brachtaria	山指甲甲 契約來丁帝 對來當年 來處帶來 軟成帶來 以花亭 如用所的 以五醇花 又都 及 以 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一 一	++ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+++ + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + +	++++ + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + +	+ + + + + + + + + +
Ny cirafanone Menorale Davidscom Davidscom Nancea N	Inopinitilles spectabilis Ligurium incose Labrigia erese Labrigia erese Datis cornectatais Pantago mojor Pantacom propose Pantacom propose Pantacom pago eres Pantacom adopeceraides Bhytochytem opon Microstigue ciliatan Braccharia muica Microstigue ciliatan Braccharia muica Microstigue ciliatan Braccharia muica Microstigue ciliatan Braccharia muica Microstigue ciliatan Braccharia muica Microstigue ciliatan Coli Largua pholi Pantacom macimen Coli Largua pholi Pantacom macimen Coli Largua pholi Pantacom Materia Coli angena pholi Pantacom Researce Polygoum kysteropper Polygoum kysteropper Polygoum kysterofolatan Polygoum kysterofolatan Portulasa deveseara	山田中 支援水丁市 教授卒 東京本 東京本 東京本 東京本 東京本 東京本 東京本 東京本	++           +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+++ + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + +	+++ + + + + + + + + + + + + + + + + +	++ +- + + + + + + + + + + + + +	+ + + + + + + + + +
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Nyinginosei Nikona Nikona Nangrose Nangrose Nacas Na	Impaintillea speciabilis Ligarismi minuse Ligarismi minuse Labrigii areveta Datlis contricitata Pantican reports Pantican populari Pantican populari Resolution popularia Brachtaria matica Brachtaria matica Brachtaria Brachtaria Brachtaria Brachtaria Brachtaria Brachtaria Brachtaria Chloris rispati Arando danas Chloris rispati Arando danas Chloris rispati Brattaria Brattaria Brattaria Brattaria Brattaria Brattaria Solamu chlorone Dolygoma balteria Brattaria Solamu perfoliation Dolygoma balteria Brattaria sangellis Solamu nigram Dolygomi approxi Solamu strava Sularus Interna Solamu strava Sularus Brattaria Solamus Arangen Disconstan Solamus Arangen Disconstan Solamus Arangen Disconstan Solamus Collas Brattaria saperta Cyclinoren parasitica Chi sinesis Franso strava Solamus La Cola Solamus Chi sinesis Franso strava	出指甲甲 契約來丁勞 對來當年 東京之事 東京之事 東京之事 東京之事 大事 支京之一章 大事 支京之一章 大事 支京之一章 大事 支京之 大事 大事 支京之 大事 大事 支京之 大事 大事 支京之 大事 大事 支京之 大 大 支 京 之 平 大 支 京 之 平 二 大 事 之 平 二 大 事 之 平 二 二 王 第 之 平 二 之 平 二 二 王 第 之 平 二 二 二 二	++           -	+ + + + + + + + + + + + + + + + + + +	+           +           -	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+++ + + + + + + + + + + + + + + + + +	+ + + + + +	++ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + +
Nyinginces Mencas Mencas Dalidaces Dalidaces Nar	Bengeinrittler operabilis Ligerarm insense Laborgie arceca Laborgie arceca Dattis consicutata Pantange major Pantange major Pantange major Pantange major Pantange major Pantange major Pantange pantange Pantange pantange Pantange pantange Pantange pantange Pantange pantange Pantange pantange Pantange pantange Pantange	山指甲甲 支訊水丁市 数型定 整章章章 整章章章 整章章 集章章 集章章 集章章 集章章 支票 如將章拉章 五世章 石珍之 五世章 石 石 五世章 石 石 五世章 石 石 五世章 石 石 五世章 石 石 五世章 石 五 五 五 五 五 五 五 五 五 五 五 五 五	++           +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + - - - -	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + + +	+ + + + + +	++ + + + + + + + + + + + + + + + + + +	++++++++++++++++++++++++++++++++++++++	+ + + + + + + + + +
yinginaces Manaza Manaza Natifaces N	Inogainettlea opecabilis Ligaetam innase Labotagia eresta Otalis correladata Mentago major Peniseram apagraem Peniseram apagraem Peniseram apagraem Microtorgium cilianom Microtorgium cilianom Cots Iarryma-jobi Aradiae Manase Peniseran descritto Microtorgium cilianom Cots Iarryma-jobi Aradiae Microtorgium Microtorgium cilianom Cots Iarryma-jobi Aradiae Microtorgium Polygouma Ichioense Polygouma Jeliotatum Polygouma Jeliotatum Scoparia dukist Lainoreita ingenta Scoparia dukist Lainoreita ingenta Scoparia Iangan Scoparia Janeselatu Salamun tarvum Sarendae Ianocedata Starvanta Jeneseta Cotta sinoreita Cotta sinoreita Cotta sinoreita Proma cometoua Direntae corecus	山指甲甲 契約來丁帝 對來成帶單 軟成帶單 軟成帶單 數定是單一 對來的帶來 數定是單一 之影響 之一 及要 一 之事 之一 之事 之一 之事 之一 之事 之一 之事 之一 之事 之一 之事 之一 之 一 之事 之 之 之 之	++           +           -           +	+           +           -	+           +           -	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + +	++ + + + + + + + + + + + +	++ + + - - - - - - - - - - - - - - - -	+ + + + + + + + + +
ysingiaceae Mancaa Margarcea Margarcea Margarceae Marga	Inogainettlea opecabilis Ligaetam innase Labotagia eresta Otalis correladata Mentago major Peniseram apagraem Peniseram apagraem Peniseram apagraem Microtorgium cilianom Microtorgium cilianom Cots Iarryma-jobi Aradiae Manase Peniseran descritto Microtorgium cilianom Cots Iarryma-jobi Aradiae Microtorgium Microtorgium cilianom Cots Iarryma-jobi Aradiae Microtorgium Polygouma Ichioense Polygouma Jeliotatum Polygouma Jeliotatum Scoparia dukist Lainoreita ingenta Scoparia dukist Lainoreita ingenta Scoparia Iangan Scoparia Janeselatu Salamun tarvum Sarendae Ianocedata Starvanta Jeneseta Cotta sinoreita Cotta sinoreita Cotta sinoreita Proma cometoua Direntae corecus	山指甲甲 支訊水丁市 数型定 整章章章 整章章 整章章 集建 整章章 集建 整章章 整章章 整章章 整章章 整章章 整章章 整章章 整章	+++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++ ++	+           +	*           *	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + +	*  * * * * * * * * * * * * * * * * * *	++ + + + + + + + + + + + + + + + + + +	++ + + + + + + + + + + + + + + + + + +	+ + + + + +	++	+ + + + + + + + + + + + + + + + + + +	+ + + + + + + + + +

No. of species
Note:
+, occurred; ++, common; +++, Species abundant/dominant in the the study area

#### 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 cons	struction	monitoring						Post cons	truction m	onitoring					Post constr	uction mon	itoring				Pos	t constru	ction monito	oring					Post co	nstruction	n monitoring	3	
		Stream				Jan-14	1							Feb-14						1	Mar-14						A	Apr-14							May-14	4		
	-	Transect	T1		T2		T3		T4		T1		T2		T3	Т	ļ	T1		T2		Г3	T4	1	1	T	2	T	3		Г4	Т		T2		T3		T4
Family	Species	Chinese name	Height(m)	% Hei	ight(m) %	% He	eight(m) %	6 Heig	,ht(m) %	Hei	ght(m) %	6 Height	t(m) %	Height(n	n) %	Height(m	%	Height(m)	% F	Height(m) 9	6 Height(	m) %	Height(m) 9	Height(n	1) %	Height(m)	%	Height(m)	%	Height(r	1) %	Height(m	) %	Height(m)	% Heig	ght(m) 9	% Heig	ght(m) %
Poaceae	Microstegium ciliatum	剛秀竹																						(	).3	2							0.3 2	1				
Fabaceae	Pueraria lobata	野葛							0.3	10							0.3 10						0.3	10				0	.3	5	0.3	5				0.3	5	0.3 5
Poaceae	Pennisetum purpureum	象草							1.5	5							1.5 5						1.5	5														
Araceae	Alocasia odora	海芋																																				
Caesalpiniaceae	Cassia alata	翅莢決明																																				
Magnoliaceae	Michelia alba	白蘭																																				
Poaceae	Brachiaria mutica	巴拉草	0.8	10	0.8	10					0.8	10	0.8 10	0				1	1 13	1	13			(	).5	5 (	0.6 10	)			0.6	0	0.5 5	5 0.6	6			0.6 6
Moraceae	Ficus hispida	對葉榕																																				
Asteraceae	Mikania micrantha	薇甘菊	0.5	10	0.5	5	0.5	10	0.4	10	0.5	10	0.5	5	0.5	10	0.4 10	0.5	5 10	0.5	5	0.5 1	0 0.4	10		(	0.3	5 0	.3 1	5	0.3	5		0.3	5	0.3	15	0.3 5
Musaceae	Musa paradisiaca	大蕉																																				
Ulmaceae	Celtis sinensis	朴樹																																				
Araceae	Pistia stratiotes L.	大漂																																				
Urticaceae	Boehmeria nivea	苧麻																																				
Asteraceae	Bidens alba	白花鬼針草	0.4	5			0.5	10			0.4	5			0.5	10		0.4	4 5			0.5 1	0	(	).5 2	0 0	0.5 10	0 0	.7 1	5	0.6	0	0.5 20	0.5	10	0.7	15	0.6 10
Poaceae	Coix lacryma-jobi	薏苡																																				
Solanaceae	Solanum nigrum	龍葵																																				
Cyperaceae	Cyperus flabelliformis	風車草																																				
Poaceae	Miscanthus floridulus	五節芒																																				
Euphorbiaceae	Macaranga tanarius	血桐																																				
Asteraceae	Wedelia chinensis	蟛蜞菊																																				
Commelinaceae	Commelina diffusa	節節草					0.3	5							0.3	5						0.3	5	(	0.2 1	0		0	.3	3			0.2 8	5		0.3	3	
Asteraceae	Erechtites hieracifolia	革命菜																																				
Thelypteridaceae	Cyclosorus parasiticus	華南毛蕨																																				
Convolvulaceae	Pharbitis nil	牽牛																																				
Verbenaceae	Lantana camara	馬纓丹																															1					
Mimosaceae	Leucaena leucocephala	銀合歡																															1					
Brassicaceae	Nasturtium officinale	西洋菜																								(	0.2	5 0	.2 5	D	0.2	5	1	0.2	2	0.2	2	0.2 1
Onagraceae	Ludwigia erecta	美洲水丁香																																				
Poaceae	Pennisetum alopecuroides	狼尾草																															1					
Amaranthaceae	Celosia argentea	青葙					1	2							1	2						1	2										1					
Bare Gound	1			75		85		73	1	75		75	8	5		73	75		72		82	7	3	75	6	3	70	)	1	2	6	5	65	j literatura	77		60	73

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

#### Table 4.2. Flora species recorded from belt transect survey at the Upper Lam Tsuen River (TI- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

					Post co	onstruct	tion monitoring					Post constr	uction monite	oring			Pe	ost construc	ction mon	itoring		Р	ost constru	ction moni	itoring			Post constr	uction mor	nitoring			Post c	onstructio	n monitor	ing		1	Post construc	tion mon	itoring	
		Stream				Jun	n-14						Jul-14					Au	ug-14				S	ep-14					Oct-14					Nov-	14				D	ec-14		
		Transect	T1		T2		T3		T4	T1		T2	T	3	T4		T1	T2	T3	3 T-	1	T1	T2	T3		T4	T1	T2	Т	3	T4	T1		T2	T3	T4		T1	T2	T3	\$	T4
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m) %	Heigh	ıt(m) %	Height(m)	% He	ght(m) %	Height(m)	%	Height(m)	% Heig m)	- %	Height( m)	Height (m)	% Height m)	( He % m)	- 90	Height( n)	Height (m)	% Heigh m)	ht(	Height( m)	Height( m)	6 Height m)	- %	leight m)	Height( m)	% Heig m)	` %	Height( n)	Height( m)	% Heig m)	ight( % H	Height( n)	Height( m)	( <sup>%</sup> Heig m)	ght( %
Poaceae	Microstegium ciliatum	剛秀竹	0.	3 2						0.5	4					(	).7 5					0.7 5																				
Fabaceae	Pueraria lobata	野葛					0.3	5	0.3 5				0	).3 5	0.3	5			0.3	5 0.	3 5			0.3	5 0.	0.3 5					0.6 1	0				0.6	10					0.6 10
Poaceae	Pennisetum purpureum	象草																																								
Araceae	Alocasia odora	海芋																													1.8	1				1.8	1					1.8 1
Caesalpiniaceae	Cassia alata	翅莢決明																																								
Magnoliaceae	Michelia alba	白蘭																																								
Poaceae	Brachiaria mutica	巴拉草	0.	5 5	0.6	6 8			0.6 6	0.6	10	0.8 1	0		0.8	6 (	0.6 10	0.8 12	2	0.	8 8	0.6 10	0.8 1	2	0.	.8 8	1 10	) 1.5	15 1.3	3 30	1	5 1	10	1.5 15	1.3 3	0 1	5	1 10	1.5 1.	i 1.3	30	1 5
Moraceae	Ficus hispida	對葉榕																																								
Asteraceae	Mikania micrantha	薇甘菊			0.3	3 6	0.3	15	0.3 8			0.3	6 0	).3 15	0.3	8		0.3 6	5 0.3	15 0.	3 8		0.3	8 0.3	15 0.	0.3 10	0.3 15	5 0.3	15 0.3	3 15	0.3 1	5 0.3	18 (	0.3 18	0.3 1	8 0.3	18	0.3 18	0.3 1	3 0.3	18	0.3 18
Musaceae	Musa paradisiaca	大蕉																																								
Ulmaceae	Celtis sinensis	朴樹																																								
Araceae	Pistia stratiotes L.	大漂																																								
Urticaceae	Boehmeria nivea	苧麻																																								
Asteraceae	Bidens alba	白花鬼針草	0.	5 20	0.5	5 10	0.7	15	0.6 10	0.5	20	0.5 1	2 0	0.7 18	0.6	10 (	0.5 20	0.6 12	2 0.7	15 0.	5 10	0.5 20	0.6 1	2 0.7	15 0.	0.6 10	0.5	5 0.8	12 0.2	7 10		0.5	5 (	0.8 12	0.7 1	0		0.5 5	0.8 12	2 0.7	10	
Poaceae	Coix lacryma-jobi	薏苡																									2 5	5				2	5					2 5				
Solanaceae	Solanum nigrum	龍葵																																								
Cyperaceae	Cyperus flabelliformis	風車草																																								
Poaceae	Miscanthus floridulus	五節芒																																								
Euphorbiaceae	Macaranga tanarius	血桐																																								
Asteraceae	Wedelia chinensis	蟛蜞菊																																								
Commelinaceae	Commelina diffusa	節節草	0.	2 8			0.3	3		0.2	8		0	).3 3		(	0.3 10		0.3	5		0.3 10		0.3	5		0.3 10	0.8	20		0.3 2	0.3	12 (	0.8 22		0.3	20	0.3 12	0.8 22	2		0.3 20
Asteraceae	Erechtites hieracifolia	革命菜																																								
Thelypteridaceae	Cyclosorus parasiticus	華南毛蕨																																								
Convolvulaceae	Pharbitis nil	牽牛																																								
Verbenaceae	Lantana camara	馬纓丹																																								
Mimosaceae	Leucaena leucocephala	銀合歡																																								
Brassicaceae	Nasturtium officinale	西洋菜			0.2	2 2	0.2	2	0.2 1			0.3	1 0	).3 1	0.3	1		0.3 1	1 0.3	1 0.	3 1		0.3	1 0.3	2 0.	0.3 1			0.3	3 2	0.1	1			0.3	2 0.1	1			0.3	2	0.1 1
Onagraceae	Ludwigia erecta	美洲水丁香																									2 30	) 2	15	2 10	1.8	5 2	25	2 13	2 1	0 1.8	5	2 25	2 1	3 2	10	1.8 5
Poaceae	Pennisetum alopecuroides	狼尾草																																								
Amaranthaceae	Celosia argentea	青葙																											1.	5 15					1.5 1	5				1.5	15	
Bare Gound				65		74		60	70		58	7	1	58		70	55	69	9	59	68	55	6	7	58	66	25	5	23	18	4	3	25	20	1	5	40	25	20	)	15	40

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)

			<u> </u>		Р	ost constr	uction mo	nitoring		Post	constru	ction me	onitoring	5	Po	st const	truction	monitor	ring	Post	t const	ruction	monite	oring
							Jan-14				F	eb-14					Mar-14	ţ				Apr-14	ł	
Common Name	Species name	Chinese name	Status	Commonness		Al	bundance				Ab	indance				A	Abundan	ice			А	bundan	ice	
					С	T1	T2	T3	T4	С	T1	T2	T3	T4	С	T1	T2	T3	T4	С	T1	T2	T3	T
Barn Swallow	Hirundo rustica	家燕	PM	с						+					+					+				1
Black Drongo	Dicrurus macrocercus	黑卷尾	Sv	С																				
			R, RC,																			$\vdash$		⊢
Black Kite	Milvus lineatus	麻鷹	Cap.586	с						+					+									
Black-faced bunting	Emberiza spodocephala	灰頭鵐	WV&PM	С																		$\square$	$\square$	
Black-necked Starling	Sturnus nigricollis	黑領椋鳥	R	С	++		2	2	1	++		2		3	++	1		4	2	++		2	1	
Black-winged Cuckoo-shrike	Coracina melaschistos	暗灰鵑鵙	PM	С																				
Buzzard (Common Buzzard)	Buteo buteo	普通鵟	WV,Cap.586	С											+								$\square$	Γ
Chinese Bulbul	Pycnonotus sinensis	白頭鵯	R	С	+	1		2	3	+	3	1	2	2	+	2	2	4	3	+	2		3	
Chinese Pond Heron	Ardeola bacchus	池鷺	R,RC	С	++	1	2	4	3	++		1	2	2	++	2	3	3	1	++	3	2	2	
Common Kingfisher	Alcedo atthis	普通翠鳥	R	С	+			1		+				1	+			1		+				
Common Koel	Eudynamys scolopacea	噪鹛	R	С	+					+	1				+	1		1		+	2	$\square$	1	
Common Sandpiper	Actitis hypoleucos	磯鷸	WV&PM	С	+		1	2		+		2	2		+		2	2	1	+		2	1	
Common Tailorbird	Orthotomus sutorius	長尾縫葉鶯	R	С	++	2	1	3	2	++	1	1	2	1	++	1	2	1	2	++	1	1		1
Crested bulbul	Pycnonotus jocosus	紅耳鵯	R	с	+++	6	5	4	5	++++	4	3	3	4	+++	3	2	6	5	+++	2	3	4	2
Crested Goshawk	Accipiter trivirgatus	風頭鷹	R, CR, Cap.586	R	1														<u> </u>	1	<u> </u>		$\neg$	F
Crested Myna	Acridotheres cristatellus	八哥	R	С	++		3	2	3	++		2	4	2	++			6	3	++		1	3	2
Crested Serpent Eagle	Spilornis cheela	蛇鵰	R, VU, LC, Cap	R	1										+			<u> </u>	1	1	<u> </u>		$\neg$	
Daurian redstart	Phoenicurus auroreus	北紅尾鴝	WV	U	+		1	1		+		1		1	+		1	1	1	1	<u> </u>		$\neg$	
Domestic pigeon	Columba sp.	鸽	R	с	+					+					+			<u> </u>	<u> </u>	<u> </u>	<u> </u>	$\vdash$	$\dashv$	
Dusky Warbler	Phylloscopus fuscatus	褐柳鶯	wv	U	+	1				+	1		1		+		1	1	1	+	<u> </u>		1	
Eurasian tree sparrow	Passer montanus	麻鹊	R	с	+					+					+			<u> </u>	<u> </u>	+	2	$\vdash$	$\dashv$	
Great Coucal	Centropus sinensis	褐翅鴉鵑	R,VU	С	+			1	1	+		1	1		+		1	1	1	+	<u> </u>	1	$\neg$	1
Great Tit	Parus major(commixtus)	大山雀	R	с	+					+	1			2	+	1		<u> </u>	<u> </u>	+	<u> </u>		$ \neg$	F
Green Sandpiper	Tringa ochropus	白腰草鷸	PM&WV	U	+		2			+			2		+		2	2	<u> </u>	+	<u> </u>	1	2	
Grey Heron	Ardea cinerea	蒼鷺	WV,PRC	С	+					+					+					+	1			
Grey Wagtail	Motacilla cinerea	灰鶴鴒	wv	с	++	2	2	4	1	++	2	1	2	2	++	2	1	2	1	+	<u> </u>	1		⊢
Japanese White Eye	Zosterops japonica(simplex)	暗綠繡眼鳥	R	С	+++	4	3	3	5	+++	5		4		++	4		5	3	++	2		3	
Jungle Crow	Corvus macrorhynchus	大咀烏鴉	R	с						+.					+.					+				
Large Hawk Cuckoo	Cuculus sparverioides	鷹鵑	SV	U																-	1			
Lesser Coucal	Centropus bengalensis	小鴉鵰	R, VU	С											+.					-	1			
Little Egret	Egretta garzetta	小白鷺	R, FC	С	+	1	2	3	2	+	2	2	3	3	++	1	3	4	2	++	3	2	2	1
Great Egret	Ardea alba	大白鷺	R,WV, RC	С																				
Little Swift	Apus affinis	小白腰雨燕	R,SpM	С	+					+			2	1	+		2	2		-	1			
Magpie	Pica pica	喜鵲	R	с	+					+					+			1		+	1			
Magpie Robin	Copsychus saularis	鹊鸲	R	с	++	2	1	3	1	++	1	2	1	2	++	1	1	2	2	++	1		2	1
Mandarin Duck	Aix galericulata	鴛鴦	WV	U				-													<u> </u>	$\vdash$		⊢
Masked Laughing Thrush	Garrulax perspicillatus	黑臉噪鶥	R	С	+					+			3	2	+		2	4	2	+	<u> </u>	2		⊢
Night Heron	Nycticorax nycticorax	夜鷺	R&WV, LC	с									-						<u> </u>	-	<u> </u>			⊢
Northern Shoveler	Anas clypeata	琵嘴鴨	WV	с											$\vdash$			<u> </u>	<u> </u>	<u> </u>	<u> </u>		$\dashv$	⊢
Olive Backed Pipit	Anas ciypeata Anthus hodgsoni	樹鷚	WV	с	++	2	1		2	+			1		+		1	2	<u> </u>	+	<u> </u>	$\vdash$	2	F
Plaintive Cuckoo	Cacomantis merulinus	八聲杜鵑	sv	с		<u> </u>	<u> </u>			<u> </u>			<u> </u>		$\vdash$		L .	<u> </u>	<u> </u>	<u> </u>	<u> </u>		$\dashv$	⊢
Red-billed Blue Magpie	Urocissa erythrorhyncha	紅咀藍鵲	R	с						+					+			<u> </u>	<u> </u>	<u> </u>	<u> </u>		$\dashv$	⊢
Red-flanked Bluetail	Tarsiger cyanurus	紅脇藍尾鴝	R PM&WV	с	+		1		1	+				1	+			<u> </u>	<u> </u>	<u> </u>	<u> </u>	$\vdash$	$ \neg$	⊢
Rufous Turtle Dove	Streptopelia orientalis	山斑鳩	R	с			·		· ·					-				<u> </u>	<u> </u>	<u> </u>	<u> </u>	$\vdash$	$\dashv$	⊢
Rufous-backed Shrike	Lanius schach	山 <sub>陸</sub> 崎 棕背伯勞	R	с	+					+					+			<u> </u>	<u> </u>	+	<u> </u>		1	⊢
Rufous-capped Babbler	Stachyridopsis ruficeps	紅頭穗鶥	R	с	+					+					+			<u> </u>	<u> </u>	+	<u> </u>	$\vdash$	$ \rightarrow$	⊢
Scarlet Minivet	Pericrocotus flammeus	赤紅山椒鳥	R	с						+								<u> </u>	<u> </u>	<u>⊢</u>	<u> </u>		$\dashv$	⊢
Siberian Stonechat	Saxicola maurus	黑喉石䳭	wv	U	+		1			+					+			1	<u> </u>	<u> </u>	<u> </u>	$\vdash$	$\dashv$	⊢
Sooty-headed Bulbul	Pycnonotus aurigaster	白喉紅臀鵯	p	с			<u> </u>			<u> </u>					$\vdash$			⊢ ́	<u> </u>	<u> </u>	<u> </u>	$\vdash$	$ \neg$	⊢
Spotted Dove	Streptopelia chinensis	口喉紅骨鴨 珠頸斑鳩	R	с	++	3	2	3	4	++	3	4	3	2	++	2	3	4	3	++	3	2	2	
Spotted Munia	Lonchura punctulata	斑文鳥	R	U	++		<u> </u>			++	-		~	-	++	-	<u> </u>	<u> </u>	É	++	۲,	<u>⊢</u> -	4	Ľ
Velvet-fronted Nuthatch	Sitta frontalis	城額鳾	R	U														<u> </u>	<u> </u>	<u> </u>	<u> </u>	$\vdash$	<u> </u>	⊢
White Wagtail	Motacilla alba		WV	c			2	1	2	41	1	2	3	2	++	1	2	2	1	++	1	2	1	2
White-breasted Waterhen		白鶺鴒	P	c	++			1	2	++	1	2	د	2	++	1	-	2	1	++	1	-	<u> </u>	1
White-breasted Waternen White-throated Kingfisher	Amaurornis phoenicurus Halcyon smyrnensis	白胸苦惡鳥	R, LC	c	+ +					+					τ				┣──	+ +	<del> </del>	$\vdash$	$\vdash$	⊢
Yellow Bellid Prinia	Halcyon smyrnensis Prinia flaviventris	白胸翡翠 黃腹鷦鶯	R	c	+ +		1	2	1	+			1	2	+		1	2	1	+	1	1	1	⊢
Yellow Wagtail	Motacilla flava	寅腹黯鷹 黃鶺鴒	K WV&PM	U	Ŧ		1		1	Ť			4	2	*		<u> </u>	-	<u> </u>	+	⊢ ́	<u> </u>	-	⊢
Zitting cisticola	Cisticola juncidis	寅鵬海 棕扇尾鶯	WV&PM	- C											$\vdash$		-	├──	├──	├──	<u> </u>	$\vdash$	$\vdash$	⊢
	concora junctais	你啊吧啊	or vect ivi	~		25	33	41	37		25	25	42	35	$\vdash$	22	32	66	33	┣─	23	23	36	
Number of birds																								

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 the study area

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

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

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RC: Regional concern Fellowes et al (2002)

LC : Local Concern Fellowes et al (2002)

PRC: Potential Regional Concern Fellowes et al (2002)

CR: Rare in China Red Data Book Status

VU: Vulnerable in China Red Data Book Status

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

					Po	st constr	ruction n	onitoring	1	Post con	struction	monito	ing	Post c	onstructio	n monite	oring	Post	construct	ion monit	oring	Post co	nstruction	n monito	ring	Pos	t construc	tion mon	itoring		Post cons	truction r	monitorin	ıg	Post co	nstruction	a monite	oring
							May-14				Jun-14	4			Jul-	4			Auş	g-14			Sep-1	4			0	ct-14				Nov-14				Dec-1	.4	
Common Name	Species name	Chinese name	Status	Commonness		А	bundanc	e			Abunda	nce			Abund	ance			Abun	dance			Abunda	ance			Abu	ndance			1	Abundand	ce			Abunda	ince	
					С	T1	T2	T3 1	4 C	T1	T2	T3	T4	СТ	1 T2	T3	T4	C 1	1 T.	2 T3	T4	СТ	T2	T3	T4	С	T1 1	12 T.	3 Т	4 C	T1	T2	T3	T4	C 1	T1 T	2 T	3 1
Barn Swallow	Hirundo rustica	家燕	PM	с	++	2	1	4	2 +		1	2	1	+		2														+								
Black Drongo	Dicrurus macrocercus	黑卷尾	Sv	с																																	+	+
- -	Net le .		R, RC,	c																																	+	-
Black Kite	Milvus lineatus	麻鷹	Cap.586	С														+								+				+					+			
Black-faced bunting	Emberiza spodocephala	灰頭鵐	WV&PM	С																															+			$\perp$
Black-necked Starling	Sturnus nigricollis	黑領椋鳥	R	С	++	1	2	2	++	2		3	2	++ 2	3	2	1	++	1	3		++	2	2	1	++	2	3		++		2	2		++	2	3	3
Black-winged Cuckoo-shrike	Coracina melaschistos	暗灰鵰鵙	PM	С																																		
Buzzard (Common Buzzard)	Buteo buteo	普通鵟	WV,Cap.586	с																																		
Chinese Bulbul	Pycnonotus sinensis	白頭鵯	R	с	+		1	2	+	2		2		+ 1				+	2	1		+ 2	2	1		+	3	2	1	+	2			1	++	2 2	1 3	3
Chinese Pond Heron	Ardeola bacchus	池鷺	R,RC	С	++	1		2	++	2	1	1		++ 4	2	3	2	++	2 1	2	2	++ 3	2	3	1	++	4	1 1	2	++	3		2	1	+	2 1	. 3	3
Common Kingfisher	Alcedo atthis	普通翠鳥	R	с	+				+					+				+				+				+		1	1	+				1	+	1		
Common Koel	Eudynamys scolopacea	噪鵑	R	с	+	1		1	+			1		+ 1				+	1			+				+									+			
Common Sandpiper	Actitis hypoleucos	磯鷸	WV&PM	С	+			1	+					+				+				+				+				+					+			
Common Tailorbird	Orthotomus sutorius	長尾縫葉鶯	R	с	++	1		1	++	1	1	1	1	++ 2		1		++	1 2	1	1	++ 1	1	2	2	++	1	1	1	+		1			++	1		Т
Crested bulbul	Pycnonotus jocosus	紅耳鵯	R	С	+++	3	2	3	3 +++	+ 2	3	4	2	+++ 4	3	6	3	+++	3	4	2	+++ 2	2	3	2	+++	3	3 4	. 2	+++		2	2	3 -	+++	4	1 1	3
Crested Goshawk	Accipiter trivirgatus	鳳頭鷹	R, CR, Cap.586	R																																		
Crested Myna	Acridotheres cristatellus	八哥	R	С	+		2	1	++		3	5	2	++ 1	2	5		++	2	3		++	4	3	2	++	1	2	1	++	3		4		++	2 3	; :	5
Crested Serpent Eagle	Spilornis cheela	蛇鵰	R, VU, LC, Cap	R																																		
Daurian redstart	Phoenicurus auroreus	北紅尾鴝	wv	U																						+		1		+		1	1		++	1	1 1	1
Domestic pigeon	Columba sp.	鸽	R	С																		+				+				+					+			Τ
Dusky Warbler	Phylloscopus fuscatus	褐柳鶯	WV	U	+			1	l +			1		+	1	1		+		1	1	+		1		+		1 1		+			1		+	1 1	1	
Eurasian tree sparrow	Passer montanus	麻鹊	R	С	+				+				2	+ 2		3	1	+	1	2	2	+	1			+		3	1	+	2	2			++	3	2	2
Great Coucal	Centropus sinensis	褐翅鴉鵑	R,VU	С	+	1		1	l +			1	1	+ 1		1	1	+		1	1	+	1	1	1	+		1 1		+	1		1		+	1	1	T
Great Tit	Parus major(commixtus)	大山雀	R	С	+			2																														
Green Sandpiper	Tringa ochropus	白腰草鷸	PM&WV	U	+				+																					+					+			T
Grey Heron	Ardea cinerea	蒼鷺	WV,PRC	С																										+								Т
Grey Wagtail	Motacilla cinerea	灰鶴鴒	WV	С	+									+	1	1		+		1	1	+ 2	1	3	1	+	1	2 2	1	+	1	1	1	2	+	1	1	2
Japanese White Eye	Zosterops japonica(simplex)	暗綠繡眼鳥	R	С	++	4	3	5	2 ++	2	2	3		++ 5	2		2	++	3	4	3	++ 2				++	3			++	2		3		++	3 4	1 3	5
Jungle Crow	Corvus macrorhynchus	大咀烏鴉	R	С	+				+									+				+				+												
Large Hawk Cuckoo	Cuculus sparverioides	鷹鹃	SV	U	+				+																													
Lesser Coucal	Centropus bengalensis	小鴉鵑	R, VU	с																																		
Little Egret	Egretta garzetta	小白鷺	R, RC	С	++	1	2	3	2 ++	- 1	1	2	1	++ 1	2	3	1	++ 3	2 3	4	2	++ 1	2	4	2	++	2	1 3	1	++	3	2	4	2	++	2 1	1 3	3
Great Egret	Ardea alba	大白鷺	R,WV, RC	с																																		
Little Swift	Apus affinis	小白腰雨燕	R,SpM	С																																		
Magpie	Pica pica	喜鹊	R	с																		+				+		1		+					+			
Magpie Robin	Copsychus saularis	鹊鸲	R	С	++	1	1	1	++	- 1	2		1	++	1	3	1	++	1 2	2	1	++ 2	1	2	1	++	1	2 2		++	1	1	2	1	++	1 1	. 2	2
Mandarin Duck	Aix galericulata	鴛鴦	WV	U																																		
Masked Laughing Thrush	Garrulax perspicillatus	黑臉噪鶥	R	С	+		2	4	+	2		3		+		2	1	+	3	2	3	+	2	4	2	+		2		+	3		3		++		2	2
Night Heron	Nycticorax nycticorax	夜鸞	R&WV, LC	С																																		
Northern Shoveler	Anas clypeata	琵嘴鴨	WV	с																										+								
Olive Backed Pipit	Anthus hodgsoni	樹鷚	wv	с	+												μĪ																ĻШ		+			
Plaintive Cuckoo	Cacomantis merulinus	八聲杜鵑	SV	С	+				+				ΙĪ				μĪ																ĻШ					
Red-billed Blue Magpie	Urocissa erythrorhyncha	紅咀藍鵲	R	С										+			μĪ													+			ĻШ					
Red-flanked Bluetail	Tarsiger cyanurus	紅脇藍尾鴝	PM&WV	С																												$\square$	∟				$\perp$	$\bot$
	Streptopelia orientalis	山斑鳩	R	С																												$\square$	∟				$\perp$	$\bot$
Rufous-backed Shrike	Lanius schach	棕背伯勞	R	с	+				+					+		1	1	+		1		+	1	1		+	1	1		+			ĻШ	1	+	1	1	1
	Stachyridopsis ruficeps	紅頭穗鶥	R	С	+																					+				+		$\square$	∟		+		$\perp$	$\bot$
Scarlet Minivet	Pericrocotus flammeus	赤紅山椒鳥	R	С								1				<u> </u>																<u> </u>	$\square$				$\perp$	
Siberian Stonechat	Saxicola maurus	黑喉石䳭	WV	U	L					-			$\square$			<u> </u>	$\square$			_					$\square$					+	1	1	$\square$		++	1	<u> </u>	
Sooty-headed Bulbul	Pycnonotus aurigaster	白喉紅臀鵯	R	С								1				<u> </u>																<u> </u>	$\square$				$\perp$	
Spotted Dove	Streptopelia chinensis	珠頸斑鳩	R	С	++	2	3	5	2 ++	. 3	1	3	2	++ 2	3	5	1	++	1 2	_	_	++ 3	2	_	3	++	4		_	_	-	3	5	3 -		2 3	1 3	3
Spotted Munia	Lonchura punctulata	斑文鳥	R	U	++	L	$\square$		++	·		1	$\vdash$	+	_	<u> </u>	$\square$	+		2	1	+	_	5	$\square$	++	5	8		++	4	4	5		+++	5	7	7
	Sitta frontalis	絨額鳾	R	U																																		
White Wagtail	Motacilla alba	白鶺鴒	WV	с	+				+					++ 1	2	3	1	++ 3	2 1	2	2	++ 3	2	3	4	++	2	1 2	1	++	1	2	1	2	++	1 1	. 2	2
White-breasted Waterhen	Amaurornis phoenicurus	白胸苦惡鳥	R	с	+			1	+		1			+		1	1	+	1	1		+	1	2	1	+		1	1	+			1	1	+		1	1
	Halcyon smyrnensis	白胸翡翠	R, LC	с	+																					+				+			$\square$				Ē	$\square$
	Prinia flaviventris	黃腹鷦鶯	R	С	+			1	l +	1			1	+ 1	2	1	1	+	1 2	2	1	+ 1	1	2	2	+	1	1		+		1	1	1	+	1	1	ı.
Yellow Wagtail	Motacilla flava	黃鶴鴒	WV&PM	U																													Ľ					
Zitting cisticola	Cisticola juncidis	棕扇尾鶯	WV&PM	с																						T								T	+			$\Box$
Number of birds						18	19	41	21	1	9 16	5 32	16		28 24	44	18		19	21 4	3 24		22 2	8 46	5 25		34	21	39	17	25	5 23	39	19		29	26	49 18
No. of species		1				11	10	19	14	1	1 10	) 14	- 11		14 12	18	14		11	12 2	0 14		11 1	7 18	3 14		15	13	18	12	13	2 13	17	12		15	15	18

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 loca

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

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CR: Rare in China Red Data Book Status

VU: Vulnerable in China Red Data Book Status

										Pos	t constructio	on monitoring				
Species	Common name	Chinese name	Status	Common- ness	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14
Acisoma panorpoides panorpoides	Asian Pintail	錐腹蜻	NP	VC						+						
Brachythemis contaminata	Asian Amberwing	黃翅蜻		VC												
Ceriagrion auranticum ryukyuanum	Orange-tailed Sprite	琉球橘黃蟌	NP	VC				+	+	+	+	+	+	+	+	
Coeliccia cyanomelas	Blue Forest Damsel	黃紋長腹蟌	NP	VC				+								
Copera marginipes	Yellow Featherlegs	黃狹扇蟌	NP	VC				+		+	+	+	+	+		
Crocothemis servilia servilia	Crimson Darter	红蜻	NP	VC			+	+	+	+	+	+		+	+	+
Euphaea decorata	Black-banded Gossamerwing	方帶幽蟌	NP	VC				+		+						
Ictinogomphus pertinax	Common Flangetail	霸王葉春蜓	NP	С							+					
Ischnura senegalensis	Common Blue Jewel	褐斑異痣蟌	NP	VC				+	+	+						
Mnais lacteola	Indochinese Copperwing	煙翅綠色蟌	P, LC	С				+								
Nannophya pygmaea	Scarlet Dwarf	侏紅小蜻	P, LC	С				+								
Neurobasis chinensis	Chinese Greenwing	華艷色蟌	NP	VC			+	+	+	+	+	+	+	+	+	+
Neurothemis fulvia	Russet Percher	網脈蜻	NP	VC							+	+	+	+		
Neurothemis tullia tullia	Pied Percher	截斑脈蜻	NP	С								+				
Orthetrum chrysis	Red-faced Skimmer	華麗灰蜻	NP	VC												
Orthetrum glaucum	Common blue skimmer	黑尾灰蜻	NP	VC								+				
Orthetrum luzonicum	Marsh Skimmer	呂宋灰蜻	NP	VC												
Orthetrum pruinosum neglectum	Common Red Skimmer	赤褐灰蜻	NP	VC					+	+	+	+	+	+		
Orthetrum sabina sabina	Green Skimmer	狹腹灰蜻	NP	VC								+				
Pantala flavescens	Wandering Glider	黄蜻	NP	VC	+				+					+	+	+
Paracercion calamorum duyeri	Dusky Lilysquatter	葦尾蟌	P, LC	С				+								
Prodasineura autumnalis	Black Threadtail	烏齒原蟌	NP	VC				+	+	+	+	+	+	+		
Pseudagrion rubriceps rubriceps	Orange-faced Sprite	丹頂斑蟌	NP	UC					+	+	+	+	+	+	+	
Rhinocypha perforata perforata	Common Blue Jewel	三斑鼻蟌	NP	VC				+			+	+	+	+	+	
Rhyothemis variegata arria	Variegated Flutterer	斑麗翅蜻	NP	С						+	+	+	+	+	+	
Trithemis aurora	Crimson Dropwing	曉褐蜻	NP	VC	+	+	+		+	+	+	+	+	+	+	+
Trithemis festiva	Indigo Dropwing	慶褐蜻	NP	VC						+	+	+	+	+	+	
Zygonyx iris insignis	Emerald Cascader	彩虹蜻	P,PGC	VC						+						
No. of species	•	•			2	1	3	12	9	14	13	15	11	13	9	4

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 accroding to AFCD biodiversity website (www.hkbiodiversity.net)

LC- Local Concern - Fellowes et al (2002)

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

# Table 4.5 Aquatic Macro invertebrates recorded at Lam Tsuen River (T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

											Po	st con	struct	ion monitor	ring													
Species	Chinese name	Sampl point	ling		Ja	n-14				Fe	b-14					ar-14				Ap	or-14				Ma	y-14		
	•	Statu s		Reference point	T1	T2	T3	T4	Referenc e point	T1	T2	Т3	T4	Referenc e point	T1	T2	T3	T4	Referenc e point	T1	T2	T3	T4	Referenc e point	T1	T2	Т3	T4
Molluscs		•		•					•		,			•										•				<u> </u>
Biomphalaria sp.		NP	VC	+	+				+	+	+			+	+	+		+	+	+			+	+	+			
Brotia hainanensis		NP	VC	++	+	+	+		++	+	+	+		++	+	+	+	+	++	+	+	+	+	++	+	+	+	+
Melanoides tuberculata	瘤擬黑螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Pomacea canaliculata	蘋果螺	NP	VC			+	+	+	+		+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+
Radix plicatulus	羅白螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Sinotaia quadrata	田螺	NP	VC	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+
Insects				-																								
Baetis sp.		NP	VC	+			+		+		+	+		+		+	+		+		+					+		
Caenis sp.		NP	VC																+									
Chironomus sp.	蠓幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Electrogenas sp.		NP	VC	+					+	+	+			+	+	+			+	+				+	+			
Hydropsyche sp.		NP	VC	+	+				+	+				+	+				+	+	+				+			
Indobaetis sp.		NP	VC	+			+		+			+		+	+	+	+		+	+	+		+	+	+			+
Mnais sp.		NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	
Orthetrum sp.		NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Crustaceans																												
Caridina cantanensis	廣東米蝦	NP	VC	+	++	++	++	+	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++
Cryptopotamon anacoluthon	鰓刺溪蟹	NP	VC	+	+				+	+				+	+				+	+	+				+			
Macrobrachium hainanense		NP	VC	+					+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Somanniathelphusa zanklon	束腰蟹	NP	VC																									
No. of species				15	11	9	10	) 8	16	13	13	11	8	16	14	14	12	11	17	15	16	13	12	13	15	10	10	10

Note: NP – Not protected in Hong Kong; P - Protected in Hong Kong "VC" – Very Common; "UC" – Uncommon; "C" - Common; "R" - Rare

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

# Table 4.5 Aquatic Macro invertebrates recorded at Lam Tsuen River (T1- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

											]	Post c	onstru	ction mor	itoring	g													Post co	nstruc	tion n	nonitor	ing	Post co	onstruc	tion m	onitor	ing
Species	Chinese name	Samp point	-		J	un-14					Jul-14					Aug-14	Ļ			S	Sep-14				C	Oct-14				No	ov-14				De	ec-14		
		Statu s		Referen e point		T2	T3	T4	Referen e point	c T1	T2	T3	T4	Refere e point		T2	T3	T4	Referen e point		T2	T3	T4	Referenc e point	T1	T2	T3	T4	Referenc e point	T1	T2	T3	T4	Referenc e point	T1	T2	T3	T4
Molluscs														•					•					•														
Biomphalaria sp.		NP	VC	+	+				+	+		+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Brotia hainanensis		NP	VC	++	+	+	+	+	++	+	+	+	+	++	+	+	+		++	+	+	+		++	+	+	+		++	++	+	+	+	++	++	+	+	+
Melanoides tuberculata	瘤擬黑螺	NP	VC				+	+				+	+			+	+	+			+					+	+	+			+	+	+				+	$\square$
Pomacea canaliculata	蘋果螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+
Radix plicatulus	羅白螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Sinotaia quadrata	田螺	NP	VC	+	+			+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Insects																																						
Baetis sp.		NP	VC			+			+		+			+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			+
Caenis sp.		NP	VC																	+																		
Chironomus sp.	蠓幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Electrogenas sp.		NP	VC	+	+				+	+				+	+	+			+	+	+			+	+	+			+	+	+	+		+	+	+	+	
Hydropsyche sp.		NP	VC			+	+		+		+	+		+		+	+		+		+	+	+	+		+	+		+		+			+		+		
Indobaetis sp.		NP	VC	+	+		+		+	+	+	+		+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Mnais sp.		NP	VC			+					+	+			+	+	+			+	+	+	+		+	+	+	+		+	+	+				+	+	
Orthetrum sp.		NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+		+
Crustaceans																																						
Caridina cantanensis	廣東米蝦	NP	VC	+	++	++	++	++	+	++	++	++	++	+	++	· ++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++
Cryptopotamon anacoluthon	鰓刺溪蟹	NP	VC		+	+					+	+				+	+				+	+			+	+	+			+		+					+	$\square$
Macrobrachium hainanense	海南沼蝦	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+
Somanniathelphusa zanklon		NP	VC																																			$\square$
No. of species				1	1 1	2 1	1 1	0 9	9 1	13 1	1 1	3	13 1	0	13	13 1	5 1	5	9	13 1	4 1	6 14	4 12	2 13	3 14	4 16	5 15	11	13	5 14	15	14	12	13	12	12	2 13	11

Note: NP – Not protected in Hong Kong; P - Protected in Hong "VC" – Very Common; "UC" – Uncommon; "C" - Common; "F

+, occurred; ++, common; +++, abundant/dominant Species ir

# 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)

														Post con	struc	tion n	nonite	oring										
					Jar	n-14				Fe	b-14				Ma	ur-14				Ap	r-14				Ma	ay-14		
			Sampling point	Referenc e	T1	T2	T3	T4	Referen ce	T1	T2	T3	T4	Referen ce	T1	T2	T3	T4	Referen ce	T1	T2	Т3	T4	Referen ce	T1	T2	Т3	T4
Species	Chinese name	Status	Commonnes s																									
Fish																												
Acrossocheilus parallens	側條光唇魚	P, PGC	R	+	+	+	+		+	+	++	+++	+	+	++	++	+++	++		++	++	+++	++		+	+	+	+
Channa maculate	斑鱧	NP	С																									
Cirrhina molitorella	鯪魚	NP	С																		+							
Clarias fuscus	胡子鯰	NP	С	+		+			+		+			+			+	+				+	+					+
Cyprinus carpio var. viridiviolaceus	錦鯉	NP	С			+					+					+					+							
Gambusia affinis	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Liniparhomaloptera disparis	擬平鰍	NP	С											+	+	+	+		+	+	+	+		+	+	+	+	
Misgurnus anguillicaudatus	泥鰍	NP	С	+					+		+			+		+	+	+	+	+	+	+	+	+	+	+	+	+
Oreochromis niloticus	尼羅口孵非鲫	NP	С	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Parazacco spilurus	異鱲	V and	С	+	+	+	+		+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poecilia reticulate	孔雀花魚將	NP	VC			+	+				+	+				+	+	+			+	+	+			+	+	+
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	С	+					+	+	+			+	+	+				+	+			+	+			
Pterocryptis cochinchinensis	黃鯰	NP	С	+			+		+			+		+			+		+			+		+				
Puntius semifasciolatus	七星魚	NP	С	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Rhinogobius spp.	鰕虎魚	NP	C/UN/R	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Schistura fasciolata	橫紋南鰍	NP	С	+	+	+			+	+	+			+	+	+			+	+	+			+	+	+		
Xiphophorus hellerii	劍尾魚	NP	С	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Xiphophorus variatus	雜色劍尾魚	NP	С	+		+	+		+		+	+		+		+	+				+	+	+			+	+	
Zacco platypus	寬鰭鱲	NP	С	+	+	++	++	++	+	+	++	+++	++	+	+	++	+++	++	+	+	++	+++	++	+	+	++	++	++
2x2m fish counting		No. of fish	n	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
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
Amphibian																												
Paramesotriton hongkongensis	香港瘰螈	170, NT, PGC)	R	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Fejervarya limnocharis	澤蛙	NP	VC																									
No. of species				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Note: NP - Not protected in Hong Kong

"VC" - Very Common; "UC" - Uncommon; "C" - Common; "R" - Rare

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

-V - Listed as vulnerable in China Fish Red Data Book

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

"NT" - Near Treatened in IUCN Red List Status

"PGC"-Potential Golal 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)

				Post cor	nstruct	ion m	nonito	oring	Post cor	struc	tion n	nonito	oring	Post con	struc	tion n	nonite	oring	Post cor	nstruc	tion n	nonito	ring	Post con	struct	tion n	nonit	oring	Post con	struct	tion n	nonit	oring	Post co	nstruc	ction r	nonitori
					Jur	n-14				Ju	l-14				Au	ıg-14				Se	p-14				Oc	t-14				No	v-14				De	ec-14	
			Sampling point	Referen ce	T1	T2	T3	T4	Referen ce	T1	T2	T3	T4	Referen ce	T1	T2	T3	T4	Referen ce	T1	T2	T3	T4	Referen ce	T1	T2	T3	T4	Referen ce	T1	T2	T3	T4	Refere ce	n T1	1 T2	T3 T
Species	Chinese name	Status	Commonnes s																																T		$\square$
Fish																																			Τ	$\square$	$\square$
Acrossocheilus parallens	側條光唇魚	P, PGC	R		+	+	+	+		+	++	++	+		++	++	++	+		++	++	++	+		++	++	++	+		++	++	++	++		++	+ ++	++ +
Channa maculate	斑鱧	NP	С																																Τ	$\square$	$\square$
Cirrhina molitorella	鯪魚	NP	С																																$\top$	$\square$	$\square$
Clarias fuscus	胡子鯰	NP	С					+					+					+					+					+					+		$\top$	$\square$	1
Cyprinus carpio var. viridiviolaceus	錦鯉	NP	С																																Τ	T	$\square$
Gambusia affinis	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ +
Liniparhomaloptera disparis	擬平鰍	NP	С	+	+	+			+	+	+			+	+	+			+	+	+	+		+	+	+	+		+	+	+			+	+	+	+
Misgurnus anguillicaudatus	泥鰍	NP	С	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	Τ	+	+ +
Oreochromis niloticus	尼羅口孵非鲫	NP	С			+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+ +
Parazacco spilurus	異鱲	V and	С	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ +
Poecilia reticulate	孔雀花魚將	NP	VC			+		+			+		+			+	+	+			+	+	+			+	+	+			+	+				+	+
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	С	+	+				+	+				+	+	+			+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+
Pterocryptis cochinchinensis	黃鯰	NP	С	+					+			+		+			+		+	+	+	+		+	+	+	+		+	+	+			+	+	+	
Puntius semifasciolatus	七星魚	NP	С	+	+	+	+	+	+	+	+	+	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++ +
Rhinogobius spp.	鰕虎魚	NP	C/UN/R	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	++	++	+	+	++	+ ++	++ +
Schistura fasciolata	橫紋南鰍	NP	С	+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+	+	+	+	+	+		+	+	+	+		+	+	+	+
Xiphophorus hellerii	劍尾魚	NP	С		+	+	+	+		+	+	+	+		+	++	++	+		+	++	++	+		+	++	++	+		+	++	++	+		+	++	++ +
Xiphophorus variatus	雜色劍尾魚	NP	С			+	+				+	+					+					+	+				+	+				+	+		Т	Т	+ +
Zacco platypus	寛鰭鱲	NP	С	+	+	+	+	+	+	+	+	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	+ ++	+ +
2x2m fish counting		No. of fish	n	6	12	10	6	8	8	16	15	5	10	10	12	18	10	12	20	30	30	20	20	30	40	40	30	30	50	70	70	60	60	60	60	) 60	50 5
No. of species				10	12	13	11	11	11	12	13	12	11	10	12	13	13	11	11	13	14	15	13	11	13	14	15	12	11	13	14	13	11	11	13	3 14	14 1
Amphibian																																					
Paramesotriton hongkongensis	香港瘰螈	P (Cap 170, NT, PGC)	R	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+ +
Fejervarya limnocharis	澤蛙	NP	VC																																T	L	$\Box$
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

Note: NP - Not protected in Hong Kong

"VC" - Very Common; "UC" - Uncommon; "C" - Common; "R" - Rare

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

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

Table 4.7 Abotic data for Upper Lam Tsuen River(T1- upper river channel sampling site . T4 - lower river channel sampling site)

river channel sampling site)		Post construct	ion monitoring		Po	ost construct	ion monitori	inσ	Post	construc	tion moni	toring	Post	construct	ion monit	oring	Post	construct	ion moni	toring	F	Post construc	tion monitorir	ισ
Parameter / date			1-14				p-14		1000		ur-14	lioning	1000		r-14	oning	1 0.50		y-14	toring			n-14	.9
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
DO (mg/L)	9.1	9.0	8.6	8.5	7.8	8.7	9.8	9.8	7.5	5 7.8	8.2	8.1	7.7	7.6	7.8	8.0	8.2	7.8	8.1	8.2	7.6	7.8	7.4	7.
pH	6.2	6.9	7.1	7.1	8.2	8.5	8	7.8	8.3	8 8.2	7.6	7.2	7.6	7.8	8.2	7.8	7.7	7.8	7.9	8.2	7.6	7.8	7.8	8.
Nitrate (mg N/L)	0.9	0.8	1.3	1.26	1.3	1.8	1.6	2.1	1.2	2 1.4	1.1	1.3	1.5	1.5	1.3	1.2	0.9	0.7	0.6	0.7	0.8	0.8	0.9	0.9
Ammonia (mg/L)	0.04	0.1	0.12	0.15	0.05	0.04	0.1	0.12	0.06	5 0.04	0.04	0.1	0.1	0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	0	) 0	0	0 0	0	0	0	0	0	) ()	0	0 0	0	0	0	0	0.02	0.02	0.03	0.03	0.01	0.02	0.03	0.03
Conductivity (µS/cm)	72	2 78	88	108	78	87	118	119	120	123	125	123	96	114	120	122	82	80	72	66	39	58	69	70
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
Water flow at pool (m/s)		0.0	1-0.2			0.01	1-0.2			0.0	1-0.2			0.01	1-0.2			0.0	1-0.2			0.0	3-0.2	
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	2-0.6	
Sand (%)	5	5 5	5	5	5	5	5	5	5	5 5	5	5	5	5	5	10	5	5	5	10	5	5	5	10
Stone (%)	90	85	85	85	90	85	85	85	90	85	85	80	90	85	85	75	90	85	85	75	93	90	90	75
Mud (%)	5	5 10	10	10	5	10	10	10	5	5 10	10	15	5	10	10	15	5	10	10	15	2	5	5	15

Table 4.7 Abotic data for Upper Lam Tsuen River(T1- upper river channel sampling site . T4 - lower river channel sampling site)

iiver enamer sampning site)					-																			
	Pos	st constructi	ion monito	ring	Pos	st construction	on monitor	ing	Post	constructi	on monito	ring	Pos	t constru	ction moni	toring	Pos	t construct	ion monito	ring	Po	st construc	tion monitor	ing
Parameter / date		Jul-	-14			Aug	-14			Sep	-14			C	Oct-14			No	v-14			De	ec-14	
Replicate	T1	T2	T3	T4	T1	T2	Т3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
DO (mg/L)	7.6	5 7.2	2 7.0	5 7.5	7.6	7.4	7.3	7.6	8.7	8.7	8.4	8.6	7.2	7.3	8.1	7.6	7.3	7.3	8.2	7.8	7.2	8.1	8.2	8.2
рН	7.6	5 7.7	7.8	8 8	7.8	7.5	7.6	7.8	8.4	8.1	8.4	8.0	8.4	8.2	8.1	8.0	8.1	8.3	8.1	8.3	8.5	8.4	8.2	8.2
Nitrate (mg N/L)	0.8	3 1.1	1.1	0.8	1.2	1.1	0.9	1.1	1.2	1.3	1.2	1.2	0.9	1	0.9	1	1	1	0.9	0.9	0.9	1	0.9	0.9
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	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	0	0 0	) (	0 0	0 0	0	0	0	0	0	0	0	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
Conductivity (µS/cm)	43	8 85	5 72	2 75	75	78	82	86	73	77	74	72	47	50	80	88	52	56	82	84	112	92	86	67
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
Water flow at pool (m/s)		0.03	-0.2			0.03-	0.2			0.03	-0.2			0.	03-0.2			0.03	3-0.2			0.0	3-0.2	
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	2-0.5	
Sand (%)	5	5 5	5 4	5 10	5	5	8	10	5	5	8	10	5	5	8	10	5	5	8	10	5	5	8	10
Stone (%)	93	90	) 90	) 75	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75
Mud (%)	2	2 5	5 4	5 15	2	5	2	15	2	5	2	15	2	5	2	15	2	5	2	15	2	5	2	15
							-																	

Prepared by: Mike Pang

January 13, 2015

January 13,2015

Ecology Team: China Hong Kong Ecology Consultants

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

> 2014 Annual Report She Shan River

> > January 2015



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Validated by: Mark Shea

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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 2014 Annual Report She Shan River

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#### 1 Introduction

- 1.1 Agreement No. CE65/2013(EP) Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River – Investigation required a post-construction ecological monitoring programme when the project completed. An annual report is required to be prepared for 2014 by using the collected data from surveys of January to November conducted by Contract NO. DC/2007/06 River Imporvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River and survey of December conducted under the 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. This report aims to summaries and present findings of the post construction ecological monitoring carried out during 2014.
- 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 1 annual report for the project summarising monitoring results collected from January to December of 2014. It contents the following subsections:
  - Summary of major points
  - Monitoring Methods
  - Monitoring Results
  - Summary and Comments

#### 2 Summary of Major Points

- Field ecological monitoring were undertaken during January to December 2014;
- Presentation of species abundance and species richness for fauna and flora using graphs;
- Fauna and flora along the drainage project sections is in a process of reestablishing or restoration;
- Hong Kong Newt was recorded with a low abundance near the habitat with abundant vegetation at She Shan River.
- The species richness and abundance of marco-invertebrate, odonata and avifauna were in natural fluctuation;
- A significant low number of fish was observed during wet season as large amount of fishes were affected by heavy rain or flooding; and
- The measured water quality parameters showed that the river water was not eutrophicated although moderate nutrient levels were recorded in early 2014.

### 3 Monitoring Methodology

### 3.1 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 follows in the AFCD website (www.hkbiodiversity.net) and Carey et al (2001). The point count was conducted at three locations located at the lower, middle and upper portion of the river channel. 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.

### **3.2** Fish Population and Hong Kong Newt

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

Sampling was conducted at three proposed sampling locations, i.e. upper, middle and lower river sections, and was cover major type of stream habitats, e.g. river pool and riffle (**Figure 1**). The number of the captured or observed fish was estimated and recorded. Nomenclature and protection status of the species followed those documented in the AFCD website (www.hkbiodiversity.net) and Virginia et al (2004).

### **3.3** Aquatic Macro-invertebrates

Macro-invertebrates in the riverbed were surveyed. Three sampling sites were designed to collect necessary macro-invertebrate fauna for ecological monitoring information (**Figure 1**). Five replicates were taken at each sampling point and pool together for further sample process. Kick sampling and hand netting were the main 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 will follow those documented in the AFCD website (www.hkbiodiversity.net) and other literatures such as Dudgeon (1994).

#### 3.4 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 behaviour were recorded. Nomenclature and protection status of the species followed those documented in the AFCD website (www.hkbiodiversity.net) and Keith (2003&2011). Adult Odonata survey was conducted along line transects in parallel with river channel within the works area where access was permitted.

#### 3.5 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, middle and lower portion of the river channel (**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 followed those documented in the AFCD website (http://herbarium.gov.hk/) and Hong Kong Herbarium (2012).

#### **3.6** Abiotic Data Collection

#### 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.

#### **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.

#### 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

Over 80 flora species was recorded within the survey transects along the river course within 2014. Most of the recorded floras were comprised of marsh species with few floating aquatic species such as *Lemna minor* 浮萍 and submerged plant such as *Hydrilla verticillata* 黑藻. The height of the dominated riparian grass and herb species were in a range from 0.3m to 3m as observed along survey transect. Dominant flora species were shown in the **Table 4-1** marked with relative abundance sign "+++". Vegetation has generally covered the riparian habitat in upper sections and part of the riverbed.

Aquatic plants *Brachiaria mutica* 巴拉草 and *Commelina diffusa* 節節草 were the most abundant plants found at most section of the river channel all of the years. An aquatic plant, which is also a vegetable, *Nasturtium officinale* 西洋 菜 were recorded especially high in abundance during dry season when there was no flooding occurred (see photograph below). The recorded floras were generally in good health indicating that the vegetation of the riverbed and banks is in a process of re-establishing or restoration. 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.



Photograph showing general view of She Shan River in March



Photograph showing general view of She Shan River in June. In the wet season, most of the plants in riverbed had been washed away by flood.



Photograph showing general view of She Shan River in September



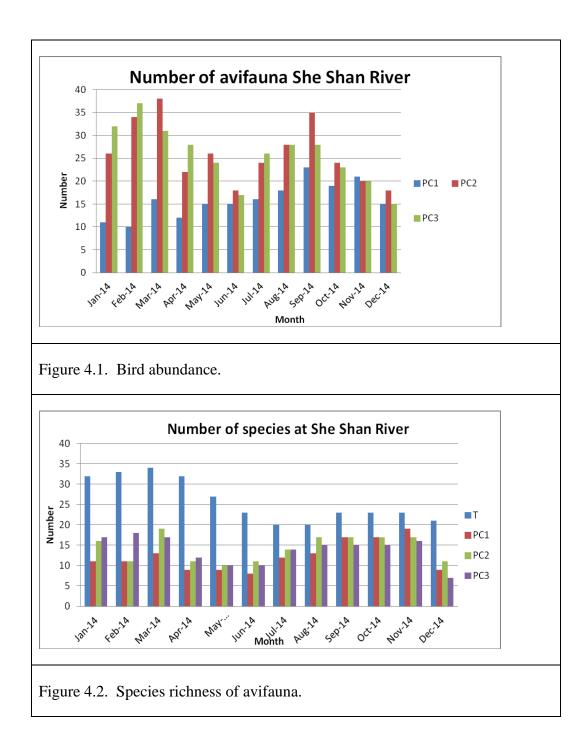
Photograph showing general view of She Shan River in January. An aquatic plant, also a vegetable, *Nasturtium officinale* 西洋菜 was very abundant during dry season in She Shan River.

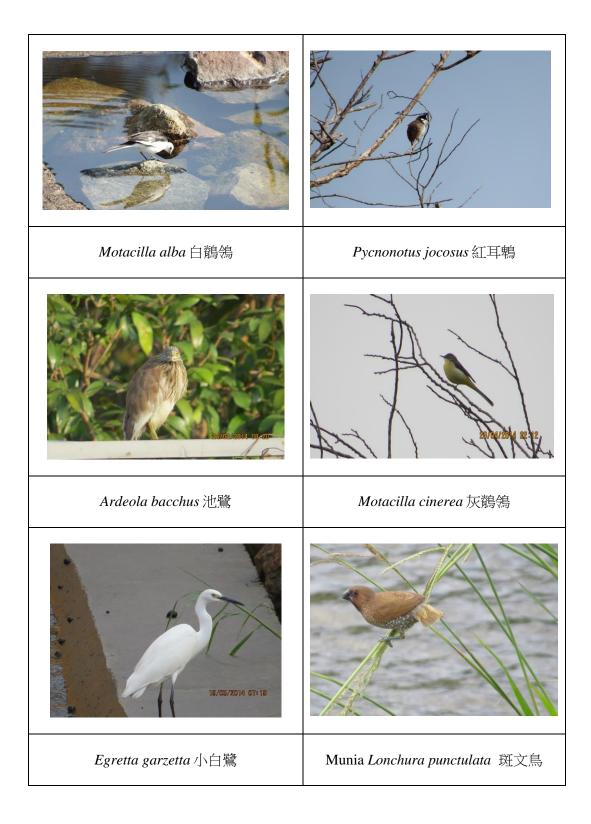
#### 4.2 Fauna

#### 4.2.1 Avifauna

An avifauna surveys were undertaken from January to December 2014 along survey transects and at three selected point count locations. Transect and Point Count locations were shown on **Figure 1**. Result of bird survey was presented in the **Table 4-3**. The summarised results showed that there was

no obvious change on species richness of avifauna at She Shan River and the number of avifauna was presenting a natural fluctuation, shown as **Figure 4.1** and **Figure 4.2**. In total, over 35 species of birds were recorded during the bird surveys within project area within 2014. 9 species of total recorded were wetland dependent species such as *Egretta garzetta, Motacilla alba,Ardeola bacchus* and *Actitis hypoleucos* commonly found forging in the river channel. The most common terrestrial birds recorded included – *Pycnonotus jocosus* 紅耳鵯, *Sturnus nigricollis* 黑領椋鳥, *Copsychus saularis* 鵲鴝, and *Streptopelia chinensis* 珠頸斑鳩. Below photographs are showing the common species recorded at She Shan River.

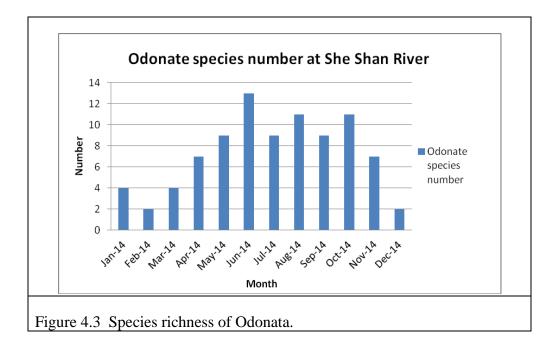






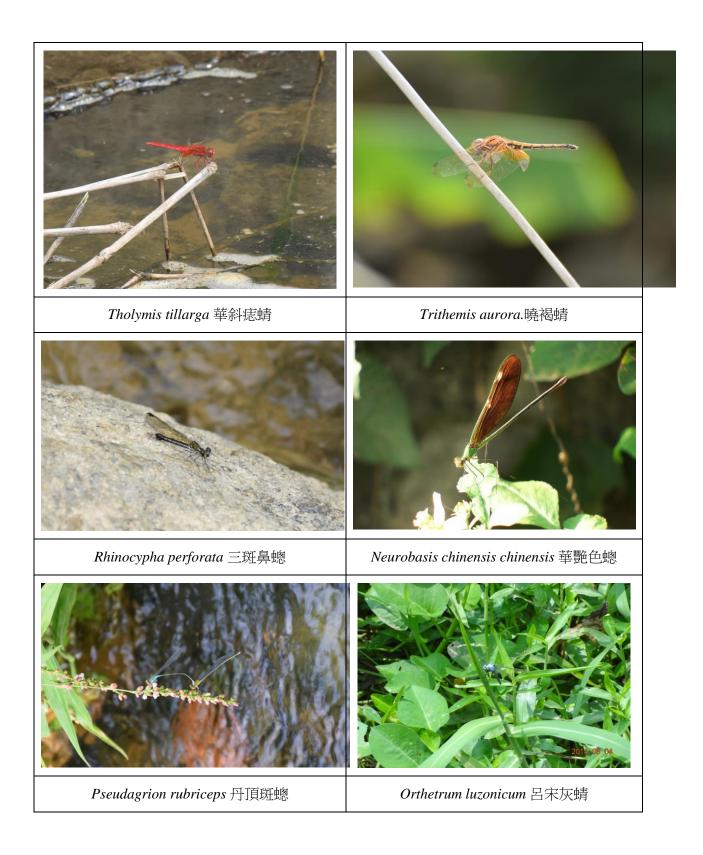
#### 4.2.2 Adult Odonata Survey

Odonata surveys were performed from January to December 2014 and a list of recorded odonata species in She Shan River is shown in **Table 4-4**. A graph of odonata species richness is shown in **Figures 4.3**, it indicates that species number of odonata fluctuated among seasons. The maximum number of odonata species was recorded during wet season and a big contrast showing species number of odonata in dry season is significant low. More species and higher abundance observed in wet season was due to seasonality (Keith, 2003&2011). In total, 23 species of odonata were recorded in a year. Sampling location was shown on **Figure 1**. Photographs of some of the recorded dragonfly and damselfly species are presented below.



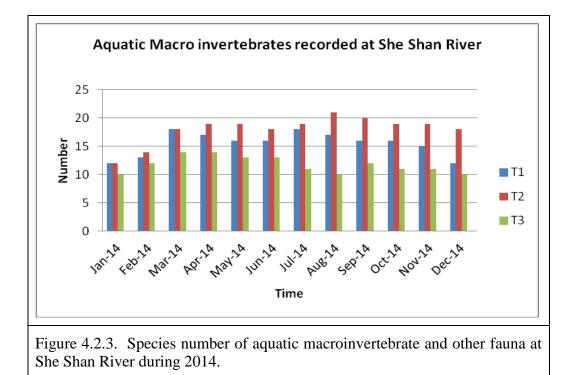


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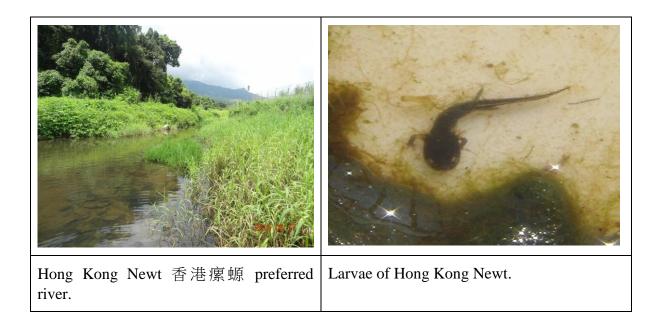
#### 4.2.3 Aquatic Macro-invertebrates

The river benthic fauna collected was mainly comprised of insects, mollusks and crustaceans. Over 20 species were recorded during ecology surveys undertaken from January to December 2014. The species richness was observed with no significant change, shown as **Figure 4.2.3**. 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 conducted at She Shan River from January to December of 2014. Adult Hong Kong Newt *Paramesotriton hongkongensis* 香港瘰螈 was observed in every survey conducted during 2014 at the river channel (See below Photographs). The abundance of Hong Kong Newt at She Shan River is low. 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 from January to December 2014 and total 13 species of freshwater fish were recorded. Native fish *Zacco platypus* 寬鰭鱲 was one of the dominant fish in the river channel (see below photograph). During wet season, heavy rain and flooding affected fish abundance counted at the 2x2 meter recording area, **Figure 4.2.5b**. There was no apparent change on the species number and composition at She Shan River within 2014, shown as **Figure 4.2.5a**. Details of recorded of fish fauna refers to **Table 4-6**. Sampling location was shown on **Figure 1**.

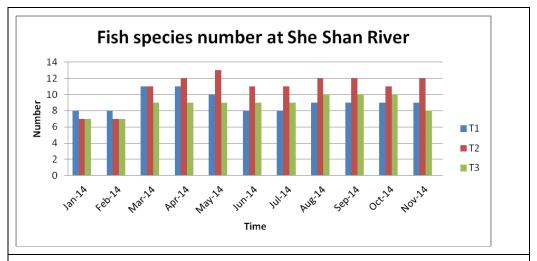
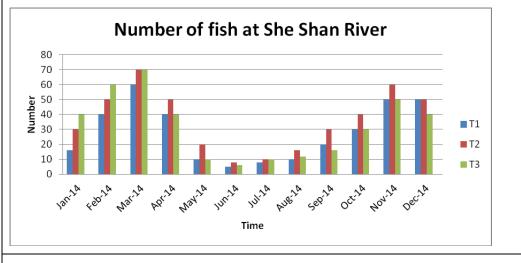


Figure 4.2.5a. Number of fish species recorded in She Shan River during 2014.



4.2.5b. Fish abundance (fish counts in 2x2m plots) recorded in She Shan River during 2014.

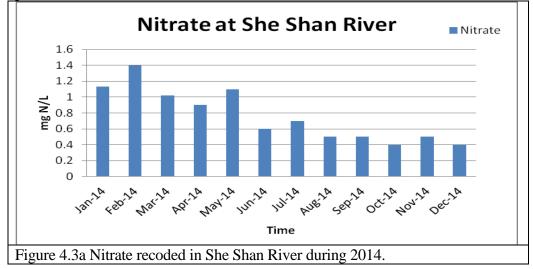


#### 4.3 Abiotic Data

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**.

Water quality parameters measured at She Shan River showed low nutrient level of the river water and no eutrophication problem, refer to **Figure 4.3a**. Results of water test are presented in the **Table 4.7**.

The river substratum was comprised of over 20-80% 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

- 5.1 Data presented and analyzed in this report were derived from ecology surveys conducted during 2014. The post-construction ecological monitoring will be continued and it is expected that long term monitoring will reveal even more information on ecological recovery and habitat improvement.
- 5.2 Aquatic and riparian vegetation re-established quickly after the completion of the drainage works as demonstrated by the photographs in this report. Aquatic and marsh plants growing on the riverbed and along the water margins provide breeding and feeding habitat for a variety of aquatic life including insects, shrimps, fish and the Hong Kong Newt.
- 5.3 Paramesotriton hongkongensis 香港瘰螈 were frequently recorded during ecological surveys in 2014, but its abundance was low, especially in wet season.
- 5.4 The species richness of fish was recorded in a stable level during 2014. However, the fish abundance was observed significant low during wet season, it was believed that fishes were affected by heavy rain and floods. Native fish *Zacco platypus* 寬鰭鱲 was one of the dominant species in the river channel.
- 5.5 Abundance of the aquatic marco-invertebrates and avifauna were stable with no apparent seasonal change.
- 5.6 The species richness of odonata fluctuates sharply along with different season, maximum species number was recorded during wet season due to seasonality.

5.7 Measured water quality parameters and physical characteristics showed only minor monthly fluctuation. It is predicted that the water quality will improve over the long term as flora and fauna continues to establish in the river channel.

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Hong Kong Biodiversity Website : http://www.afcd.gov.hk/english/conservation/hkbiodiversity/hkbiodiversity.html FIGURE

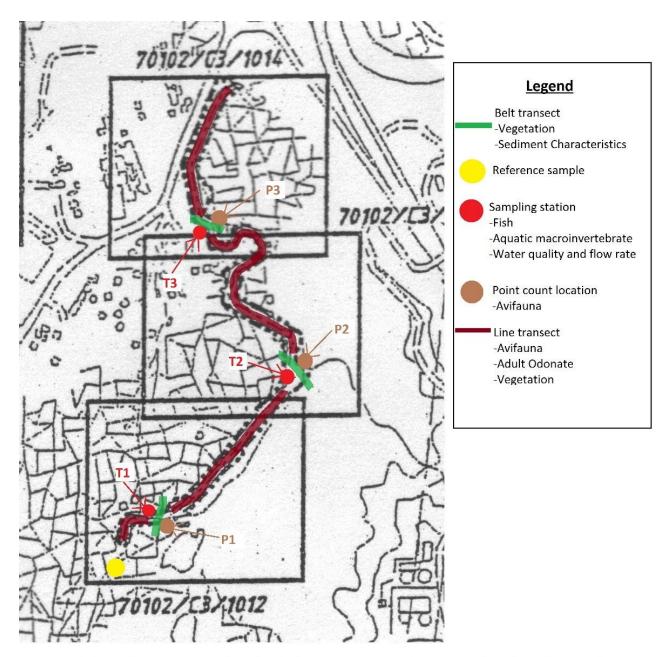


Figure 1. Sampling Location of Ecological Survey and Monitoring at She Shan River, Tai Po.

TABLE

## Contract No. DC/2007/06 River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River Ecological Impact Monitoring Report - She Shan River

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

Acracas Acoracas Amuranhaceae Amuranhaceae Amuranhaceae Amuranhaceae Amuranhaceae Amuranhaceae Adaenaea Anaceae Anaceae Anaceae Anaceae Anaceae Anteraceae	Species name Delignera chinensis Acoras grannineus Acoras grannineus Acoras grannineus Acoras grannineus Acoras Ac	Species same in Colorer           利用菜           自用菜           自用菜           全込備子草           合素/香           力素           水芹           合果菜           小芹           合果菜           白素           白	Jan-14 + + + + + + + + + + + + + + + + +	Feb-14 + + + + + + + + + + + + + + + + + + +	Mar-14	Apr-14 + + + + + + + + +	May-14 + + + + + + + + + + + + + + + + + + +	Jun-14 + + + + + + +	Jul-14 + + + + + +	Aug-14 + + + + +	Sep-14 + + + + +	Oct-14 + + + + + + + +	Nov-14 + + + +	Dec-14 + + + + + +
kiparian Plant Acanthaceae A Anaranthaceae A Anaranthaceae A Anaranthaceae A Anaranthaceae A Anaranthaceae A Anaraceae A Anaceae A Anaceae A Anaceae A Anaceae A Anaceae A Anaceae A Anaraceae A Anara	Dicliptera chinensis Acorus graniness Acorus graniness Alexandres phlosensides Celosia argentes L Omanthe joranica Elexantand Alexania evalenta Alexania evalenta Syngonian pedophlum Pistia stratistes Synderella nodybulta Pistia stratistes Synderella nodybulta Pistia stratistes Synderella nodybulta Pistia stratistes Synderella nodybulta Pistia stratistes Synderella nodybulta Erigero tratisti Giunar di varicuta Chipar postrata Erigero tratisti Guinar di varicuta Agentum conycsides Enclose hierarifiplius Pisnia pomica Splanhee panvisulta Calipteris escultata Begonias cascultata var Josefori Bedonia evaluta	内肝死            肉肝死         全規係           全規係         空返湯子型           背着         水片           水片         海豚芋           学         今風市           方         二月之先封/卒           魚脂等         四加松皮油           加松皮油         一月之先封/卒           加松皮油         一月二月二月二月二月二月二月二月二月二月二月二月二月二月二月二月二月二月二月二	Jan-14 + + + + + + + + + + + + + + + + +	+eb-14 + + + + + + + + + + + + + + + + + + +	Mar-14 + + + + + + + + + + + + + + + + + + +	Apr-14 + + + + + + + + + + + + + + + + + + +	May-14 + + + + + + + + + + + + + + + + + + +	Jun-14 + + + + + + +	Jul-14 + + + + +	Aug-14 + + + + + + + + + + + + + + + + + + +	Sep-14 + + + + + + +	+ + + + + + + + + + + + + + + + + + +	Nov-14 + + + + + +	+ + + + + + + + + + + + + + + + + + +
Acanthacene Acaracene Acaracene Anaranthacene Anaranthacene Anaranthacene Anaranthacene Anaranthacene Anaranthacene Anaranthacene Anaranthacene Anaracene An	Acoras granineus Akornas granineus Akoras agentes philoscevides Celasia argentes L Omanthe jananics Elex ranala Akocasia odora Colocasia esculorata Saganiam podophyllam Pritais artatiotes Saganiam podophyllam Pritais artatiotes Saganiam podophyllam Pritais artatiotes Saganiam Antoniokiamas Erigeron Harvitokiamas Erigeron Austristikamas Erigeron Austristikamas Salasta pannica Spilanthe panniculata Califyeris esculenta	全线运道	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + +	+ + + + + +	+ + + + +	+ + + +	+ + + +	+ + + +	+ + + +	÷ ÷ ÷
Acracas Acoracas Amuranhaceae Amuranhaceae Amuranhaceae Amuranhaceae Amuranhaceae Amuranhaceae Adaenaea Anaceae Anaceae Anaceae Anaceae Anaceae Anteraceae	Acoras granineus Akornas granineus Akoras agentes philoscevides Celasia argentes L Omanthe jananics Elex ranala Akocasia odora Colocasia esculorata Saganiam podophyllam Pritais artatiotes Saganiam podophyllam Pritais artatiotes Saganiam podophyllam Pritais artatiotes Saganiam Antoniokiamas Erigeron Harvitokiamas Erigeron Austristikamas Erigeron Austristikamas Salasta pannica Spilanthe panniculata Califyeris esculenta	全线运道	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + +	+ + + + + + + + + + + +	+ + + + + + + +	+ + + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +	+ + + +
Annanthacea Annanthacea Apairola Apairola Apairola Aracea	Ahemanthera philosensides Celosia argontes L Oomanthe jaromica Bee rotunda Rec rotunda Colocastia escueltata Syngoniam podophyllum Paisa straitotes Bieleva aba Belleva aba Belleva aba Edipta prostrata Edipta escueltata Ecolutica thereacificata Ecolutica hieracificata Ecolutica thereacificata Ecolutica thereacificata Ecolutica thereacificata Ecolutica thereacificata Ecolutica thereacificata	空心碰子草 青葙 木芹 繊冬青 子 子 星 子 子 子 星 子 白花斑 詩 子 白花斑 詩 石 大 浩 四 第 右 大芹 八 道 昭 寺 名 朱 子 二 大芹 二 二 大芹 二 二 大芹 二 二 大芹 二 二 大芹 二 二 大芹 二 二 大芹 二 二 大芹 二 二 大 子 二 二 大 子 二 二 大 子 二 二 大 子 二 二 大 二 二 大 二 二 大 二 二 大 二 二 ( 大 二 二 大 二 二 ( 大 二 二 ( 大 二 二 ( 大 二 二 ( ) 二 ( ) ( ) ( ) ( ) ( ) ( ) ( ) (	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + +	+ + + + + + +	+ + + + +	+ + + + + + + + + + + + + + + + + + + +	+ + + + +	+ + + +	+ + +	+ + +	+ + +	+ +
Anaranthaceae Aplaceae Aplaceae Araceae Aracea	Celosia argentea L Ormanthe joranica Eae naturda Aloccasia odora Coloccasia eculorata Symposium pedophilum Pisia stratistes Bidora alba Symodrella nodiforon Milania micrantha Erigeno harrinskianas Erigeno harrinskianas Erigeno partinas Ginura di varicusta Agentum conycsides Encostin hierasififolias E rechtin hierasififolias E rechtin hierasififolias E rechtin hierasififolias Spilanhen panvisultan Califperis escultanta Beginais escultanta	荠梢 木芹 水芹 湯芋 子 今果芋 子 今果芋 人活 電気地計亭 全腰筋 截 式 物時 白子既 動 輪 白子 馬 男 等 二 之 大 酒 、 花 、 二 、 二 、 二 、 二 、 二 、 二 、 二 、 二 、 二	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + + +	+ + + +	+ + + + + +	+ + + +	+ + +	+	+	+ +	+	+	+
Apiaceal Apainfoluceae A Apainfoluceae A Anaceae Anaceae Anaceae Anaceae Anaceae Anaceae Anaceaea Anaceae Anaceae Anaceae Anac	Omanthe javanica Iler, extanda Alexania odora Colocania esculorata Saganiam podophytlam Paria stratiores Bidora alla Synachrella modifara Manaia micraatha Erigeron Martinokiama Erigeron Martinokiama Erigeron Andrika Gymara divaricanta Agerratum conzychiles Emilia sanchifolia E rechtiten hieraciifoilus E rechtiten hieraciifoilus	水菜 序 端 及 序 字 子 全 果 字 子 全 果 字 子 全 果 字 子 全 果 字 子 合 鬼 要 子 子 在 鬼 數 ¥ 卒 自 全 廠 策 助 勒 經 自 子 菜 紙 師 日 子 菜 紙 員 子 菜 紙 員 子 菜 業 二 字 子 子 子 字 子 字 、 二 字 子 字 、 二 字 子 字 、 二 字 子 字 、 二 字 子 字 、 二 字 子 二 、 二 字 二 名 来 二 字 二 名 来 二 二 名 来 二 二 名 名 男 二 二 名 名 第 二 二 名 名 第 二 二 名 名 二 名 二 名 二 名	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + + + + + + + + + + + + + + +	+ + +	+ + +	+	+	÷	+			-
Araceae Aracea	Alocania odora Colocania esculorta Colocania esculorta Synoniane podophilum Pista araniores Bilara atraniotes Milanis micratulto Milanis micratulto Milanis micratulto Estipa porstrata Grunea divaricata Grunea divaricata Grunea divaricata Agentum conzychides Encolution hieracificilias Encolution hieracificilias Encolution hieracificilias Splanhene puncilata Calliperio seculutata Begonias caesallata var Josefori	海芋 芋 芋 子 条 菜 花 枕 斑 子 右 花 鬼 計 年	+ + + + + + + + + + + + + + + + + + + +	+ + + + + + + +	+ + + + + + + + + + + + + + + + + + + +	+ +	+	+						(
Aracese Aracese Aracese Asteracese Basistacese Brasistacese Brasistacese Brasistacese Cassiphilinaces Cassiphilinaces Cassiphilinacese	Celectric esculents Syngonium podophythum Potius stratifiers Billers allen Billers allen Syndrellen nodifiers Matania microsofta Kelgen porstrasse Genare divarisata Genare divarisata Genare divarisata Genare divarisata Genare divarisata Erechtites hieracifipilas Erechtites hieracifipilas Erechtites hieracifipilas Celligeneis esculenta Begeniae casculata var Josekorf Begeniae Celligeneis	学 令果学 合果学 力花應気計率 金蔵計率 金蔵計率 加助能後 運 動 朝時 日子菜 開一 、 業 の 果 子 、 二 の の 男 を 、 二 の の 男 を の の 男 を の の の 男 を の の の 引 本 の の の の の の の の の の の の の の の	+ + + + + + + + + +	+ + + + + + +	* * * *	÷	+	÷						ĺ .
Araceae Araceae Asteraceae Basteraceae Basterae Basteraceae Basteraceae Baste	Syngonium podophyllum Prisia straitoses Bleava alba Syndrella molifikra Mannis micratuba Eclipta prostratu Eclipta prostratu Eclipta prostratu Agernatu corycyoles Emilia sonchifolia E rechtie hieraciifolias E rechtie hieraciifolias E rechtie hieraciifolias E rechten hieraciifolias Calliptoris escultatu Ecliptoris escultatus	- - - - - - - - - -	+ + + + + +	+ + + + + +	+ 	+	+		+	÷	+	÷	+	+
Araceae Aracea	Pistia aratistes Bilien alta Syndrella nolflora Mianis micratha Erigero Itaritotikanus Echipa prostratus Granza divaricatus Granza divaricatus Agantam conzychide Encolitoti nolfofa Encolitoti herexificilius Vonația japonica Splanhere parivaltus Calliperis escultatus Begonise cascultatu var Joseferi Bechema oriente	大康 白花鬼針草 金腰箭 燕甘菊 加勒比烧蓬 靖陽 百子菜 勝紅廟 一點紅 榮子菜	+ + + + +	+ + + + + + + + + + + + + + + + + + + +	+ +			+	+	+	+	+	+	+
Asteraceae Caryophyllaceae Caryophyllaceae	Bidens alba Synoiellei nodffora Milanis nicrautha Erfigron larvinskianus Erfigron paratnas Gymara dynaiska Gymara dynaiska Ageratum conysides Emilia sunchfolia Enektich hirraciifolius Y enngia japunisa Spilanthes punicadata Calliperis escultuta Begonia cucultuta var hocheri	白花鬼針草 金腰箭 產甘菊 加勒比幾蓬 韓勝 白子葉 勝紅 一點紅 案子葉	+ + + + +	+ + +	+ +				+	+	+	+	+	+
Addracese Addracese Advanc	Synodrella nodrflora Mlania nicrantha Erigeron karvinskiamus Echya prostratus Gymura divaricusta Agentum concyclides En cohtin kirescrififias E rechtin kirescrififias E rechtin kirescrififias Agunaha pumiculata Callipteris esculanta Begonia cacullata var hocheri Michanan ariontale	金腰箭 截甘菊 加勒比烧蓬 續勝 白子菜 勝紅前 一點紅 梁子菜 梁子菜	+ + + + + +	+ + +	+									
Attracean Beginiacean Beginiacean Brasicacean Brasicacean Brasicacean Canyaphyllacean Canyaphyllacean Canyaphyllacean	Milanis micranthe Erigeron Itaritoklamus Echiga porstratus Graura divaricuta Agentum conzychides Emeditech hieracifiolius E meditech hieracifiolius Zongria japonica Splanthea punvilatta Calliperis excutanta Begonise excutanta Begonise casulatu var Joseferi	截甘菊 加勒比凝蓬	+ + +	+++	Ŧ	+	**	**	++	**	++	++	++	
Asteraceae Bassicaceae Brassicaceae Brassicaceae Cassiphilaceae Cassiphilaceae	Erigeno karrinskianus Eclipta prostratus Gynura divaricutas Gynura divaricutas Gynura divaricutas Eneltito exclificita E rechtote hieracificitas Youngia kaponica Spilanshes panisulata Callipetri escuelenta Regonia escuellata var hooleri Blechman orientale	加勒比飛蓬 續勝 白子菜 勝紅蓟 一點紅 來子菜	+	+	+	+	++	++	++	++	++	++	++	++
Asteraceae Asteraceae Asteraceae Asteraceae Asteraceae Asteraceae Asteraceae Asteraceae Asteraceae Basesicaceae Brassicaceae Brassicaceae Brassicaceae Casophylaceae Casophylaceae	Eclipta prostrata Grana divaricata Agentan conyoides Emilia sonchifolia Enelita sonchifolia Yanagia japomica Spilanthea panicatata Calliperia casculata Begonia casculata wa Poskeri Bechama orientade		+		+	+	+	+	+	+	+	+	+	+
Asteraceae Asteraceae Asteraceae Asteraceae Asteraceae Asteraceae Asteraceae Baysiaceae Baysiaceae Baysiaceae Baysiaceae Bassiaceae Bassiaceae Bassiaceae Bassiaceae Cassiphiliaceae Cassiphil	Agentum conycsides Emilia sonchifolia E rechtien hieraciifolias V oungia japonica S pilanthes poniculata Callipteris esculata Begonia escullata var.hookeri Blechnum orientale	勝紅蓟 一點紅 樂子菜		+	+	+	÷	+	+	÷	+	÷	+	+
Asteraceae Asteraceae Asteraceae Asteraceae Asteraceae Asteraceae Begoniaceae Brassicaceae Brassicaceae Cassaphinaceae Cassyphyliaceae Caryophyliaceae	Emilia sonchifolia E rechtites hieraciifolius Y oungia japonica S pilanthes paniculata Callipteris esculenta Begonia cucultata var.hookeri Blechnum orientale	一點紅 樂子菜		÷	+	÷	+	÷	+	+	+	÷	+	+
Asteraceae Asteraceae Asteraceae Asteraceae Asteraceae Begoniaceae Begoniaceae Brassicaceae Brassicaceae Brassicaceae Caesalpiniaceae Caesalpiniaceae Carsophyllaceae Carsophyllaceae	E rechtites hieraciifolius Y oungia japonica Spilanthes paniculata Callipteris esculenta Begonia cucullata var.hookeri Blechnum orientale	樂子菜	+	+	+	÷	+	÷	+	+	+	+	+	+
Asteraceae Asteraceae Asteraceae Begoniaceae Bechanceae Brassicaceae Brassicaceae Brassicaceae Cassalpinaceae Caryophyllaceae Caryophyllaceae	Y oungia japonica S pilanthes paniculata Callipteris esculenta Begonia cucullata var.hookeri Blechnum orientale		+	+	+	÷	+	+	+	+	+	÷	+	+
Asteraceae Athyriaceae Begoniaceae Begoniaceae Brassicaceae Brassicaceae Brassicaceae Caesalpriniceae Caryophyllaceae Caryophyllaceae Caryophyllaceae	S pilanthes paniculata Callipteris esculenta Begonia cucullata var.hookeri Blechnum orientale	黄鹤菜				÷	+	÷	+	+	+	+	+	+
Athyriaceae Begoniaceae Begoniaceae Bicchnaceae Brassicaceae Brassicaceae Brassicaceae Cassophyllaceae Caryophyllaceae Caryophyllaceae	Callipteris esculenta Begonia cucullata var.hookeri Blechnum orientale	A Attales				+	+	+	+	+	+	+	+	+
Begoniaceae B Blechnaceae B Brassicaceae B Brassicaceae B Brassicaceae C Casyophyllaceae C Caryophyllaceae C	Begonia cucullata var.hookeri Blechnum orientale	金鈕扣 菜蕨	+	+	+	++	++	+	+	+	+	+	+	+
Blechnaceae Brassicaceae Brassicaceae Brassicaceae Caesalpiniaceae Caryophyllaceae Caryophyllaceae	Blechnum orientale	<sup>未成</sup> 四季秋海棠				+	+	+	+	+	+	+	+	+
Brassicaceae , Brassicaceae , Caesalpiniaceae , Caryophyllaceae , Caryophyllaceae ,		烏毛蕨	+	+	+	+	+	+	+	÷	+	+	+	+
Caesalpiniaceae Caryophyllaceae Caryophyllaceae	Nasturtium officinale	西洋菜	+++	+++	***	+	+	+	+	÷	+	÷	+	+
Caesalpiniaceae . Caryophyllaceae . Caryophyllaceae .	R orippa indica	塘葛菜				+	+	+	+	+	+	+	+	+
Caryophyllaceae Caryophyllaceae	C apsella bursa-pastoris	齊菜				+	+	+	+	+	+	+	+	+
Caryophyllaceae	Bauhinia championii	缺葉藤										$\vdash$		<b> </b>
	Drymaria diandra Myosoton aquaticum	荷蓮豆 鵝腸菜	+	+	+ +	+	+	+	+	* +	+	+		
	Myosoton aquaticum Chenopodium ficifolium	胞腸菜 小薬			e	+	+	+	+	+	+	+	+	+
	Commelina diffusa	小架 節節草	++ +	++ +	++ +	++++	++	++	++	++++	++++	++++	++++	++ +
	Pharbitis nil	<b>車車車</b> 牽牛	+	+	+	+	+	+	+	÷	+	+	+	+
	Ipomoea cairica	五爪金龍	+	+	+	+	÷	÷	+	÷	+	+	+	+
Cucurbitaceae	Solena amplexicaulis	茅瓜												
Cuscutaceae	Cuscuta australis	南方菟絲子												
	Cyperus sp.	莎草	+	+	+	+	+	+	+	+	+	+	+	+
	Cyperus involucratus	風車草			+	+	+	+	+	+	+	+	+	÷
	Macaranga tanarius	血桐			+	+	+	+	+	+	+	+	+	+
	Aporusa dioica Pueraria lobata	銀柴	+		*	*	++		++	++	++			
Fabaceae	Sesbania cannabina	野葛 田善	+	+	+	т	**		+	+	+	+	+	+
	Cinnamomum burmannii	四百 陰香		+	+				+	+	+	+	+	+
	Lygodium japonicum	海金沙		-	-	+	+	+	+	+	+	+	+	+
	Michelia alba	白蘭		+	+		+	+	+	+	+	÷	+	+
Malvaceae	Hibiscus rosa-sinensia	大紅花												
Mimosaceae	Mimosa pudica	含羞草	+	+	+	+	+	+	+	+	+	+	+	÷
	Leucaena leucocephala	銀合歡	+	+	+	÷	+	÷	+	+	+	+	+	+
	C alliandra haematocephala	紅絨球				+	+	+	+	+	+	+	+	+
	Broussonetia papyrifera	構樹		+	+									
	Ficus hispida Ficus pumila	對葉榕 薜荔	Ŧ	Ŧ	Ŧ	Ŧ	Ŧ	Ŧ	+	+	+	+	+	+
	Ficus variolosa	<sup>純小加</sup> 變葉格								-	-	-		-
Moraceae	Ficus variegata	青果榕												
Musaceae	Musa paradisiaca	大蕉		+	+	+	+	÷	+	+	+	÷	+	+
Myrsinaceae	Maesa perlarius	鲫魚胆												
	Cleistocalyx operculatus	水翁		+	+	+	+	+	+	+	+	+	+	÷
	Ludwigia hyssopidolia	草能	+	+	+	+	+	+	+	+	+	+	+	÷
	Ludwigia erecta	美洲水丁香	+	+	÷	+	+	+	++	++++	++++	++	++	**
	Averrhoa carambola Oxalis corniculata	楊桃	+		-	+	+							-
	Oxalis corniculata Plantago major	酢醬草 車前草	Ŧ	Ŧ	Ŧ	Ŧ	Ŧ	Ŧ	Ŧ	+	+	+	+	+
	Plantago major Panicum maximum	車前草 大黍	+	+	+	+	+	+	+	+	+	+	+	+
	Panicum repens	入** 枯骨草	+	+	+	+	+	+	+	÷	+	+	+	+
	Brachiaria mutica	巴拉草	++	++	++	++	++	++++	+++	+++	++++	+++	+++	++++
	Pennisetum purpureum	象草	+	+	+	+	+	+	+	+	+	+	+	+
	Coix lacryma-jobi	薏苡	+	+	÷	+	÷	+	+	÷	+	+	+	+
	Microstegium ciliatum	剛秀竹	+	+	+	+	+	+	++	++	++	++	++	++
	Miscanthus floridulus	五節芒	+	+	÷	+	+	+	+	÷	+	+	+	+
	Pennisetum alopecuroides	狼尾草 47月2日				+	+	+	+	÷	+	+	+	+
	Digitaria radicosa Polygonum hydropiper	紅尾翎 * 草	+	+	+	+	+	+	+	+	+	+	+	+
	Polygonum hydropiper Polygonum glabrum	水蓼 光蓼			-	· · · ·		-		-	Ľ –	r	·	1
	Polygonum chinense	火炭母	+	+	+	+	+	+	+	÷	+	+	+	+
	Rumex trisetifer	假菠菜				+	+	+	+	÷	+	+	+	+
	Polygonum lapathifolium	大馬夢				+	+	÷	+	÷	+	÷	+	÷
	Hedyotis hedyotidea	牛白藤												
	Dimocarpus longan	龍眼												
Solanaceae	Solanum torvum	水茄		+	÷	+	+	+	+	÷	+	+	+	+
	Solanum americanum	少花龍葵				+	+	+	+	÷	+	+	+	+
	Cyclosorus parasiticus	華南毛蕨										$\vdash$		-
	Celtis sinensis	朴樹		+	÷	+	÷	+	+	÷	+	+	+	+
	Celtis timorensis	樟葉朴												
	Trema orientalis Trema tomentosa	異色山黄麻 山茶庭	+	+	+	+	+	+	+	+	+	+	+	+
	Boehmeria nivea	山黃麻 苧麻	· +	+	+	+	+	+	+	+	+	+	+	+
	Pilea microphylla	テ麻 透明草	+	+	÷	+	+	+	+	÷	+	÷	+	+
	Pouzolzia zeylanica	返明早 霧水葛	+	+	÷	+	+	+	+	÷	+	÷	+	+
	Vitex quinata	山牡荆												
	Polygonum perfoliatum	杠板歸				+	+	+	+	÷	+	+	+	+
	Lantana camara	馬纓丹	+	+	+	+	+	+	+	+	+	+	+	+
Floating Plant							-						· · · ·	
emnaceae	Lemna minor	浮萍	+	+	÷	+	+	+	+	÷	+	÷	+	+
Submerged Plant														
	Hydrilla verticillata	黑藻			1	1		+	+	+				<u>.</u>

Note:

Note: "+" - Species exists in the study area "++" - Species common in the study area "+++" - Species abundant/dominant in study area

#### 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)

(T1- Upper stream se	ection,T2 - middle stream section a	ind 13 - Lower s	tream section)		t constructio	on monit	oring		1	Post	t construction	n mori	toring			Post co	nstruction	monito	ring			Post	t construction	monit	oring			Post	construction	n morit	oring			Post	construction	monit	oring	
		Stream		ros	Jan-1		oring			rus	Feb-1		toring			rost co	Mar-14		ing			rost	Apr-14		oring			FUSL	May-1		oring			rost	Jun-1		n ing	
		Transect	T1		T2		T3	;	T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3	3
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	% He	eight(m)	% I	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	) %
Commelinaceae	Commelina diffusa	節節草	0.2	15	0.5	5 30	0.	.2 1	0.2	2 20	0.5	30	0.2	5	0.3	20	0.5	35	0.3	6			0.5	30					0.5	20					0.5	25	1	
Poaceae	Panicum repens	枯骨草					0.	.2 1	l				0.2	1					0.4	1																	i	
Asteraceae	Mikania micrantha	薇甘菊	0.1	10			0.	.2 1	0.1	1 10			0.2	1	0.1	10			0.2	1	0.3	3 10	0.3	10	0.3	1	0.3	10	0.3	10	0.3	1	0.3	10	0.3	10	0.	3 1
Brassicaceae	Nasturtium officinale	西洋菜																			0.3	3 20			0.3	5	0.3	5			0.3	5	0.3	5			0.	3 5
Moraceae	Ficus microcarpa	細葉榕																																			i	
Moraceae	Ficus hispida	對葉榕																																			I	
Poaceae	Microstegium ciliatum	剛秀竹																																		$\square$	<b></b>	
Fabaceae	Pueraria lobata	野葛																																		$\square$	<b></b>	
Araceae	Colocasia esculenta	芋																																		$\square$	<b> </b>	
Urticaceae	Boehmeria nivea	苧麻																																		$\square$	<b> </b>	
Asteraceae	Bidens alba	白花鬼針草					0.	.3 1	1				0.4	1					0.4	1			0.3	5	0.8	1			0.3	5	0.8	1			0.3	5	0.	.8 1
Poaceae	Pennisetum purpureum	象草	1.5	10	1.5	5 10			1.5	5 10	1.5	10	)		1.5	5	1.5	5																		$\square$	i	
Poaceae	Coix lacryma-jobi	薏苡																							0.8	1					0.8	1				$\square$	0.	.8 1
Amaranthaceae	Alternanthera philoxeroides	空心蓮子草																																			I	
Poaceae	Panicum maximum	大黍																																			i	
Moraceae	Broussonetia papyrifera	構樹																																		1	ł	
Polygonaceae	Polygonum chinense	火炭母																																		i T	1	
Onagraceae	Ludwigia hyssopidolia	草龍					0.	.3 2	2				0.4	1					0.4	1																	i	
Cyperaceae	Cyperus sp.	莎草																																				
Poaceae	Miscanthus floridulus	五節芒																																		$\square$		
Poaceae	Brachiaria mutica	巴拉草	1.5	60	0.3	8 20			1.5	5 55	0.8	25	;		1.5	60	0.8	30			1.5	5 50	1	50			1.5	40	1	40			1.5	45	1	45		
Blechnaceae	Blechnum orientale	烏毛蕨																																			i	+
Poaceae	Pennisetum alopecuroides	狼尾草						+										-			2	2 20					2	15					2	15				+
Araceae	Alocasia macrorrhizos	海芋																							0.8	1					0.8	1					0.	.8 1
Lemnaceae	L emna minor	浮萍						+				-													N.A	5					N.A	5				r+	N.A	5
Polygonaceae	Polygonum hydropiper	水蓼						-				-										+														μŤ		
	Cyperus involucratus	小麥 風車草						+														+														┌──┼	( <b></b>	+
Cyperaceae					0.8	8 30					0.8	30					0.8	25				+			1	2				-	1	2				⊢−┤		
Onagraceae	Ludwigia erecta	美洲水丁香			0.3	o 30					0.8	30	' 				0.8	25				+			1	2						2				⊢┤		1 2
Convolvulaceae	Ipomoea cairica	五爪金龍								-		_						_												-						$\vdash$		
Bare Gound				5		10		94	-	5		5	,	91		5		5		90		0		5		84		30		25		84		25		15	ı	84

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

#### Table 4.2. Flora species recorded from belt transect survey at the She Sha

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

(11- Opper stream s	ection,T2 - middle stream section a	ind 15 - Lowers		Post	construction	n monito	oring			Post	constructi	ion mon	itoring			Pos	st construct	ion mo	onitoring			]	Post cor	nstruction	n monito	ring			Post	construc	tion more	nitoring		<u> </u>		Post	constructio	on moni	itoring	
		Stream			Jul-14	4	U				Aug		e				Sep	<b>b-14</b>	Ũ					Oct-1		Ũ					v-14	Ū		+			Dec-1	14	U	
	-	Transect	T1		T2	_	T3	_	T1		Т	2	Т	3	T1		1	12		ГЗ	T1			T2		T3		T1		1	ſ2		T3		T1		T2			T3
Family	Species	Chinese name	Height(m)	%	Height(m)	% 1	Height(m)	%	Height(m)	%	Height(m	) %	Height(m	ı) %	Height(m)	%	Height(n	1) %	Height(r	n) %	Height	(m) 9	% He	eight(m)	% F	Height(m)	%	Height(m)	%	Height(n	1) %	Heigh	nt(m) %	i H	Height(m)	%	Height(m)	%	Heigh	ht(m) %
Commelinaceae	Commelina diffusa	節節草			0.5	5 25					0	.5 2	5				(	).5	25			1	10	1	50	0.	1 2	1	10		1 5	50	0.1	2	1	10	1	1 50	0	0.1 2
Poaceae	Panicum repens	枯骨草																																						
Asteraceae	Mikania micrantha	薇甘菊	0.3	3 10	0.3	3 10	0.3	2	0.3	3 12	0	.3 1	2 0	).3	5 0.	.3 1	2 (	).3	12	0.3	5	0.3	5	1	15	0.	3 2	0.3	5		1 1	5	0.3	2	0.3	5	1	1 15	5	0.3 2
Brassicaceae	Nasturtium officinale	西洋菜	0.3	3 2	2		0.3	2	0.3	3 1			(	).3	1 0.	.3	1			0.3	1																			
Moraceae	Ficus microcarpa	細葉榕																																						
Moraceae	Ficus hispida	對葉榕																																						
Poaceae	Microstegium ciliatum	剛秀竹												_																		_		$\rightarrow$						
Fabaceae	Pueraria lobata	野葛				$\downarrow$													_															$\rightarrow$		$\square$		<u> </u>		
Araceae	Colocasia esculenta	芋				+													_	$\square$														$\rightarrow$		$\square$		<u> </u>		
Urticaceae	Boehmeria nivea	苧麻																	_															$\rightarrow$		$\square$		<u> </u>		
Asteraceae	Bidens alba	白花鬼針草			0.3	3 5	0.8	8 2			0	.3	5 (	).8	5		(	).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	i 5	5	0.8 10
Poaceae	Pennisetum purpureum	象草												_		_			_	_												_		$\rightarrow$		$\vdash$		<u> </u>		
Poaceae	Coix lacryma-jobi	薏苡					0.8	1					1	.2	1	_			_	1.5	1				1	5	1					15		1		$\vdash$		<u> </u>	15	1
Amaranthaceae	Alternanthera philoxeroides	空心蓮子草				+													_	$\square$														$\rightarrow$		$\square$		<u> </u>		
Poaceae	Panicum maximum	大黍																																						
Moraceae	Broussonetia papyrifera	構樹																																						
Polygonaceae	Polygonum chinense	火炭母																																						
Onagraceae	Ludwigia hyssopidolia	草龍																																		$\square$				
Cyperaceae	Cyperus sp.	莎草																																						
Poaceae	Miscanthus floridulus	五節芒																																$\neg$		$\square$				
Poaceae	Brachiaria mutica	巴拉草	1.5	5 45	5 1	1 45			1.5	5 50		1 5	0		1.	.5 5	0	1	50			1.8	65	1.8	20	1.	5 5	1.8	3 70		1.8 2	25	1.5	8	1.8	70	1.8	8 25	5	1.5 8
Blechnaceae	Blechnum orientale	烏毛蕨																																+		$\square$				
Poaceae	Pennisetum alopecuroides	狼尾草	2	2 12	2				2	2 10						2 1	D					2	15	3	5			2	10		3	2		-	2	10	3	3 2	2	
Araceae	Alocasia macrorrhizos	海芋					0.8	3 1					(	).8	1					0.8	1													+				1		
Lemnaceae	L emna minor	浮萍					N.A	1				+	N.A	+	1				N.A	+	1						1				-	+		+				+		
Polygonaceae	Polygonum hydropiper	水蓼												-						-				1	3						1	1		+		$ \square $	1	1 1	1	
Cyperaceae	Cyperus involucratus	<b> 風車草</b>		-		+						+	+	+						+-	+			1.7	2		+				17	1	-+	+		$ \rightarrow$	1.7	7 1	1	-+
Onagraceae	Ludwigia erecta	風単草 美洲水丁香		+	+	+	1	4		-		-		1	6	-		_		1	6	1.5	1	1./	-		2 5	1.5	1			-	2		1.5		1.1	+'		2 5
Convolvulaceae	-			-	+	+ $+$	1					+		-	-	+		+-		-	<u> </u>	1.5	1		$\vdash$			1				+	-	+	1.5			+		
Bare Gound	Ipomoea cairica	五爪金龍		31		15		87		27		_	0	8		-	7	_	0	-	20	+	2		0		75					1		72				<u> </u>	1	70
Bare Gouliu				5		15		8/		27			°	8	0	2	/		0	8	50		2		U		/5		2			1		12		2			1	72

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)

				1	+	Iar	n-14		1	Fe	b-14		1	М	ar-14				Apr-14			May-	-14			Jun-14	struction		-	ul-14			Aug-1	14			Sep-14	L			Oct-14	1		Ņ	Nov-14		<u> </u>	Dec-14	4
C	G	Chi	<b>G</b> 4-4	Comm																	-							-		undance							Abundan		-		Abundar		_		oundance				
Common Name	Species name	Chinese name	Status	on nes			ndance	72			ndance			<b>1</b>	ndance		6	<b>1</b>	undance		6	Abund	-	<b>T</b> 2		Abundar	_	T2 (	_	-	-		Abunda		72			-	_				F3 (	_	_	-		Abundan T1	
Barn Swallow	Hirundo rustica	家燕	PM	C		11	12	T3	С	T1	2	T3	C	T1	T2 2	T3	C ++	T1	T2 3	T3 4	C ++		T2 4	T3 4	C	T1 2	T2 7	T3 (		T2	T3	С	T1	T2	15		T1 T2	2 T;	3	С	T1	T2 1	r3 (	- 1	1 T2	T3	С		12
	Dicrurus			c	Ŧ				Ŧ	-	-		Ŧ	2	2	1	TT	1	5	-			4	+	т	2		1	-						-		-	-			-	_	-		+-		$\vdash$	$\rightarrow$	_
Black Drongo	macrocercus	黑卷尾	Sv	С	_																	_	-				_	_	_	_	-							+-	_			_	_		+	-	$\vdash$	$\rightarrow$	
Black Kite	Milvus lineatus	麻鷹	R, RC, Cap.5 86						+				+																							+							+	÷			+		
Black-necked Starling	Sturnus nigricollis	黑領椋鳥	R	С	+				+				+		2		+			2	+		1	2	+	2		1 +	+ 2	1	2	+	2		2	+	1 2	2	2	+	2		1 -	÷	2		+	2	
Black-throated Laughingthrush	Garrulax chinensis	黑喉噪鶥	R	С																																													
Buzzard (Commo Buzzard)	n Buteo buteo	普通鵟	WV, Can	U									+																																				_
Chinese Bulbul	Pycnonotus sinensis	白頭鵯	R	С	+	1		2	+	2	3	4	++		2	3	+			2	+				+			-	+		1	+			2	+	2	3	3	+			2 +	+ 1		3	+		2
Chinese Pond Hero	n Ardeola bacchus	池鷺	R,RC	С	+	1	3	2	+	1	2	3	+	1	3	2	+	1	2	1	+	1	1		+	1	2	4	+ 2	2	1	++	1	2	2	++	2 1	1	1	++	2	2	+	+ 1			+		1
	d Chalcophaps indica	4 綠翅金嶋	R,VU	s																																									+			+	
Dove Common Kingfishe	r Alaado atthis	普通翠鳥	D	c	+								<u> </u>				<u> </u>	-		-	+	+	-		+		_	-	+	-	-		+	_	-			+	_	+	-				+-		$\vdash$	$\rightarrow$	
	Eudynamys		R.	c	Ŧ				Ŧ	-	-		Ŧ				т	-							т			-	-						-	Ŧ	-	-			-	_		-	+-		$\vdash$	$\rightarrow$	
Common Koel	scolopacea	噪鵑	R	C	+				+				+				+				+	_	-		+		_	-	+	_	-	+						+-	_	+		_	-	+	+		$\vdash$	$\rightarrow$	
Common Sandpiper	r Actitis hypoleucos	磯鷸	WV& PM	С	+				+				+				+				+				+																								
Common Tailorbird	d Orthotomus sutorius	5 長尾縫葉鶯	R	С	+	1	1	1	+	1		1	+	1	2	1	+	1	1		+	1	2	1	+		1	4	+ 1	1	1	+	1	1		+	1 2	1	_	+		1	1 +	÷	1		++	1	1
Crested bulbul	Pycnonotus jocosus	紅耳鵯	R R. CR.	С	++	2	4	6	++	2	2	8	++	3	4	6	++	2	2	5	++	2		4	++	3	2	3 +	++ 2	4	5	++	3	2	4	++	2 4	3	3	++	3	1	4 +	+ 2	2 1	3	+++	2	3
Crested Goshawk Crested Myna	Accipiter trivirgatus Acridotheres		Can 5 R	R			,	2				3	<u> </u> .		2			-		-	+		-		+		-	2			2		2	-	2		-	2		+		2	4 +		-	-	+	_	
Crested Myna Crested Serper	t Spilornis cheela	八哥 蛇鵰	к	R	+		5	2	+	-	-	3	+		2		+	-			+				+			2 1	+	3	2	+	2	2	3	+		2	-	+	-	2	4 7	+ 3			+	-	
Eagle Domestic pigeon	Columba sp.	鸽	R	C														-																				+							+		++	$\rightarrow$	
Dusky Warbler	Phylloscopus fuscatus	褐柳鶯	wv	U	+		1	1	+		2	1	+	1	1		+		1		+				+			н	+			+		1		+	1			+	1	1	н	+ 1		1	++		
Eurasian tre sparrow	Passer montanus	麻鹊	R	С	+				+				+		2		+				+	2			+		2	1 +	+ 2		1	+		3	2	+	3 2			+	2		3 +	÷		2	++++		5
Fork-tailed Sunbird	Aethopyga christinae	叉尾太陽鳥	R	С																																													
Great Coucal	Centropus sinensis	褐翅鴉鵰	R,VU	С	+				+				+				+				+				+			4	+			+		1		+	1			+		1	4	÷			+		
Great Egret	Ardea alba Parus	大白鷺	R,RC	U	+			1	+			1	+			1	+																												—		$\square$	$\rightarrow$	
Great Tit	maior(committue)	大山雀	R PM&	С	+				+				+				+	+				_					_	-	+				+		_	_		+-				_	_	_	+-	-	$\vdash$	$\rightarrow$	
Green Sandpiper	Tringa ochropus	白腰草鷸	WV	U	+		2		+				+				+				+				+																								
Grey Heron	Ardea cinerea	蒼鷺	WV,P PC	С																																									_		$\square$		_
Grey Wagtail	Motacilla cinerea Zosterops	灰鶺鴒	WV	C	+++	2	3	3	++	_	2	2	++	1	3	2	+	2	1	1 4	+ +		-	6		4	2	2 .	+	-	4	+	2	1	1	+	1 2	1	,	+		1	1 +	+	+-	1	+ +	$\rightarrow$	1
Japanese White Eye Large Hawk Cucko	(uculus	暗絲繡眼鳥 鷹鵑	к SV	U U	++		-	5	++		-	3	++			0	+	3		4	+			0	++	4	2	5 +	++		4	++	2	2	5	+		3	,	+	-	_		+	+		+	$\rightarrow$	
Little Egret	Egretta garzetta	小白鷺	R,RC	С	+		2	3	+	1	2	2	+	1	1	2	+	-	1	1	+	1	2	1	+		2	2 +	+ 1	2	1	+	1	2	2	+	2 3	2	2	+	1	2	1 -	+ 1	2	2	+	2	1
Magpie Robin	Copsychus saularis	鹊鸲	R	С	+		1	1	+		2		+	1	2	1	+	1	1	2	+	1	1	1	+	1	2	2 +	+ 1	1	1	+	1	1	1	+	1 1	2	2	+	1		1 +	+ 1	1	1	+		1
Night Heron	Nycticorax	夜鷺	R,LC	U																																									+				
Olive Backed Pipit		樹鷚	WV	С	+		1		+				+																																				_
Oriental Dollarbird	Eurystomus Cacomantis	三寶鳥	PM	U																																									_		$\square$		_
Plaintive Cuckoo Rufous-backed	marulinus	八聲杜鵑	SV	С	-	-	<u> </u>	-	$\left  \right $				+ +				+	-			+ +		$\left  - \right $		+				<u>.</u>  -	+.	-	<u> </u>	+				+.	_	_	+					+-	_	$\vdash$	$\rightarrow$	_
Shrike Rufous-capped	Lanius schach Stachyridopsis	棕背伯勞 紅頭穗鶥	R R	с С	+	-	+	-	+		-+		+ +				++	+		-	+	+		$\vdash$	+	$\vdash$			τ –	1		+	+	1	-+	+	+			+	-+	1		- 1 +	+		+ +	$\rightarrow$	
Babbler Scarlet Minivet	Pericrocotus	赤紅山椒鳥	R	C	- ·	1	1						<u> </u>				<u> </u>			1	<u> </u>	-							+		1		+		+	-	+	+		·	+				+			+	
Sooty-headed	Pycnonotus	白喉紅臀鵯	R	с	1															1										1															+			$\top$	
Bulbul	aurigaster Streptopelia		D	C		-				_	6	F			4	4			2			-					,			4	<u> </u>		2	,	3		$\frac{1}{2}$	-	-				, .		+	1	+	+	-
Spotted Dove	chinensis Lonchura	珠頸斑鳩	ĸ	C 	++	-	2	4	++	2	6	5	++	3	4	4	++	2	3	4	++	-	-	3	++	2	3	1 +	++ 3	+	4	++	2	3	5	_	3 3	5	_	++	4	2	3 +	+ 3	3	-	+	1	2
Spotted Munia	punctulata	斑文鳥	R	U	++	<u> </u>	<u> </u>		++		7		++		4		++	<u> </u>	6	<u> </u>	++	_	8					-	+	2		+		3	-+	+	6	<u>'</u>	_	+	$ \downarrow$	7		+ 6	5 5	_	+	5	
White Wagtail	Motacilla alba	白鶺鴒	wv	С	+	-	2	1	+		1	2	+	1	2	1	+	-	1	1	+		2	1	+		1		+ 1	2	2	+	2	2	1	+ :	2 3	2	2	+	2	2	1 +	+ 1	2	2	++	1	2
White-breasted Waterhen	Amaurornis phoenicurus	白胸苦惡鳥	R	С	+				+				+				+				+				+			4	+			+				+				+				÷					
	a Prinia flaviventris	黃腹鷦鶯	R	С	+	_	1		+	1	3	2	+	1	2	1	+	1		1	+	_		1	+		1	1 -	+ 1			+	1	1			1 2	1		+	1		1 -	÷	1	_			
Number of birds	<u> </u>					11	26				34	37		16	38	31		12	22	28				24				17	16	_	_		18		28	_	3 35	_	_				23	2			$\square$		19
No. of species	1		1		32	11	16	17	33	11	18	18	34	13	19	17	32	9	- 11	12	27	9	10	10	23	8	11	10 2	20 12	14	14	20	13	17	15	23 1	7 17	7 15	5	23	17	17 1	15 2	3 19	9 17	16	21	9	11

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

SpM - Spring migrant; Sv - Summer visitorC - transect count; P1 - Point count location 1; P3 - Point count location 3

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

Commonness and status were decided accroding 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

Dec-	14	
ound	ance	
Г1	T2	T3
2		
-		
	2	2
-		
	1	
-		
-		
1	1	
2	3	2
2	3	2
1		
-		
	5	3
-		
-		
	1	
-		2
		3
2	1	1
~	_	
	1	
-		-
_		L
1		
1	2	2
5		
-		
1	2	2
1		
1.6	10	16
15	19	15
9	11	7

#### Table 4.4. Odonate species recorded at the She Shan River

										Post	construction	monitoring				
Species	Common name	Chinese name	Status	Commo nness	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14
Agriocnemis pygmnalis	Wandering Midget	黃尾小蟌	NP	VC				+								
Brachythemis contaminata	Asian Amberwing	黃翅蜻	NP	VC												
	×	琉球橘黃蟌	NP	VC				+	++	+		+				
Copera ciliata	Black-knees Featherlegs		NP	VC				+								
Copera marginipes		黃狹扇蟌	NP	VC				+		+		+	+	+		
Crocothemis servilia servilia	Crimson Darter	红蜻	NP	VC	+				+	+	+	+	+	+	+	+
Diplacodes trivialis	Blue Percher	紋藍小蜻	NP	VC	+	+	+									
Ictinogomphus pertinax	Common Flangetail	霸王葉春蜓	NP	С	+	+	+			+	+	+	+	+		
Ischnura senegalensis	Common Bluetail	褐斑異痣蟌	NP	VC				+	+	+						
Nannophya pygmaea	Scarlet Dwarf	侏紅小蜻	NP	С												
Neurobasis chinensis chinensis	Chinese Greenwing	華艷色蟌	NP	VC			+							+	+	
Neurothemis fulvia	Russet Percher	網脈蜻	NP	VC						+	+					
Orthetrum chrysis	Red-faced Skimmer	華麗灰蜻	NP	VC												
Orthetrum glaucum	Common blue skimmer	黑尾灰蜻	NP	VC					+							
Orthetrum luzonicum	Marsh Skimmer	呂宋灰蜻	NP	VC					+	+						
Orthetrum pruinosum neglectum	Common Red Skimmer	赤褐灰蜻	NP	VC					++	++	+	+	+	+		
Orthetrum Sabina sabina	Green Skimmer	狹腹灰蜻	NP	С					+				+	+		
Pantala flavescens	Wandering Glider	黃蜻	NP	VC	+									+	+	
Prodasineura autumnalis	Black Threadtail	烏齒原蟌	NP	VC				+	+							
Pseudagrion pruinosum fraseri	Ferruginous-faced Sprit	赤斑蟌	NP	С												
Pseudagrion rubriceps rubriceps	Orange-faced Sprite	丹頂斑蟌	NP	UC				+	+	+	+	+	+	+	+	
Rhinocypha perforata perforata	Common Blue Jewel	三斑鼻蟌	NP	VC								+	+	+	+	
Rhyothemis variegata arria	Variegated Flutterer	斑麗翅蜻	NP	С						+	+	+				
Trithemis aurora	Crimson Dropwing	曉褐蜻	NP	VC						+	+	+	+	+	+	+
Trithemis festiva	Indigo Dropwing	慶褐蜻	NP	VC			+			+	+	+	+	+	+	
Zygonyx iris insignis	Emerald Cascader	彩虹蜻	P,PG	VC						+	+	+				
No of Species					6	6	8	7	9	13	9	11	9	11	7	2

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

"VC" – Very Common; "UC" – Uncommon; "C" - Common

"+" – Species exists in the study area

"++" – Species common in the study area

"+++" – Species abundance in the study area

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

LC- Local Concern - Fellowes et al (2002)

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

# Contract No. DC/2007/06 River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River Ecological Impact Monitoring Report - She Shan River

#### Table 4.5 Aquatic Macro invertebrates recorded at She Shan Rive

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

				Post con	structio	n mon	itoring	Post con	structio	n moni	itoring	Post con	structio	n mon	itoring	Post cons	structio	on mor	itoring	Post con	structio	n mon	itoring
Species	Chinese name	Samplir	ng location		Jan-1	14			Feb-1	14			Mar-	14			Apr-	14			May-	14	
		Status	Common -ness	Reference	T1	T2	Т3	Reference	T1	T2	Т3	Reference	T1	T2	Т3	Reference	T1	T2	Т3	Reference	T1	T2	T3
Mollusks																	-						
Anodonta woodiana	背角無齒蚌	NP	VC																			+	
Biomphalaria sp.		NP	VC					+				+	+	+		+	+	+		+	+	+	
Brotia hainanensis		NP	VC	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Corbicula fluminea	河蜆	NP	VC	+				+				+						+				+	
Melanoides tuberculata	瘤擬黑螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Pomacea canaliculata	蘋果螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Radix plicatulus		NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Sinotaia quadrata	田螺	NP	VC	+	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	+	+	+	+
Insects																							
Baetis sp.		NP	VC	+				+	+			+	+	+		+		+		+		+	Τ
Caenis sp.		NP	VC													+							
Chironomus sp.	蠓幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Euphaea sp.		NP	VC																				1
Indobaetis sp.		NP	VC	+				+	+	+		+	+	+	+	+	+	+	+	+	+	+	+
Odonate larvae		NP	VC																				
Orthetrum spp.		NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Pseudagrion spp.		NP	UC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Pseudocloeon sp.		NP	VC									+				+	+						
Serratella sp.		NP	VC					+				+	+	+		+	+	+			+		1
Crustaceans	· · · · · · · · · · · · · · · · · · ·		·						·	·				·							·		<u> </u>
Caridina cantanensis	廣東米蝦	NP	VC																				
No of Species				11	8	8	7	13	10	9	8	14	12	12	9	14	12	13	9	11	11	13	8

Note: NP - Not protected in H(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

# Contract No. DC/2007/06 River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River Ecological Impact Monitoring Report - She Shan River

#### Table 4.5 Aquatic Macro invertebrates recorded at She Shan Rive

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

				Post con	structio	n mon	itoring	Post cons	structio	on mon	itoring	Post con	structio	on mon	itoring	Post cons	structio	on mon	itoring	Post cons	structio	n mon	itoring	Post cons	structio	on mon	itoring	Post const	ructior	1 monit	oring
Species	Chinese name	Sampli	ng location		Jun-	14			Jul-1	14			Aug-	14			Sep-	14			Oct-	14			Nov-	-14			Dec-1	4	
		Status	Common -ness	Reference	eT1	T2	T3	Reference	T1	T2	T3	Reference	e T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	Т3
Mollusks	•		•	•								•				•								•	<u> </u>					· · · ·	
Anodonta woodiana	背角無齒蚌	NP	VC																												
Biomphalaria sp.		NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+				+		
Brotia hainanensis		NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
Corbicula fluminea	河蜆	NP	VC			+				+	+			+	+			+	+			+				+				+	$\square$
Melanoides tuberculata	瘤擬黑螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Pomacea canaliculata	蘋果螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Radix plicatulus		NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Sinotaia quadrata	田螺	NP	VC	+	+	+	+	+	+	+	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	+	+	+	+	+	+
Insects							•					•										•			<u> </u>					·	
Baetis sp.		NP	VC		+				+	+			+	+		+	+	+		+	+	+		+	+	+			Τ	+	
Caenis sp.		NP	VC																											$\square$	
Chironomus sp.	蠓幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Euphaea sp.		NP	VC			+				+				+				+								+				+	
Indobaetis sp.		NP	VC	+	+	+	+	+	+	+	+	+	+	+		+	+	+		+	+	+		+	+	+		+		+	
Odonate larvae		NP	VC																											$\square$	
Orthetrum spp.		NP	VC	+	+	+	+	+	+	+		+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Pseudagrion spp.		NP	UC	+	+	+	+	+	+	+		+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+		+	
Pseudocloeon sp.		NP	VC											+		+	+	+		+	+	+		+		+		+	1	+	$\square$
Serratella sp.		NP	VC		+	+				+			+	+															1	$\square$	$\square$
Crustaceans	•			•		•				•			•		•			•											+		
Caridina cantanensis	廣東米蝦	NP	VC																												
No of Species				10	12	13	8	10	11	14	7	10	12	15	6	12	12	14	8	12	12	13	7	12	11	13	7	10	8	13	6

Note: NP – Not protected in  $\mathrm{HeP}$  - protected species in Hong Konş

"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

Contract No. DC/2007/06 River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River Ecological Impact Monitoring Report - She Shan River

# Table 4.6 Fish species and Hong Kong Newt recorded at She Shan River (11- Upper stream section, 12 - middle stream section and 15 - Lower stream

section)								1				-				1				1			
				Post co	onstruct	ion moi	nitoring	Post co	onstruct	ion mor	itoring	Post con	struction	n monito	oring	Post co	nstructio	on monite	oring	Post con	nstructio	n monito	ring
					Jar	n-14			Feb	<b>-</b> 14			Mar-1	4			Apr-	14			May-	14	
Species		Status	Commonness	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
Channa maculata	斑鱧	NP	С					+				+	+	+		+	+	+		+	+	+	
Clarias gariepinus	革胡子鯰	NP	VC					+				+				+						+	
Gambusia affinis	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Misgurnus anguillicaudatus	泥鰍	NP	С	+				+				+	+	+		+	+	+		+	+	+	
Oreochromis niloticus	尼羅口孵非鯽	NP	С	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Parazacco spilurus	異鱲	NP, V	С	+	+	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poecilia reticulata	孔雀花魚將	NP	VC					+				+	+	+	+	+	+	+	+	+	+	+	+
Pterocryptis cochinchinensis	越南隱鰭鯰	NP	С					+				+				+		+				+	Τ
Puntius semifasciolatus	七星魚	NP	С	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Rhinogobius spp.	鰕虎魚	NP	С	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Xiphophorus hellerii	劍尾魚	NP	С	+	+	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Xiphophorus variatus	雜色劍尾魚	NP	С		+				+				+	+			+	+	+			+	+
Zacco platypus	寛鰭鱲	NP	С	+	+	++	+	+	+	++	++	+	+	++	++	+	+	++	++	+	+	+	+
		2x2m fis	sh number	12	16	30	40	30	40	50	60	60	60	70	70	40	40	50	40	20	10	20	10
No of Species				8	8	7	7	12	8	7	7	12	11	11	8	12	11	12	9	10	10	13	9
Amphibian																							1
Paramesotriton hongkongensis	香港瘰螈	P, Cap 170, NT, PGC	R	+				+		+		+	+	+				+				+	

Note: NP – Not protected in Hong Kong

"VC" - Very Common; "UC" - Uncommon; "C" - Common

"+" - Species exists in the study area

"++" - Species common in the study area

"+++" - Species abundance in the study area

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

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

"NT" - Near Treatened in IUCN Red List Status

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

'V" - Vulerable - in Red China Data Book

#### Contract No. DC/2007/06 River Improvement Works in Upper Lam Tsuen River, She Shan River and Upper Tai Po River Ecological Impact Monitoring Report - She Shan River

# Table 4.6 Fish species and Hong Kong Newt recorded at She Shan River (11- Upper stream section, 12 - middle stream section and 15 - Lower stream

section)

section)				Post co	nstructio	n monito	oring	Post co	nstructio	on monite	oring	Post co	nstructio	n monito	ring	Post cons	struction	n monit	toring	Post con	structio	n monito	ring	Post co	onstructio	on monite	oring	Post	construct	tion monit	toring
					Jun-	14			Jul-1	14			Aug-	14			Sep-1	14			Oct-1	4			Nov-	14			Dec	c-14	
Species		Status	Commonness	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	Т3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	• T1	T2	T3
Channa maculata	斑鱧	NP	С	+	+			+	+			+	+	+		+	+	+			+	+			+	+					
Clarias gariepinus	革胡子鲶	NP	VC			+				+	+			+	+			+	+			+	+			+				+	
Gambusia affinis	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Misgurnus anguillicaudatus	泥鰍	NP	С	+		+	+	+		+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+				+	
Oreochromis niloticus	尼羅口孵非鯽	NP	С	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Parazacco spilurus	異鱲	NP, V	С	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poecilia reticulata	孔雀花魚將	NP	VC	+			+				+				+				+				+				+				+
Pterocryptis cochinchinensis	越南隱鰭鯰	NP	С			+				+				+				+				+				+				+	
Puntius semifasciolatus	七星魚	NP	С	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Rhinogobius spp.	鰕虎魚	NP	С	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Xiphophorus hellerii	劍尾魚	NP	С	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+
Xiphophorus variatus	雜色劍尾魚	NP	С			+				+				+				+								+				+	
Zacco platypus	寛鰭鱲	NP	С	+	+	+	+	+	+	+	+	+	+	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+
		2x2m fis	sh 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
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
Amphibian																														1	
Paramesotriton hongkongensis	香港瘰螈	P, Cap 170, NT, PGC	R			+				+				+				+				+				+				+	

Note: NP – Not protected in Hong Kong

"VC" - Very Common; "UC" - Uncommon; "C" - Common

"+" - Species exists in the study area

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"+++" - Species abundance in the study area

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

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

"NT" - Near Treatened in IUCN Red List Status

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

'V" - Vulerable - in Red China Data Book

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Table 4.7 Abotic data for the UpperShe Shan River(T1- Upperstream section, T2 - middle streamsection and T3 - Lower streamsection)

Post con	Post construction monitoring Post construction monitoring					Post construction monitoring Mar-14			Post construction monitoring Apr-14			Post construction monitoring May-14			Post construction monitoring Jun-14			
Jan-14			Feb-14															
T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	
8.3	8.2	8.6	7.2	7.6	7.8	7.1	7.2	7.2	7.3	7.5	7.6	7.8	7.6	7.7	7.6	7.8	7.4	
6.8	7.3	7.4	7.8	6.7	7.6	7.2	6.8	7.5	6.6	7.3	7.2	7.5	7.5	7.4	7.5	7.5	7.4	
1.2	1.12	1.02	1.5	1.2	1.6	1.2	1.1	0.77	0.6	0.8	1.2	1.1	1.0	1.1	0.5	0.6	0.6	
1.9	1.8	1.73	0.8	1.2	1.4	0.4	0.6	0.01	0.6	0.5	0.8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	
0	0	0	0	0	0	0	0	0	0	0	0	0.04	0.04	0.06	0.04	0.05	0.05	
124	118	132	128	113	132	123	136	140	112	116	120	124	121	123	118	115	119	
<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	
0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	
0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2-0.4	0.2-0.3	0.2-0.4	0.2-0.5	0.2-0.4	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	
15	10	5	15	10	5	15	10	5	10	10	5	5	5	5	5	5	5	
65	80	20	65	80	20	65	80	20	70	80	30	80	80	30	80	80	30	
10	10	5	10	10	5	10	10	5	10	10	5	5	5	2	5	5	2	
10	0	70	10	0	70	10	0	70	10	0	60	10	10	63	10	10	63	
	T1           8.3           6.8           1.2           1.9           0           124           <2	Jan-14           T1         T2           8.3         8.2           6.8         7.3           1.2         1.12           1.9         1.8           0         0           124         118           <2	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	$\begin{array}{c c c c c c c c c c c c c c c c c c c $	Jan-14         Feb-14           T1         T2         T3         T1         T2           8.3         8.2         8.6         7.2         7.6           6.8         7.3         7.4         7.8         6.7           1.2         1.12         1.02         1.5         1.2           1.9         1.8         1.73         0.8         1.2           0         0         0         0         0           124         118         132         128         113 $<2$ $<2$ $<2$ $<2$ $<2$ 0.1         0.1         0.1         0.1         0.1           0.2         0.2         0.2         0.2         0.2           15         10         5         15         10           65         80         20         65         80           10         10         5         10         10	Feb-14           T1         T2         T3         T1         T2         T3 $8.3$ $8.2$ $8.6$ $7.2$ $7.6$ $7.8$ $6.8$ $7.3$ $7.4$ $7.8$ $6.7$ $7.6$ $1.2$ $1.12$ $1.02$ $1.5$ $1.2$ $1.6$ $1.9$ $1.8$ $1.73$ $0.8$ $1.2$ $1.4$ $0$ $0$ $0$ $0$ $0$ $0$ $124$ $118$ $132$ $128$ $113$ $132$ $<2$ $<2$ $<2$ $<2$ $<2$ $<2$ $<2$ $0.1$ $0.1$ $0.1$ $0.1$ $0.1$ $0.1$ $0.1$ $0.2$ $0.2$ $0.2$ $0.2$ $0.2$ $0.2$ $0.2$ $0.1$ $0.1$ $0.1$ $0.1$ $0.1$ $0.1$ $0.1$ $0.2$ $0.2$ $0.2$ $0.2$ $0.2$ $0.2$ $0.2$ $1$	Jan-14         Feb-14           T1         T2         T3         T1         T2         T3         T1           8.3         8.2         8.6         7.2         7.6         7.8         7.1           6.8         7.3         7.4         7.8         6.7         7.6         7.2           1.2         1.12         1.02         1.5         1.2         1.6         1.2           1.9         1.8         1.73         0.8         1.2         1.4         0.4           0         0         0         0         0         0         0           124         118         132         128         113         132         123 $<2$	Jan-14         Feb-14         Mar-14           T1         T2         T3         T1         T2         T3         T1         T2           8.3         8.2         8.6         7.2         7.6         7.8         7.1         7.2           6.8         7.3         7.4         7.8         6.7         7.6         7.8         7.1         7.2           6.8         7.3         7.4         7.8         6.7         7.6         7.2         6.8           1.2         1.12         1.02         1.5         1.2         1.6         1.2         1.1           1.9         1.8         1.73         0.8         1.2         1.4         0.4         0.6           0         0         0         0         0         0         0         0         0           124         118         132         128         113         132         123         136           <2	Feb-14         Mar-14           T1         T2         T3           8.3         8.2         8.6         7.2         7.6         7.8         7.1         7.2         7.2           6.8         7.3         7.4         7.8         6.7         7.6         7.2         6.8         7.5           1.2         1.12         1.02         1.5         1.2         1.6         1.2         1.1         0.77           1.9         1.8         1.73         0.8         1.2         1.4         0.4         0.6         0.01           0         0         0         0         0         0         0         0         0         0           124         118         132         128         113         132         123         136         140            2         <2	$ \begin{array}{c c c c c c c c c c c c c c c c c c c $	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	Jan-14         Feb-14         Mar-14         Apr-14         Apr-14         May-14           T1         T2         T3         T1         T3         T1         T2         T3         T1         10         T3         T2         T3         T3         T2 <td< td=""><td><math display="block"> \begin{array}{ c c c c c c c c c c c c c c c c c c c</math></td><td><math display="block"> \begin{array}{ c c c c c c c c c c c c c c c c c c c</math></td><td><math display="block"> \begin{array}{ c c c c c c c c c c c c c c c c c c c</math></td></td<>	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	$ \begin{array}{ c c c c c c c c c c c c c c c c c c c$	

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Table 4.7 Abotic data for the Upper She Shan River (T1- Upper stream section, T2 - middle stream section and T3 - Lower stream section)

section)																		
	Post co	Post construction monitoring			Post con	struction mo	onitoring	Post construction monitoring			Post construction monitoring			Post construction monitoring				
Jul-14					Aug-14		Sep-14			Oct-14			Nov-14			Dec-14		
Replicate	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
DO (mg/L)	7.7	7.7	7.4	7.2	7.2	7.4	7.8	7.0	8.1	7.8	8.0	7.5	7.6	8.1	7.6	8.5	8.6	8.6
рН	7.4	7.5	7.3	7.2	7.3	7.1	8.2	8.2	8.2	8.4	8.3	8.1	7.9	8	7.8	8.2	8.5	8.4
Nitrate (mg N/L)	0.8	0.6	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.3	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4
Ammonia (mg N/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	0.04	0.05	0.05	0	0	0	0.03	0.04	0.03	0.03	0.03	0.04	0.01	0.03	0.02	0.02	0.02	0.02
Conductivity (µS/cm)	110	113	111	120	116	108	125	125	123	113	114	116	110	96	106	127	132	121
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2
Water flow at riffle (m/s)	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5
Sand (%)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Stone (%)	80	80	30	80	80	30	80	80	30	80	80	30	80	80	30	80	80	30
Mud (%)	5	5	2	5	5	2	5	5	2	5	5	2	5	5	2	5	5	2
Concrete (%)	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63

