Issue No. : Issue 1 Issue Date : Mar 2017 Project No. : 1266

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

DETAILED ECOLOGICAL MONITORING REPORT (No.4)

Prepared By:

ALLIED ENVIRONMENTAL CONSULTANTS LTD.

For:

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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

Detailed Ecological Monitoring Report (No. 4) Upper Lam Tsuen River

August 2016

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6 September, 2016

6 September, 2015

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Ecology Team: China-Hong Kong Ecology Consultants

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

Detailed Ecological Monitoring Report (No. 4) 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 detailed ecological survey for Lam Tsuen River and She Shan River during dry season. The collected data are mainly used to compare with baseline parameters in order to assess ecological recovery process and effectiveness of ecological migration proposed and enforced during the construction period.
- 1.2 The scope of the ecological monitoring was detailed in EM & A Manual of the project. In brief, the survey aimed to collect data on abiotic factors such as water quality, substratum characteristics, water flow as well as flora and fauna.
- 1.3 China Hong Kong Ecology Consultants Ltd. was committed by Allied Environmental Consultants Ltd (AEC) to undertake the ecological monitoring tasks for the project since December 2014.
- 1.4 This is the number 4 detailed ecological monitoring report summarizing the data collected from detailed surveys of July in 2016 and August in 2016. It contains the following subsections:
 - Summary of major points
 - Monitoring Methods and Results
 - Summary and Comments

2 Summary of Major Points

- Detailed monitoring surveys were undertaken in July of 2016 and August of 2016:
- Flora recoded in Lam Tusen River is in a normal growth and more abundant than baseline survey;
- The diversity and abundance of bird, marco-invertebrate were observed with no significant change comparing with baseline level;
- More species and higher abundance of fish in Lam Tusen River was observed comparing with baseline level;
- The population of Hong Kong Newt in Lam Tusen River was significantly increased following with more colonization of vegetation within the river course; and
- Water parameters showed no difference to baseline level except nitrate level decreased slightly.

3 Monitoring Methodology

3.1 Riparian Vegetation

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

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

3.2 Avifauna

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

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

3.3 Adult Odonata Survey

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

3.4 Aquatic Macro-invertebrates

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

3.5 Fish and Newt

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

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

3.6 Abiotic Data Collection

3.6.1 Water Quality Monitoring

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

3.6.2 Sediment Characteristics

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

3.6.3 Water Flow

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

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

4 Monitoring Results

4.1 Vegetation

Detailed surveys were undertaken along the transect at Upper Lam Tsuen River. A total of 74 species were recorded from the survey and the result was more diverse than baseline level, in which only 21 species of vegetation were recorded. The increased vegetation diversity indicated that the river has

provided a more suitable environment for establishment of vegetation, especially for the design of natural river bed, where vegetation could hold tightly on the rough surface to avoid being washing out by flooding. Most recorded species were wetland species with a few floating aquatic species such as Lemna minor, Pistia stratiotes and submerged plants such as Hydrilla verticillata. An invasive species Brachiaria mutica was the dominant species along the river (Photo 1). During the survey period in wet season, flooding was usually observed and which washed out part of aquatic plant in the river bed. Therefore, vegetation coverage recorded in the detailed survey was relatively low comparing with the last detailed survey conducted in dry season. Vegetation has generally covered gabion and river bed in most of the area (Photo 2). Most of the plants are in good health, the average height of plant is significantly increasing comparing with the data measured in baseline, the highest plant of 1.5m was recorded along the 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**.



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



Photo 2: Vegetation coverage of gabion and river bed in middle section of the river.

4.2 Fauna

4.2.1 Avifauna

An avifauna detailed surveys were undertaken along survey transects and at four selected point count locations. In total, 19 species of birds were recorded during the bird surveys. Bird's species composition in Lam Tsuen River has changed in terms of abundance and species richness towards the data collected from baseline to post-construction monitoring, more species and higher abundance recorded were related to the improved river, where provided dense vegetation as their habitats, as well as food source. 2 wetland dependent species were recorded with conservation interest during the detailed surveys including *Egretta garzetta* and *Ardeola bacchus*, they were both listed as "Regional Concern" by Fellowes *et al.* (2002) and observed foraging in the river. In addition, sound call of *Centropus sinensis* was heard during the survey, this species was considered as vulnerable in China. Transect and Point Count locations were shown on **Figure 1.** Result of bird survey was presented in the **Table 4.3.**

4.2.2 Adult Odonata Survey

Odonata detailed surveys were performed and a list of recorded odonata species at Upper Lam Tsuen River is shown in **Table 4.4**. 14 species of odonata were recorded along the river transect, all recorded species were common and wide spread in Hong Kong. Relative high species richness could be recorded during current wet season as most of the odonata species emerge from late spring and keep high abundance in summer (Wilson *et al.*, 2004 & Tam *et al.*, 2011). Compared with the data collected from baseline monitoring, more species were recorded as the river has become more mature to support diverse species. Larvae of odonata were usually collected from kick sampling. Sampling location was shown in **Figure 1**.

4.2.3 Aquatic Macro-invertebrates

Upper Lam Tsuen River was flowing with constant water during survey. Aquatic-net and kick sampling were performed at the river. The river benthic fauna collected was mainly comprised of insects, molluscs and crustaceans. Species composition recorded in detailed surveys was similar to baseline survey. Details of recorded of river benthic fauna refers to **Table 4.5.** Sampling location was shown on **Figure 1**.

4.2.4 Hong Kong Newt

Detailed Surveys of Hong Kong Newt were conducted at Upper Lam Tsuen River. Adult *Paramesotriton hongkongensis* was observed at the Lam Tsuen River during their non-breeding season. Hong Kong Newt was commonly found in some habitats covering with dense vegetation (Photos 3-4). Normally, Hong Kong Newt are more likely to stay in the terrestrial habitat during their non-breeding season from April to August Dudgeon, 2003). However, the newt could still be found in some areas of the river. The increased colonization of vegetation in river bed was the main reason of increased abundance of Hong Kong Newt because 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.**



Photo 3: Dense vegetation coverage in Lam Tsuen River



Photo 4: Hong Kong Newt

4.2.5 River Fish Fauna

Fish detailed surveys were performed at Upper Lam Tsuen River. 17 species of freshwater fish, including species recorded from reference site, were recorded.

Comparing with baseline data, more species were recorded assuming river is in a process of restoration and becoming more mature and stable. *Oreochromis niloticus* and *Zacco platypus*es were the dominated species in the river. *Acrossocheilus parallens* were recorded at upper, middle and lower river sections. *Acrossocheilus parallens* is a rare freshwater fish species in Hong Kong. Except *Acrossocheilus parallens*, *Parazacco spilurus* is considered with conservation interest. Details of recorded of fish fauna refers to **Table 4.6**. Sampling location was shown on **Figure 1**.

4.3 Abiotic Data

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

Generally, there were no significant change on most of the parameters measured from baseline and detailed surveys respectively. Lower level of nitrate was measured during detailed survey indicating that water quality was improved due to nitrate absorption by abundant vegetation or decreased sewage discharge. Results of water test were presented in the **Table 4.7.**

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

5 Summary and Commentary

Detailed ecological monitoring surveys were carried out in July and August of 2016 and relevant biotic and abiotic data was collected according to project specification and EM & A Manual. Benthic fauna was temporally de-faunated in river sections due to river bed engineering works during construction period between 2008 and early 2013 and is under recovery process after that period. Abundant vegetation was generally established on the gabion and river bed along the river course, species diversity was higher than baseline survey. Avifauna and marco-invertebrate were recorded with no significant change on their species richness and abundance between baseline and detailed survey. High species richness of odonata was recorded due to seasonality. Following the river's ecosystem became more stable and mature after the completion of construction, more fish species and higher abundance of newt could be found during the survey.

Major parameters measured from baseline and detailed surveys were similar and retaining in an acceptable level. Nitrate level was decreased in detailed survey. Overall water quality is good and contains low concentration of nutrients.

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FIGURES

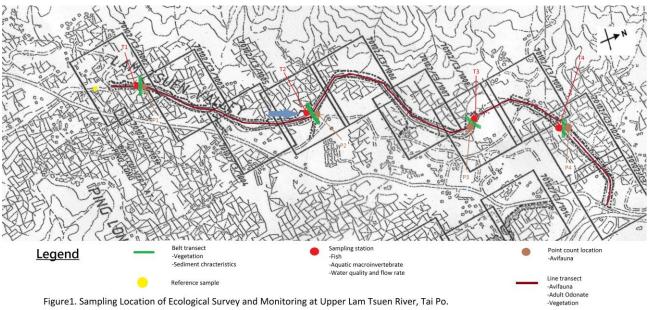


Figure 1. Sampling Location of Ecological Survey and Monitoring at Upper Lam Tsuen River, Tai Po.

TABLE

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

		ncluding riparian habitat.	Baseline monitoring	Detailed	Survey 1	Detailed	Survey 2	Detailed	Survey 3	Detailed	Survey 4
Family	Species name	Species name in Chinese	Jul to Aug 08	Dec-14	Jan-15	Jul-15	Aug-15	Dec-15	Jan-16	Jul-16	Aug-16
Riparian Plant											
Acanthaceae	Ruellia coerulea	蘭花草		+							
Acanthaceae	Dicliptera chinensis	狗肝菜						+	+	+	+
Amaranthaceae	Celosia argentea	青葙	+	++	+	+	+	+	+	+	+
Amaranthaceae	Amaranthus viridis	野莧		+	+	+	+	+	+	+	+
Amaranthaceae	Alternanthera philoxeroides	空心蓮子草		++	+	+	+	+	+	+	+
Amaranthaceae	Alternanthera sessilis	蓮子草		+	+						
Anacardiaceae	Rhus hypoleuca	白背漆			+						
Annonaceae	Uvaria macrophylla	紫玉盤		+							
Apiaceae	Oenanthe javanica	水芹			+	+	+	+	+	+	+
Apiaceae	Centella asiatica	崩大碗		+		+	+	+	+		
Araceae	Alocasia odora	海芋	+	+	+	+	+	+	+	+	+
Araceae	Colocasia esculenta	芋	+	+	+	+	+	+	+	+	+
Araceae	Pistia stratiotes	大薸		+							
Arecaceae	Rhapis excelsa	棕竹		+							
Asteraceae	Bidens alba	白花鬼針草	+	++	++	++	++	++	++	++	++
Asteraceae	Mikania micrantha	薇甘菊	++	+++	++	++	++	++	++	++	++
Asteraceae	Ageratum conyzoides	勝紅薊		+	+	+	+	+	+	+	+
Asteraceae	Emilia sonchifolia	一點紅		+	+	+	+	+	+	+	+
Asteraceae	Wedelia chinensis	蟛蜞菊		++	+	+	+	+	+	+	+
Asteraceae	Erechtites hieracifolia	革命菜		+		 	 			+	+
Asteraceae	Conyza canadensis	小蓬草		+	+	+	+	+	+	+	+
Asteraceae	Youngia japonica	黄鶴菜		+	+	+	+	+	+	+	+
Asteraceae	Eclipta prostrata	鱧腸		+	+	+	+	+	+	+	+
Asteraceae	Spilanthes paniculata	金鈕扣		+	+	+	+	+	+	+	+
Asteraceae	Wedelia trilobata	三裂葉蟛蜞菊								+	+
Asteraceae	Sonchus arvensis	芒蕒菜								<u>,</u>	<u>.</u>
Athyriaceae	Callipteris esculenta	菜蕨		_	_					_	_
Blechnaceae	Blechnum orientale	烏毛蕨		<u>.</u>	<u>'</u>					<u> </u>	· .
Brassicaceae	Cardamine flexuosa	碎米薺		_	1			_			
Brassicaceae	Nasturtium officinale	西洋菜		++	1	1	1	++	T		
Brassicaceae	Rorippa indica				1	1	+	1	T	т.	T
Brassicaceae	Capsella bursa-pastoris	塘葛菜 齊菜		_	1	1	1	_	T		
Buddlejaceae	Buddleja asiatica	白背楓		_	Т	т	т	т	т		
Caesalpiniaceae	Cassia alata		+	_	1			_		т	T
Caryophyllaceae	Drymaria cordata	翅莢決明		T		т		T			
	-	荷蓮豆		+	+	+	+	+	+		
Caryophyllaceae	Myosoton aquaticum	鹅 腸菜		++	+	+	++	+	++		
Commelinaceae	Commelina diffusa	節節草	+	++	+++	++	++	++		++	++
Convolvulaceae	Ipomoea cairica	五爪金龍		++	++	++	++	++	++	++	++
Convolvulaceae	Pharbitis nil	牽牛		+							
Convolvulaceae	Ipomoea aquatica	蕹菜		+							
Cucurbitaceae	Solena amplexicaulis	茅瓜		т			+	_	_	T	T .
Cuscutaceae	Cuscuta australis	南方菟絲子			T .	, ·	Ť.	T	T		-
Cyperaceae	Cyperus flabelliformis	風車草		+	+	+	+	+	+	†	+
Cyperaceae	Cyperus sp.	莎草		+	+	†	†	+	+	+	+
Euphorbiaceae	Macaranga tanarius	血桐	+	+	+	†	†	+	+	+	+
Euphorbiaceae	Bischofia javanica	秋楓		+		+	+	+	+	+	+
Fabaceae	Pueraria lobata	野葛	++	+	+	+	+	+	+	+	+
Fabaceae	Crotalaria pallida	猪屎豆		+							
Fabaceae	Sesbania cannabina	田菁		+							
Fabaceae	Dalbergia benthamii	兩廣黃檀								+	+
Fabaceae	Pueraria lobata var.thomsonii	粉葛		+	+	+	+	+	+		
Lauraceae	Machilus breviflora	短序潤楠								+	+
Lauraceae	Machilus pauhoi	刨花潤楠								+	+
Magnoliaceae	Michelia alba	白蘭	+	+							
Malvaceae	Hibiscus rosa-sinensia	大紅花		+		ļ	ļ			+	+
Mimosaceae	Acacia confusa	台灣相思	+	+							
Mimosaceae	Leucaena leucocephala	銀合歡		+	+	+	+	+	+	+	+
Mimosaceae	Mimosa pudica	含羞草		+							
Mimosaceae	Calliandra haematocephala	紅絨球		+	+	+	+	+	+	+	+
Moraceae	Ficus hispida	對葉榕	+	+	+	+	+	+	+	+	+

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

Table 4.1. Flora species reco	orded along the Lam Tsuen River in	ncluding riparian habitat.								_	
			Baseline								
			monitoring	Detailed	Survey 1	Detailed	Survey 2	Detailed	Survey 3	Detailed	Survey 4
					1	-			I	-	1
Family	Species name	Species name in Chinese	Jul to Aug 08	Dec-14	Jan-15	Jul-15	Aug-15	Dec-15	Jan-16	Jul-16	Aug-16
Moraceae	Ficus variegata	青果榕			+	+	+	+	+	+	+
Moraceae	Ficus subpisocarpa	筆管榕								+	+
Moraceae	Ficus microcarpa	細葉榕								+	+
Musaceae	Musa paradisiaca	大蕉	+	+	+	+	+	+	+	+	+
Myrtaceae	Cleistocalyx nervosum	水翁		+							
Nyctaginaceae	Bougainvillea spectabilis	勒杜鵑	+	+							
Oleaceae	Ligustrum sinense	山指甲			+	+	+	+	+	+	+
Onagraceae	Ludwigia erecta	美洲水丁香		++	+	+	+	+	+		
Oxalidaceae	Oxalis corniculata	酢漿草		+	+	+	+	+	+	+	+
Plantaginaceae	Plantago major	車前草		+							
Poaceae	Panicum repens	枯骨草	+	+							
Poaceae	Pennisetum purpureum	象草	+	+	++	+	+	+	+	+	+
Poaceae	Pennisetum alopecuroides	狼尾草				+	+	+	+		
Poaceae	Rhynchelytrum repens	紅毛草	+	+							
Poaceae	Microstegium ciliatum	剛秀竹	++	+	+	+	+	+	+	+	+
Poaceae	Brachiaria mutica	巴拉草	++	+++	+++	+++	+++	+++	++	++	++
Poaceae	Miscanthus floridulus	五節芒		+	+	+	+	+	+	+	+
Poaceae	Arundinella nepalensis	石珍芒		+	+	+	+	+	+	+	+
Poaceae	Panicum maximum	大黍		+						+	+
Poaceae	Coix lacryma-jobi	薏苡		+	+	+	+	+	+	+	+
Poaceae	Arundo donax	蘆竹		+						+	+
Poaceae	Chloris virgata	虎尾草		+							
Poaceae	Setaria palmifolia	棕葉狗尾草								+	+
Polygonaceae	Rumex trisetifer	假菠菜		++	+	++	++	+	+		
Polygonaceae	Polygonum chinense	火炭母		+	+	+	+	+	+	+	+
Polygonaceae	Polygonum hydropiper	水蓼		+	+	+	+	+	+	+	+
Polygonaceae	Polygonum glabrum	光蓼				_	_	_	_	-	-
Polygonaceae	Polygonum perfoliatum	杠板歸		_			<u> </u>	'	'		
Polygonaceae	Polygonum lapathifolium	大馬蓼		1							
Portulacaceae	Portulaca oleracea	馬齒莧		'							
Ranunculaceae	Ranunculus sceleratus			+							
		石龍芮			+	+	+	+	+	+	+
Rubiaceae	Adina pilulifera	水團花		+							
Sapindaceae	Dimocarpus longan	能眼		+							
Scrophulariaceae	Scoparia dulcis	野甘草		+							
Scrophulariaceae	Lindernia anagallis	長蒴母草		+							
	Solanum nigrum	能葵		+						+	+
Solanaceae	Lycopersicon esculentum	番茄									
Solanaceae	Solanum torvum	水茄		+	+	+	+	+	+	+	+
Sterculiaceae	Sterculia lanceolata	假蘋婆		+						+	+
Sterculiaceae	Byttneria aspera	刺果藤		+							
Thelypteridaceae	Cyclosorus parasiticus	華南毛蕨		+	+	+	+	+	+	+	+
	Macrothelypteris torresiana	普通針毛蕨		+	+	+	+	+	+	+	+
Tiliaceae	Microcos nervosa	布渣葉								+	+
Ulmaceae	Celtis sinensis	朴樹	+	+	+	+	+	+	+	+	+
Ulmaceae	Trema orientalis	異色山黄麻		+	+	+	+	+	+	+	+
Ulmaceae	Trema tomentosa	山黄麻		+						+	+
Urticaceae	Pilea microphylla	透明草		+	+	+	+	+	+	+	+
Verbenaceae	Duranta erecta	假連翹			+	+	+	+	+	+	+
Urticaceae	Boehmeria nivea	苧麻		+	+	+	+	+	+	+	+
Verbenaceae	Lantana camara	馬纓丹	+	+	+	+	+	+	+	+	+
Vitaceae	Cayratia corniculata	角花烏蘞莓	+	+	+	+	+	+	+	+	+
Floating Plant	1	<u> </u>	<u> </u>		<u> </u>	<u> </u>					
Lemnaceae	Lemna minor	浮萍		+	+	+	+	+	+	+	+
Submerged Plant		1	I		I	1				<u> </u>	
	Hydrilla verticillata	黑藻		+	+	+	+	+	+	+	+
No. of species	2	an ok	22	96	63	63	63	65	65	74	74
Note:			L								. , ,

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- Upper stream sampling site T4 - Lower stream sampling site)

					Baseli	ne monito	oring						Detailed	l Survey - 1						De	etailed Surv	ey - 1						Detai	led Survey -	2					Detail	ed Survey	- 2	
		Stream		Jul-0	8		Au	g-08					De	ec-14							Jan-15								Jul-15							Aug-15		
		Transect	P1		P4		P1	P4		T1		T	2	T3		T4		T1		T2		T3		T4		T1		T2	T:	3	T4		T1		T2		T3	T4
Family	Species	Chinese name	Height(m)	%	Height(m)	% Heigh	ıt(m) %	Height(m)	% Не	leight(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	% F	Height(m) %	Heigh	(m) %	Heig	ht(m) 9	6 F	Height(m)	% H	leight(m) %	Height(m)	%	Height(m)	%	Height(m)	% H	leight(m)	% Hei	ght(m) %	Height(m) %
Poaceae	Microstegium ciliatum	剛秀竹	0.4	40			0.4 40																															
Fabaceae	Pueraria lobata	野葛	0.5	30			0.5 30									0.6	10							0.6	10	0.5	10				0.	4 5	0.5	10				0.4
Poaceae	Pennisetum purpureum	象草	3	20			3 20															3	15															
Araceae	Alocasia odora	海芋	1	10			1 10									1.8	1							1.8	1													
Caesalpiniaceae	Cassia alata	翅莢決明			1.2	10		1.2	2 10																													
Magnoliaceae	Michelia alba	白蘭			6	10			6 10																													
Poaceae	Brachiaria mutica	巴拉草			1.2	70		1.3	2 70	1	10	1.5	15	1.3	30	1	5	1	20	1	20	1.3	20	1	10	0.9	30	1.5 3)).5 70)	1 15	1	30	1.5	30	0.8 7	0 1 1
Moraceae	Ficus hispida	對葉榕																																				
Asteraceae	Mikania micrantha	薇甘菊								0.3	18	0.3	18	0.3	18	0.3	18	0.4	10	0.4	15	0.3	5	0.3	20	0.3	5	0.2	5).3 5	5 0.	4 5	0.3	5	0.2	5	0.3	5 0.4
Musaceae	Musa paradisiaca	大蕉																																				
Ulmaceae	Celtis sinensis	朴樹			6	10			6 10																													
Araceae	Pistia stratiotes L.	大漂																																				
Urticaceae	Boehmeria nivea	苧麻																																				
Asteraceae	Bidens alba	白花鬼針草								0.5	5	0.0	12	0.7	10			1	10	0.4	15	1	15).3 5	5						0.4	5
Poaceae	Coix lacryma-jobi	薏苡								2	5																											
Solanaceae	Solanum nigrum	龍葵																																				
Cyperaceae	Cyperus flabelliformis	風車草							11																					0.6 2	2	1					0.6	2
Poaceae	Miscanthus floridulus	五節芒																																				
Euphorbiaceae	Macaranga tanarius	血桐																																				
Asteraceae	Wedelia chinensis	蟛蜞菊																								0.3	20	0.2 1)				0.4	20	0.2	10		
Commelinaceae	Commelina diffusa	節節草							11	0.3	12	0.0	22	2		0.3	20	0.4	10	0.4	20			0.3	20	0.3	20	0.2 2) ().2 5	5 0.	4 20	0.3	20	0.2	20	0.2	5 0.4 2
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												0.3	2	0.1	1					0.3	10	0.1	15													
Onagraceae	Ludwigia erecta	美洲水丁香								2	25	- 2	13	3 2	10	1.8	5	2	30	2	10	2	5	1.8	5													
Poaceae	Pennisetum alopecuroides	狼尾草																											-).5 5	5	2 5					0.8	5 2
Amaranthaceae	Celosia argentea	青葙												1.5	15																							
Acanthaceae	Dicliptera chinensis	狗肝菜		1 1															\vdash													1						
Bare Gound	<u> </u>		1	t					+		25		20					1	20		20						ll	- 1-	1		1	55				35		2 5

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

Table 4.2. Flora species recorded from belt transect survey at the Upper Lam Tsuen River (T1- Upper stream sampling site T4 - Lower stream sampling site)

						Detailed	Survey -	3						Detailed :	Survey - 3					De	tailed S	Survey - 4						Detailed	Survey	- 4	
		Stream				Do	ec-15							Jan	n-16						Jul	-16						Αι	ug-16		
		Transect	Т	Γ1	Т	2	-	Г3	1	Т4	Т	1	1	72	T	3	1	Γ4	T1	T2	2	T3		T4		T1		T2	7	Γ3	T4
Family	Species	Chinese name	Height(m	1 %	Height(m)	%	Height(n	1 %	Height(m)	%	Height(m	%	Height(m	%	Height(m	%	Height(m	1 %	Height(m) %	Height(n	1) %	Height(m) %	% Н	eight(m)	% He	eight(m) %	6 Heig	ght(m) %	Height((m) %	Height(m) %
Poaceae	Microstegium ciliatum	剛秀竹																													
Fabaceae	Pueraria lobata	野葛	0.5	10					0.4	1	0.5	10					0.4	5	0.5	5				0.4	5	0.5	5				0.4
Poaceae	Pennisetum purpureum	象草																													
Araceae	Alocasia odora	海芋																													
Caesalpiniaceae	Cassia alata	翅荚決明																													
Magnoliaceae	Michelia alba	白蘭																													
Poaceae	Brachiaria mutica	巴拉草	0.8	5	1.5	35	1.2	60	1.1	2 20	0.3	5	0.3	20	0.3	30	0.3	10	0.4	7 0.4	4 15	0.4	20	0.4	5	0.4	7	0.4 15	, (0.4 20	0.4
Moraceae	Ficus hispida	對葉榕																												\neg	
Asteraceae	Mikania micrantha	薇甘菊	0.3	5	0.2	2 5	0.3		5 0.4	1	0.3	5	0.2	5	0.3	5	0.4	5	0.3	5 0	2 5	0.3	5	0.4	5	0.3	5	0.2 5	, (0.3 5	0.4
Musaceae	Musa paradisiaca	大蕉																												\neg	
Ulmaceae	Celtis sinensis	朴樹																												\neg	
Araceae	Pistia stratiotes L.	大漂																												\neg	
Urticaceae	Boehmeria nivea	苧麻																												\neg	
Asteraceae	Bidens alba	白花鬼針草					0.4	10)						0.4	10)					0.4	5						(0.4 5	
Poaceae	Coix lacryma-jobi	薏苡	1	5							1	5							1	5						1	5				
Solanaceae	Solanum nigrum	龍葵																												\neg	
Cyperaceae	Cyperus flabelliformis	風車草																												\neg	
Poaceae	Miscanthus floridulus	五節芒	1	10							1	10							1	7						1	7				
Euphorbiaceae	Macaranga tanarius	血桐																													
Asteraceae	Wedelia chinensis	蟛蜞菊	0.4	5							0.4	5							0.4	5						0.4	5				
Commelinaceae	Commelina diffusa	節節草	0.3	10	0.2	20	0.2		5 0.4	1 2:	0.3	10	0.2	20	0.2	5	0.4	25	0.3	7 0.	2 10	0.2	5	0.4	10	0.3	10	0.2 15	, (0.2 10	0.4 1
Asteraceae	Erechtites hieracifolia	革命菜																													
Thelypteridaceae	Cyclosorus parasiticus	華南毛蕨																												\neg	
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 10)						0.2	10						0.2	5						0.2
Onagraceae	Ludwigia erecta	美洲水丁香																													
Poaceae	Pennisetum alopecuroides	狼尾草					1.5	10) :	2	5				1.5	10	2	5				1.5	10						- 1	1.5 10	
Amaranthaceae	Celosia argentea	青葙					0.4		5						0.4	5	5					0.4	5						(0.4 5	
Acanthaceae	Dicliptera chinensis	狗肝菜	0.3	20					1		0.3	20							0.3	5				ı		0.3	5			\neg	
Bare Gound				30		40		20)	3:	5	30		55		50)	45		54	70		65	ı	70		51	65	,	60	6:

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)

	1	ı	1	1	+		seline mo			+		г.		ailed Sur	, - 1	, .		+				Detailed S	y - 2		. 17		<u> </u>	-		Detailed	- Dai 10)		Y * -		+		Detailed	Jaive		
						Jul-08	\dashv		Aug-08	\perp		Dec-1		\perp		Jan-15		\perp		Jul-14					g-14		_		ec-15		_		Jan-16		—	Jul-		+		Au
mmon Name	Species name	Chinese name	Status	Commonness	A	Abundance			oundance		_	Abunda		_		Abundar		_		Abunda				Abur		_	<u> </u>		ındance		_	_	bundance			Abund		₩,	Ab	_
						P1	P4	С	P1	P4 C	T1	1 T2	T3	T4 (C T	1 T2	T3	T4	C :	T1 T2	_	T4	С		2 T3	T4	С	T1	T2 1	3 T4	С	Tl	T2 T	T3 T4	. C	T1 T2	T3 T4	C	Tl	-
Swallow	Hirundo rustica	家燕	PM	С	+	1	1						\sqcup	_		_	\sqcup		++		3	3	++	3	2 4			_		_		\perp	\vdash	_	++	3	3 6	++	⊢ '	1
k Drongo	Dicrurus macrocercus	黑卷尾	Sv	С															+		1												Щ	丄	Ш		Ш	Ш	∟'	
k Kite	Milvus lineatus	麻鷹	R, RC, Cap.586	С				+		+	-				+																								1	
k-faced bunting	Emberiza spodocephala	灰頭鷗	WV&PM	С						+																							П		\Box		П	\Box	Π	
-necked Starling	Sturnus nigricollis	黑領椋鳥	R	С	+++	2	1	++	2	++	+ 2		3	2 +	+ 2		2		++	2 2		2	++	4	3 3		++	5	3		++		4	4	+		4	+	Τ	•
k-winged Cuckoo-shrike	Coracina melaschistos	暗灰鵑鵙	PM	С																													П		\Box		П	\Box	ī —	•
Whistling Thrush	Myophonus caeruleus	紫嘯鶇	R	С							1																								\Box		П	\Box	ī	٠
wn Shrike	Lanius cristatus	紅尾伯勞	PM	С							1																								\Box		П	\Box	ı —	
zzard (Common Buzzard)	Buteo buteo	普通鵟	WV,Cap.586	С																											+		П		П		П	\Box	ī	
inese Bulbul	Pycnonotus sinensis	白頭鵯	R	С	++	2	3	+++	4	5 +	+ 2	2	3	+	+ 2		3	1	++	2	1	2	++	3	2	2	++			2 3	++	3	2	2	++	2 2	5 4	++	3	
inese Pond Heron	Ardeola bacchus	池鷺	R,RC	С	+			++	3	1 +	- 2	1	3		+ 2	2		1	+	1			+			1	+		1		+		\sqcap	1 1	+		1 !	+	Τ	
mmon Kingfisher	Alcedo atthis	普通翠鳥	R	С						+	-	1			+	1							+		1		+			1	+			1	\top		П	\Box	7	
ommon Koel	Eudynamys scolopacea	噪鵑	R	С	++	1		+		+																	+	1			+	1			+		П	\Box	Τ	
ommon Sandpiper	1 1	磯鷸	WV&PM	С	1	\vdash	\dashv	_	\dashv	+	_	+	+	+	+	1	\vdash	\dashv	\dashv		1		\dashv	\dashv	\vdash	1	\vdash	\dashv	\dashv	+	T	\vdash	\dashv	+	++	\vdash	\vdash	+	_	٠
ommon Tailorbird	Orthotomus sutorius	長尾縫葉鶯	R	С	+	1	1	+	1	+-	+	1	\vdash	1 +	+ 1		1	\neg	++	2	2		++	1	2 2	1	++		2	1	++	\sqcap	2	2	+	1	1	+	1	٠
rested bulbul	Pycnonotus jocosus	紅耳鵯	R	С	+++	2	3	++	3	4 ++	+	4	3	2 +	++ 3	2	3	-	++	8 3	3	5	+++	7	5 5	- 5	+++	8	5	5 12	+++	6	4	6 10	, ++ 	7 5	5 -	++	8	٠
rested Goshawk	Accipiter trivirgatus	風頭鷹	R, CR, Cap.586	5 U	+	 			-	7.	+	+-	 	- 1 -	1 3	Ť	 	+	+		Ť	 			+	+		-	+	12	+	Ť		10	+++	- 1	Η̈́	+++		٠
rested Myna	Acridotheres cristatellus	八哥	R	C	++	2	\dashv	++	2	++	+ 2	3	5		+	3	4	2	++	3 2	3	3	++	-	2 4	+	++	\dashv	+	2	++	2	\vdash	+	++	+	2	+	_	-
rested Nyna rested Serpent Eagle	-	八司 蛇鵰	R, VU, LC	II.	1.7	- 1	-+			-	+ + 2	, ,	,	+	+	,	┝╌┤	-	-	- 2	,	,			+	+		\dashv	+	+	***	1	\vdash	$\dot{+}$	++	+	++	++	_	
aurian redstart	Phoenicurus auroreus		WV	II.	+		-+	-	-	+-	+	+,	1	1	. 1	+	\vdash	-	-	_	+		-	-	_	+	 . 	\dashv	_	+	١.	+	\vdash	+	+		+	+	$\overline{}$	
	Columba sp.	地址形明	R	C	+	\vdash	-+	_	2	2 +	_	1	1	-	+ +	+	\vdash	+	+	+	+	\vdash		-+	-	+	+	\dashv	+	+	+	\vdash	\vdash	+	++	+	++	+	_	
omestic pigeon usky Warbler		高 褐柳鶯	WW.	C	7	\vdash	+	-	3	4 +	_	1	+ +	+	:	1	\vdash	+	_	1	1	\vdash	_	,	_	+	 	\dashv	+	+	+ -	+	\vdash	+	+++	\vdash	+	+-	_	
urasian tree sparrow		麻鵲	WV R	C	4.	,	-+	_		++		1	2	+		3	2	+	+	3	2	3	++	3	2 2	3		\dashv	3	- 5	++	\vdash	\vdash	2 4	+++	1 3	2 5	++	-	
			R,VU	C	T+	- 4	+	-	+	+	. 3	1	+ +	1 +		+ 3	- 1	1		-		٥	7.7	,	+ + 2	3	++	+	,	+	++	+		- 4	+++	÷ 5	+++	++		
reat Coucal	Centropus sinensis		R. V U	C	+	\vdash	+	+	+	+	+	1	+ +	1	: +	+	\vdash	+	+	+	+	\vdash	_	+	+	2	\vdash	+	+	+	+	\vdash	\vdash	+	+++	\vdash	+	++	_	
reat Tit	Parus major(commixtus)	大山雀	PM&WV	11	+	\vdash	+	\dashv	-	+	+	+	+	+	-	+	\vdash	+	+	+	+	\vdash	+	-	+	- 2	\vdash	\dashv	+	+	+-	\vdash	\vdash	+	+	+	++	+	_	
reen Sandpiper rey Heron	Tringa ochropus Ardea cinerea	白腰草鷸	WV,PRC	C	1.	\vdash	-+	\dashv	-	+	+	+	\vdash	+	+	+	\vdash	+	+	+	+	\vdash	-	-	+	+	\vdash	-	+	+	+	\vdash	\vdash	+	+	\vdash	++	+	_	-
		蒼鷺	WV,PRC WV	C	+			-		-	+.	-	1	,		٠,	١, ١		_	_	١.	\vdash				+	H. I	-	,	٠,	+-	+	+	+	+		++	+	_	-
rey Wagtail apanese White Eye	Motacilla cinerea	灰鶺鴒	W V	C	+			-		+	+ 3	+	- 2	1	+ 1	1	2		+	3 3	2	5	+	4	2 3	2	+	-	1	1 1	+	+	1	1	++		┼	+	_	-
		暗綠繡眼鳥 七明皇贈	D.	C	+		-+	+		+	+ 3	4	3	+	+ 3	+	3		++	3 3	- 2	3	++	4	2 3	- 2	++	-	-+	4 4	++	+	6	+-	+		₩	+	$\overline{}$	-
ungle Crow	Corvus macrorhynchus	大咀烏鴉	SV	T.	+		-	_		_	+	+	+	-	+	+	\vdash	-	_		1		-	_	+	+	\vdash	-	_	+	+	+	\vdash	+	++		\vdash	+	$\overline{}$	-
arge Hawk Cuckoo esser Coucal	Cuculus sparverioides Centropus bengalensis			C	+		-+	-+		+	+	+-	+	+	+	+	\vdash		-	+	+	\vdash	-	-	-	+	\vdash	-	-	+	+	+	\vdash	+	+		₩	+	_	-
	<u> </u>	小鴉鵑	R, VU R, RC	C	+		-+	-	-	++	+ 2	٠,	,	1 .	. 1	2.	2	-	. +	, ,	١,	\vdash	- +	-	. -	٠,	┨.	-	-		+-	+	. 	+	++		+	+	$\overline{}$	-
ittle Egret	Egretta garzetta	小白鷺	R, KC R,WV, RC	C	+	\vdash		+	-	-	+ 2	1	3	1 +	+ 1		3	-	+	1 1	1	\vdash	+	-	' 	1	+	-+	-+	1 1	+	+		+	++	+	1 1	+	$\overline{}$	-
Great Egret Little Swift	Ardea alba	大白鷺 小白腰雨燕	R,WV, RC R,SpM	C	+	2		-+	-	+	+	+-	+	+	+	+	\vdash		+	1	+	\vdash	- 1	-	4	+	 	-	-	+	+	+	\vdash	+	++		₩	+	_	
	Apus affinis		r,spw	C	++	3		-	-	+	+	+-	+	+	+	+	\vdash		-	+	+	\vdash	+	-	4	+	++	-	-	+	++	+	\vdash	+	++		₩	+	_	
Magpie Access Parking		喜鵲	R D	c	+	-	-	+	-	1	. ,	+.	1	2 .		٠,	_	_		2 1	١,	_		-	2 2	+	 	-	,	-	+-	+	. 	. -	++	_	++	+	_	
Magpie Robin		調鳴 編鴦	WV	C	++	1	- 1	+	1	1 +	+ 1	1	2	2 +	+ 1	1	2	2	++	2 1	1	2	++		2 2	+	+	-	1	- 2	+	+	+	1	+	2	1 1	+	_	
Mandarin Duck			w v	C C	-					_	+	-		_	-	+	\vdash	_	_	_	-	_	_			٠.	\vdash	-	_	-	_	+	\vdash	$-\!$	++		₩	+	_	
Masked Laughing Thrush	Garrulax perspicillatus	黑臉噪鶥	R	C	+			-		+-	+	-	2	2 +	+ 2	_	\vdash		++	_	-	3	++		_	4	+	-	_	- 2	-	+	\vdash	+	+		₩	+	_	
light Heron	Nycticorax nycticorax	夜鷺	R&WV, LC	c	+	\vdash	\dashv	\dashv	+	+	+	+	+	+	+	+	$\vdash \vdash$	+	+	-	+	\vdash	+	+	+	1	\vdash	\dashv	+	+	+	\vdash	\vdash	+	+	\vdash	++	+	_	
Northern Shoveler	Anas clypeata	琵嘴鴨	WV	c	+.		\dashv	\dashv	+	+	+	+	\vdash	+	+	+	 , 	+	+	-	+	\vdash	\dashv	+	+	+	\vdash	\dashv	+	+	+	\vdash	$\vdash \vdash$	+	+	\vdash	++	+	_	
Dlive Backed Pipit		樹鷚	WV	c	+	1	+	\dashv	-+	+	+	+	+	+	+	+	1	+	+	_	+	\vdash	-	-+	+	+	+	\dashv	+	+	+	\vdash	\vdash	+	+	\vdash	+	+	_	
Plaintive Cuckoo	Cacomantis merulinus		SV	c	+	\vdash	\dashv	\dashv	+	+	+	+	+	+	+	+	$\vdash \vdash$	+	+	-	+	\vdash	\dashv	+	+	+	\vdash	\dashv	+	+	+	\vdash	\vdash	+	+	\vdash	++	+	_	
ed-billed Blue Magpie	+	紅咀藍鵲	R	c	+	\vdash	\dashv	\dashv	+	+	+	+	\vdash	+	+	+	$\vdash \vdash$	+	+	-	+	\vdash	\dashv	_	+	+	\vdash	\dashv	+	+	+	\vdash	\vdash	+	+	\vdash	+	+	_	
led-flanked Bluetail	Tarsiger cyanurus	紅脇藍尾鴝	PM&WV	C	+	\vdash	\dashv	\dashv	+	+	+	+	+	+	+	+	$\vdash \vdash$	+	+	-	+	\vdash	\dashv	+	+	+	\vdash	\dashv	+	+	+	\vdash	\vdash	+	+	\vdash	++	+	_	
ufous Turtle Dove	Streptopelia orientalis	山斑鳩	R D	c	+	\vdash	\dashv		+	+	+-	+	 , 	+	+	+.	$\vdash \vdash$,	+	-	+	\vdash	_	+	+	+	\vdash	\dashv	+	+	+	\vdash	$\vdash \vdash$	+	+	\vdash	++	+	_	
ufous-backed Shrike		棕背伯勞	K	C	+	\vdash	+	+	_	+	- 1	+	1	+	+	1	$\vdash \vdash$	1	+	+		\vdash	+	_	1 1	+	+	_	+	+	+	\vdash	\vdash	+	+	+	++	+	_	
ufous-capped Babbler		紅頭穂鶥	K D	C	+	\vdash	\dashv	\dashv	+	+	+	+	\vdash	+	+	+	$\vdash \vdash$	+	+	-		\vdash	\dashv	+	+	+	\vdash	\dashv	+	+	+	\vdash	$\vdash \vdash$	+	+	\vdash	++	+	_	-
carlet Minivet	Pericrocotus flammeus	赤紅山椒鳥	K	C	+	\vdash		\dashv	_	+	+	+-	\vdash		+	+-	⊢	+	++	+	12	\vdash		_	+	+	\vdash	-	+	_	+	\vdash	\vdash	+	$+\!\!+$	\vdash	++	+	_	-
iberian Stonechat	Saxicola maurus	黑喉石鵰	WV	U	1	\vdash	\dashv	_		++	+	1	\vdash	1 +	+	1	1	\dashv	\perp	-	1	\vdash			_	+	+		1	1	+	\vdash	1	+	+	\vdash	\vdash	+	_	
ooty-headed Bulbul	Pycnonotus aurigaster	白喉紅臀鵯	R	U	+			-		+	+	+-	1	_	+	+-	\vdash	_	+	_	+	\vdash	+	_		+-	\vdash	_	_	+	+		\vdash	+	+		₩	#	_	
ootted Dove	Streptopelia chinensis	珠頸斑鳩	K	C	+	1	1	+	1	++	_		3	2 +	++ 2	3	5	2	++	2 2	2	4	++	1	2 2	4	++	3	3	2	++	2	\vdash	3 2	++	3 2	3 3	++	4	
ootted Munia	Lonchura punctulata	斑文鳥	R	C	1	\vdash	\dashv	_		++	+ 5	+	7	+	+ 5	+	8	\dashv	\perp	-	1	\vdash			_	+	\vdash		\perp	+	+-	\vdash	\vdash	+	+	\vdash	\vdash	+	_	-
elvet-fronted Nuthatch	Sitta frontalis	絨額鳾	R	С		\sqcup					\perp	\perp	\sqcup		\perp	\perp	\sqcup				_	\sqcup					ш			\perp	_	ш	\vdash	\bot	$\bot\!\!\!\bot$	\Box	$\perp \perp$	$\perp \! \! \! \! \! \perp$	_	
hite Wagtail	Motacilla alba	III no tro	WV	С		\sqcup		+		++	_	1	2	1 +	+ 1	2	3	2	++		2	\sqcup	+++			8	++		1	2	++	1	1	1 2	+	\Box	$\perp \perp$	+	_	_
/hite-breasted Waterhen		白胸苦惡鳥	R	С	+	\sqcup		+		+	-	\perp	1		+	_	\sqcup		+			1				_	ш		_	\perp	_	ш	\vdash	\bot	$\bot \bot$	\sqcup	+	╨	_	
hite-throated Kingfisher	Halcyon smyrnensis	白胸翡翠	R, LC	С		\sqcup					\perp		\sqcup		\perp		Ш				_	\sqcup					Ш					Ш	$\perp \perp$	丄	ш		$\perp \perp$	$\perp \! \! \! \! \! \perp$	_	
hite-rumped Munia	Lonchura striata	白腰文鳥	R	С		\sqcup					\perp		\sqcup		\perp		Ш				_	\sqcup					+			1		Ш	$\perp \perp$	丄	ш		$\perp \perp$	$\perp \! \! \! \! \! \perp$	_	
ellow Bellid Prinia	Prinia flaviventris	黃腹鷦鶯	R	С	+		1	+		+	- 1		1				Ш		+	1	1	\sqcup	+		1		+				+	Ш	$\perp \perp$	\bot	+		$\perp \perp$	+	_	
ellow Wagtail	Motacilla flava	黄鶺鴒	WV&PM	U									Ш				Ш				1	$oxed{oxed}$					Ш					Ш	$oldsymbol{\sqcup}$	\bot	ш		$\perp \perp$	$\perp \! \! \! \! \! \perp$	_	
tting cisticola	Cisticola juncidis	棕扇尾鶯	WV&PM	С						+												$oxed{\Box}$					$oxedsymbol{oxed}$					$oxedsymbol{oxedsymbol{oxedsymbol{\sqcup}}}$	$oldsymbol{oldsymbol{\sqcup}}$	\bot	Ш		\Box	Ш	_	
umber of birds						19	12		20	13	2	29 26	5 49	17		27 23	42	14		27 1	38	34		14	27 3	36 26		17	21	17 3	5	15	23	23 2	24	16 18	3 28 3	0	21	j
	1	I -		1	18	12	8	19	9	5 3	33 1	15 15	18	12	29	14 13	15	0	21	10 1	16	11	23	10	14	4 11	24	4	10	Q 1	1 24	1 6	10	10	9 19	4	7 11 1			:

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)

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

RC: Regional concern Fellowes et al (2002)

LC: Local Concern Fellowes et al (2002)

PRC: Potential Regional onver Fellowes et al (2002)

CR: Rare in China Red Data Book Status

VU: Vulnerable in China Red Data Book Status

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

					Baseline mo	onitoring	Detailed	Survey -1	Detailed	Survey -2	Detailed	Survey -3	Detailed	Survey -4
Species	Common name	Chinese name	Status	Common- ness	Jul-08	Aug-08	Dec-14	Jan-15	Jul-15	Aug-15	Dec-15	Jan-16	Jul-16	Aug-16
Acisoma panorpoides panorpoides	Asian Pintail	錐腹蜻	NP	VC					+					
Brachythemis contaminata	Asian Amberwing	黃翅蜻	NP	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	C					+	+			+	+
Ischnura senegalensis	Common Blue Jewel	褐斑異痣蟌	NP	VC										
Mnais lacteola	Indochinese Copperwing	煙翅綠色蟌	P, LC	C										
Nannophya pygmaea	Scarlet Dwarf	侏紅小蜻	P, LC	C										
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	C									+	+
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	黃蜻	NP	VC	+	+	+		+	+	+	+	+	+
Paracercion calamorum duyeri	Dusky Lilysquatter	葦尾蟌	P, LC	C										
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	C										
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					4	5	4	3	14	15	2	3	14	13

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

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)

[&]quot;+" – Species exists in the study area

[&]quot;++" - Species common in the study area

[&]quot;+++" - Species abundant/dominant in study area

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

				В	Baseline	monitor	ring			De	taield !	Survey -	1						Det	aield	Survey - 2								De	aield Survey - 3				
Species	Chinese name	Samp	ling point	Ju	ıl-08	Au	ıg-08		Dec-	-14			Jan	-15			J	ul-15			A	ug-15				Dec	:-15					Jan-16		
	•	Status	Commonness			r Upper n stream		Reference point	T1	Г2 Т	3 T4	Refer point	rence T1	T2	T3 T4	Refer point	1.7	1 T	T3		Reference point	T1 3	г2 Т3	T4	Reference point	T1	T2	Т3	T4	Reference point	Т1	Т2	T3	T4
			•																				Mol	luscs										
Biomphalaria sp.		NP	VC		+	+	+	+	+ -	+ +	+	+	+	+	+ +			Т		+				+					+					+
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	+	+	+	+	+	+		+	+	+		+ +	+		Т	+	+	+	П	+	+	+			+	+	+			+	+
Caenis sp.		NP	VC															Т		П		П			+	+	+	+	+	+	+	+	+	+
Chironomus sp.	蠓幼虫	NP	VC	+	+	+	+	+	+ -	+ +	+	+	+	+	+ +	+	+	+	+	+	+	+ -	+ +	+	+	+	+	+		+	+	+	+	
Electrogenas sp.		NP	VC					+	+ -	+ +		+	+			+	+	+	+		+	+ -	+ +		+	+	+			+	+	+		
Hydropsyche sp.		NP	VC					+	-	+		+		+		+	+	+			+	+ -	+		+	+	+		+	+	+	+		+
Indobaetis sp.		NP	VC	+	+	+	+	+	+ -	+ +	+	+	+		+ +	+	+	+		+	+	+ -	-	+				+					+	
Mnais sp.		NP	VC							+ +				+	+			Т	+	П		П	+		+	+	+	+	+	+	+	+	+	+
Orthetrum sp.		NP	VC	+	+			+	+ -	+	+	+		+	+			+	+	+		Π	+ +	+			+	+	+			+	+	+
Crustaceans	•	-	-																											-	-			
Caridina cantanensis	廣東米蝦	NP	VC	+	+	+	+	+	++	++ +	+ ++	+	++	++	++ ++	+++	+	+ +-	++	++	++	++	++ ++	++	++	++	++	++	++	++	++	++	++	++
Cryptopotamon anacoluthon	鰓刺溪蟹	NP	VC	+		+	1			+					+			T	+			T	+					+	+				+	+
Macrobrachium hainanense	海南沼蝦	NP	VC	+	+	+	+	+	+ -	+ +	+	+	+	+	+ +	+		+	+	+	+	1 1	+	+	+		+	+	+	+		+	+	+
Somanniathelphusa zanklon	束腰蟹	NP	VC	+		+	1							П		1		丁		П		\sqcap												
No. of species				(9 1	2 10) 11	17	17	16	16 1	4	17 1	7 16	16 1	4	17	14	4 14	14	17	7 14	14 1	4 14	12	10) 1	2 1	4 1	4 1:	2	10	12	14

No. of species

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

Reference point was the sampling location outside the works area.

[&]quot;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-upper river channel sampling site . T4 - lower river channel sampling site)

					Post const	ruction mo	nitoring			Post cons	truction mo	nitoring	
Species	Chinese name	Sampli	ng point			Jul-16					Aug-16		
	•	Status	Commonness	Reference point	T1	T2	Т3	T4	Reference point	Т1	T2	Т3	T4
	_				_			_	_	_			
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				+	+	1			+	+
Macrobrachium hainanense	海南沼蝦	NP	VC	+	1	+	+	+	+		+	+	+
Somanniathelphusa zanklon	束腰蟹	NP	VC										
No. of species				1	3 10	0 12	2	14 1	4 1	3 10	0 12	2 14	1 1

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

Reference point was the sampling location outside the works area.



[&]quot;VC" – Very Common; "UC" – Uncommon; "C" - Common; "R" - Rare

^{+,} occurred; ++, common; +++, abundant/dominant Species in the the study at

 $Table\ 4.6\ Fish\ species\ and\ amphibians\ at\ Upper\ Lam\ Tsuen\ River\ (T1-upper\ river\ channel\ sampling\ site\ .\ T4-lower\ river\ channel\ sampling\ site)$

					Baseline i	monitori	ng			Deti	aled Sur	rvey - 1					D	Detaile	d Survey 2						Deta	ailed Su	rvey 3							Deta	ailed S	Survey 4		
				Ju	ıl-08	Au	g-08		Dec-1	4			Jan-15			Jul-	-15			Aug-15				Dec-15				Jan-	16			Ju	ıl-16				Aug-	16
			Sampling point		Lower stream			Reference	T1 /	T2 T3	T4 Re	eference	T1 T2	Т3 Т	Refere	enc T1	1 T2	T3 T4	Reference	T1 T	2 T3	T4 R	Reference	T1 T2	Т3	T4 R	eference	T1	T2 T	3 T4	Reference	T1	T2	Т3	T4	Referenc e	T1 T	2 T
ecies	Chinese name	Status	Commonness																																			
Fish																																						
ossocheilus parallens	側條光唇魚	P, PGC	R		+		+		++	++ ++	++		++ ++	++ +	+	+	+	+ +		+ +	+ +	+		+	+	++			+ -	++			+	+	++		+	-
nna maculate	斑鱧	NP	Common				+											+				+				+												
hina molitorella	鯪魚	NP	С																																			
ias fuscus	胡子鯰	NP	C								+			-	+			+				+				+				+				+				T
inus carpio var. viridiviolaceus	錦鯉	NP	C															+			+								+				+				+	-
busia affinis	食蚊魚	NP	VC			+	+	+	+	+ +	+	+	+ +	+ +	+	+	+	+ +	+	+ +	+ +	+	+	+ +	+	+	+	+	+ -	+	+	+	+	+	+	+	+ +	- 1
parhomaloptera disparis	擬平鰍	NP	C					+	+	+ +		+	+ +	+	+	+	+	+	+	+ +	+ +		+	+ +	+		+	+	+ -	-	+	+	+	+		+	+ +	- [
urnus anguillicaudatus	泥鳅	NP	Common	+		+		+		+ +	+	+		+ +	+	+	+	+ +	+	+ +	+ +	+	+	+ +	+	+	+	+	+ -	+	+	+	+	+	+	+	+ +	- [
chromis niloticus	尼羅口孵非鲫	NP	C		+		+		+	+ +	+		+ +	+ +	+	++	+ ++ -	++ ++	+	++ +-	+ ++	++	+	+ ++	++	++	+	+	++ +	+ ++	+	+	++	++	++	+	+ +	+
acco spilurus	異鱲	V and	Common	+		+		+	+	+ +	+	+	+ +	+ +	+	+	+	+ +	+	+ +	+ +	+	+	+	+	+	+		+ -	+	+		+	+	+	+	+	
ilia reticulate	孔雀花魚將	NP	VC			+	+			+ +				+			+	+ +		+	+ +	+		+	+	+			+ -	+			+	+	+		+	
dogastromyzon myersi	麥氏擬腹吸鰍	NP	C		+	+	+	+	+	+ +		+	+ +	+	+	+			+	+			+	+			+	+			+	+				+	+	
ocryptis cochinchinensis	黃鯰	NP	C					+	+	+		+	+		+				+				+				+				+					+		
tius semifasciolatus	七星魚	NP	C	++	+	++	+	+	+ -	++ ++	+	+	+ ++	++ +	+	+	++	++ +	+	+ +-	+ ++	+	+	+ ++	++	+	+	+	++ +	+ +	+	+	++	++	+	+	+ +	+
nogobius spp.	鰕虎魚	NP	C/UN/R		+	+	+	+	++	++ ++	+	+	++ ++	++ +	+ +	++	+ ++ -	++ ++	+	++ ++	+ ++	++	+	++ ++	++	++	+	++	++ +	+ ++	+	++	++	++	++	+	++ +	+
istura fasciolata	横紋南鰍	NP	C		+	+	+	+	+	+ +		+	+ +		+	++	+++		+	++ ++	+		+	++ ++			+	++	++		+	++	++			+	++ +	+
hophorus hellerii	劍尾魚	NP	C	+	+	+	+		+ -	++ ++	+		+ ++	++ +	+	+	++	+ +	+	+ +-	+ +	+	+	+ ++	+	+	+	+	++ -	+	+	+	++	+	+	+	+ +	+
hophorus variatus	雜色劍尾魚	NP	C			+	+			+	+			+			+	+		+	+ +			+	+				+ -	-			+	+			+	-
cco platypus	寬鰭鱲	NP	C	+	++	+	++	+	++ -		+	+	++ ++	+ +	+	++	+++	+ +	+	++ +-	_	+	+	+ ++		+	+		++ +		+	+	++	++	++	+	+ +	
m fish counting		Number o	of fish	70	60	75	60	60	60	60 50	50	50	50 60	60 6	0 12	15	5 18	8 7	15	12 16	6 10	10	55	40 45	45	40	60	50	50 5	0 40	30	20	15	20	25	20	15 1	5
Amphibian																																						
amesotriton hongkongensis	香港瘰螈	P (Cap 170, NT, PGC)	R	+		+	+	+	+ +	+	+ +		+ +	+ +	+	+	+ +	+	+	+ +	+	+ +		+ +	+	+ +		+ +	+	+	+	+	+	+ +	+ +	+	+ +	-
jervarya limnocharis	選蚌		VC	1					+	+							† †	_			+	\vdash							_	+								\dashv

-v – Listed as viniterable in Cliniar Isin Keta Data Book
-Reference point was the sampling location outside the works area used to
compare the with the data within works area.

"Cap 170" - List in Wild Animials Protection Ordinance (Cap.170)
"NT" - Near Treatened in IUCN Red List Status

"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)

	Baseline monitoring					Detailed	Survey -	-1							Detail	ed Survey	- 2						Detailed	Survey -	3						Detailed S	Survey - 4			
Parameter / date	8-Aug			Dec-14					Jan-15				Jı	ıl-15			1	ug-15			De	ec-15			Jar	ı-16			Ju	1-16			Au	ıg-16	
Replicate		T1	T2	T3		T4	T1	T2	Т3	1	74	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	Т3	T4	T1	T2	T3	T4
DO (mg/L)	9.2	7.2	2	8.1	8.2	8.2	2 8.	.9	9.2	9.3	9.2	8.3	8.2	8.0) ;	8.3	.4 8	3 8.3	3 8	.3 8.	8.1	7.9	8.1	7.9	7.8	8.2	8.1	7.8	7.9	7.9	7.9	8.0	8.1	8.0	8.0
рН	7.49	8.5	5	8.4	8.2	8.2	7.	.9	8.2	8.3	7.9	7.7	7.8	7.8	3	7.8	7.7	7 7.0	5 7	.7 7.	7 7.5	7.6	7.6	7.8	7.9	7.7	7.7	7.7	7.6	7.6	7.7	7.7	7.7	7.6	7.7
Nitrate (mg N/L)	0.36	0.9)	1	0.9	0.9	0.	.9	0.9	0.9	0.9	0.0	0.8	0.3	8).9 (0.8	8 0.	8 (.9 0.	8 0.8	0.8	0.9	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.9
Ammonia (mg/L)	<0.01	< 0.1	< 0.1	< 0	.1	< 0.1	< 0.1	< 0.	< 0.	1 <	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	<0.1	0.02	2 0	.02	0.02	0.02	0.0	13	0.03	0.03	0.03	0.01	0.01	0.0	1 0.	01 0.	0.0	1 0.0	1 0.	0.0	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Conductivity (µS/cm)	60	112	2	92	86	67	15	6	153	152	163	42	2 32	3:	5	55	36	2 4	6	38 36.	33.0	42.0	62.0	32.0	36.0	40.0	45.0	29.0	32.0	31.0	39.0	32.0	39.0	40.0	42.0
BOD (mg/L)	<2	<2	<2		<2	<2	<2	<	-2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.1-0.3			0.03-0.2	2				0.03-0.2	2			0.0	03-0.2				03-0.2			0.0	3-0.2			0.03	3-0.2			0.0	3-0.2			0.0	3-0.2	
Water flow at riffle (m/s)	0.4-0.7			0.2-0.5					0.2-0.5				0.	2-0.5			(.2-0.5			0.	2-0.5			0.2	-0.5			0.2	2-0.5			0.2	2-0.5	
Sand (%)	15	5	5	5	8	10)	5	5	8	10	5	5 5		8	10	5	5	8	10	5 5	5 8	3 10	5	5	8	10	5	5 5	8	10	5	5	8	10
Stone (%)	80	93	3	90	90	75	9	13	90	90	75	93	90	90	0	75	93 9	0 9	0	75 9	3 90	90	75	93	90	90	75	93	90	90	75	93	90	90	75
Mud (%)	5	2	2	5	2	15	5	2	5	2	15	2	2 5		2	15	2	5	2	15	2 5	5 2	2 15	2	5	2	15	2	2 5	2	15	2	5	, 2	. 15

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

Detailed Ecological Monitoring Report (No. 4) She Shan River

August 2016

Prepared by: Mike Pang

Validated by: Mark Shea 6 September, 2016

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6 September, 2016

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

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1 Introduction

- 1.1 Agreement No. CE65/2013(EP) Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River Investigation required a post-construction ecological monitoring programme when the project completed. The collected data are mainly used to assess ecological recovery process and effectiveness of ecological migration proposed and enforced during the construction period.
- 1.2 The scope of the ecological monitoring was detailed in EM & A Manual of the project. In brief, the survey aimed to collect data on abiotic factors such as water quality, substratum characteristics, water flow as well as flora and fauna.
- 1.3 China Hong Kong Ecology Consultants Ltd. was committed by Allied Environmental Consultants Ltd (AEC) to undertake the ecological monitoring tasks for the project from December 2014.
- 1.4 This is the number 4 detailed ecological monitoring report summarizing the data collected from detailed surveys of July in 2016 and August in 2016. It contains the following subsections:
 - Summary of major points
 - Monitoring Methods and Results
 - Summary and Comments

2 Summary of Major Points

- Detailed monitoring surveys were undertaken in July of 2016 and August of 2016;
- Fauna and flora along the drainage project sections is in a process of reestablishing or restoration;
- All fauna are recorded increase in abundance and species richness compared with baseline level; and
- Two species of plant with conservation interest were recorded in the river.

3 Monitoring Methodology

3.1 Riparian Vegetation

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

3.2 Avifauna

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

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

3.3 Adult Odonata Survey

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

3.4 Aquatic Macro-invertebrates

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

3.5 Fish Population and Hong Kong Newt

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

Sampling was conducted at four proposed sampling locations at upper (T1), middle (T2), lower (T3) sections and reference site respectively. Those sampling sites covered major type of stream habitats, e.g. river pool and riffle (**Figure 1**). The number of the observed fish was estimated and recorded. Nomenclature and protection status of the species has followed those documented in the AFCD website (www.hkbiodiversity.net) and Lee *et al* (2004).

3.6 Abiotic Data Collection

3.6.1 Water Quality Monitoring

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

3.6.2 Sediment Characteristics

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

3.6.3 Water Flow

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

4 Monitoring Results

4.1 Vegetation

Detailed surveys were undertaken along the transect at She Shan River. In total, 77 flora species was recorded within the survey transects along the river course. With the comparison of 50 species recorded in baseline level, more species were recorded during detailed surveys including 2 species with conservation interest. They are *Mucuna championii* (Photo 1) and *Cibotium barometz* (Photo 2), were recorded in the adjacent woodland of the river, of which *Mucuna championii* was an Endangered species in China and *Cibotium barometz* was considered as vulnerable in China and protected under state protection (category II).

Middle to lower section of the river was made up with concrete so that only species with good acceptability could establish onto the river bed. In addition, vegetation in these sections were regularly got cleared by the workers or washed out by flooding (Photo 3). Only upper section could support more diverse vegetation (Photo 4), however, upper section is currently dominated by

an invasive species *Brachiaria mutica*. Most recorded species were wetland species. The height of the dominated riparian grass and herb species were in a range from 0.2m to 1m 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 riverbed and riparian habitat in upper sections and partially covered the riverbed in middle to lower section.



4.2 Fauna

4.2.1 Avifauna

An avifauna detailed surveys were undertaken along survey transects and at four selected point count locations. A total of 24 species of birds were recorded during the bird surveys. Bird's species composition in She Shan River has changed in terms of abundance and species richness towards the data collected from baseline to post-construction monitoring, more species and higher abundance recorded were related to the improved river's ecosystem, which provided dense vegetation as their habitats, as well as food source.

Some of wetland dependent species including *Ardeola bacchus* and *Egretta garzetta* are considered as Regional Concern by Fellowes *et al.* (2002), they were always found foraging in the river. Transect and Point Count locations were shown on **Figure 1.** Result of bird survey was presented in the **Table 4.3.**

4.2.2 Adult Odonata Survey

Odonata detailed surveys were performed and a list of recorded odonata species at Upper Lam Tsuen River is shown in **Table 4.4**. 14 species of odonata were recorded along the river transect, all recorded species were common and wide spread in Hong Kong. Relative high species richness of odonata was recorded compared with baseline level as river has become more steady and mature in terms of vegetation composition. In addition, most of the odonata species in Hong Kong are likely to emerge in wet season so that higher species richness in current wet season was due to seasonality (Wilson et al., 2003 & Tam et al., 2011). Odonata larvae were usually collected from kicking sampling. Sampling location was shown in **Figure 1**.

4.2.3 Aquatic Macro-invertebrates

The river benthic fauna collected was mainly comprised of insects, molluscs, crustaceans and as well as fish. Details of recorded benthic fauna refer to **Table 4.5**. Sampling location was shown on **Figure 1**.

4.2.4 Hong Kong Newt

During the survey, Hong Kong Newt was not captured. It is assumed that this species would get back to the terrestrial area during their non-breeding season from April to August (Dudgeon, 2003). Hong Kong Newt is listed in Wild Animals Protection Ordinance (Cap. 170) and classified as "Near Threatened" under IUCN Red List Status and as "Potential Global Concern" by Fellowes *et al.* (2002). Record of Hong Kong Newts can be referred to **Table 4.6.**

4.2.5 Fish Fauna

Fish surveys were performed at She Shan River and total 12 species of freshwater fish were recorded. Native fish *Zacco platypus* and *Oreochromis niloticus* were abundant species dominating in the river channel. Among the recorded fish, *Parazacco spilurus* is classified as "Vulnerable" in Red China Data Book, it was commonly observed along the river with low abundance. The composition of fish species was similar to baseline level with slightly increased by few species indicating that the improved river is stable and mature enough to support more species. Details of recorded of fish fauna refers to **Table 4.6.** Sampling location was shown on **Figure 1**.

4.3 Abiotic Data

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

The overall data collected from detailed survey and baseline lever were similar except the river substratum has changed significantly. The river substratum was comprised of over 30-80% stones or rocks in large proportion of the river sections with slow water flow (up to 0.2m/second at pool and 0.5m/second at riffle). Generally, the water was not pullted and nutrient levels were moderate

as a result of effluent from nearby cultivation lands, but the impact from the effluent is anticipated. Results of water test are presented in the **Table 4.7.**

5 Summary and Commentary

Detailed ecological monitoring surveys were carried out in July 2016 and August 2016. The relevant biotic and abiotic data was collected according to project specification and EM & A Manual. *Paramesotriton hongkongensis* was recorded with small abundance. Following the river became more stable and mature after the completion of construction, the species richness and abundance of fauna have increased compared with baseline level.

Aquatic plants and riparian vegetation were generally established at new drainage channel. Vegetation has completely covered the gabion wall mainly in upper sections and partially covered the river bed along the river channel. Higher diversity of vegetation was recorded compared with baseline level. Moreover, two conservation species, *Mucuna championii* and *Cibotium barometz* were recorded during the survey.

Most of the parameters are similar to baseline level except greatly change in river substratum.

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FIGURE

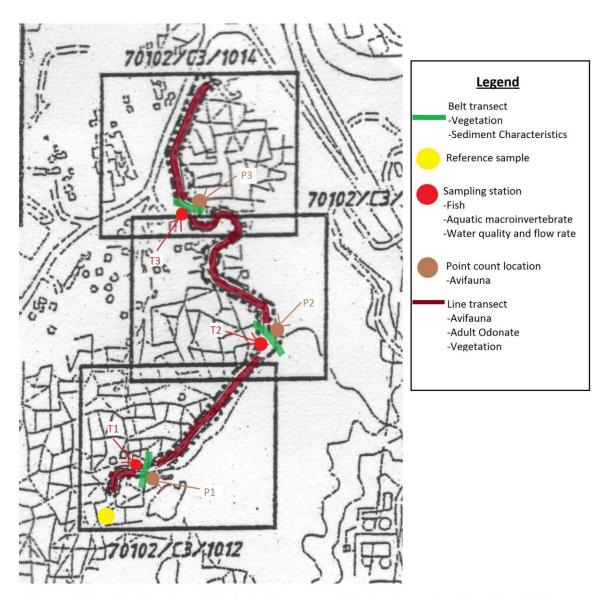


Figure 1. Sampling Location of Ecological Survey and Monitoring at She Shan River, Tai Po.

TABLE

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

Table 4.1. Flora species r	recorded along the She Shan River includi	ng riparian habitat.										
				Baseline	Detailed	survey 1	Detailed	survey 2	Detailed	survey 3	Detailed	l survey 4
	1	1	1	monitoring		<u> </u>		1		I		1
Family	Species name	Chinese name	Conservation Status	Jul to Aug 08	Dec-14	Jan-15	Jul-15	Aug-15	Dec-15	Jan-16	Jul-16	Aug-16
Riparian Plant												
Acanthaceae	Dicliptera chinensis	狗肝菜			+							
Acanthaceae	Asystasia micrantha	小花十萬錯									+	+
Actinidiaceae	Saurauia tristyla	水東哥									+	+
Acoraceae	Acorus gramineus	金錢蒲			+							
Amaranthaceae	Alternanthera philoxeroides	空心蓮子草		+	+						+	+
Amaranthaceae	Celosia argentea L.	青葙			+							
Apiaceae	Oenanthe javanica	水芹		+							+	+
Aquifoliaceae Araceae	Ilex rotunda Alocasia odora	鏃冬青 海芋		+	_	_	_	_	_	_	_	_
Araceae	Colocasia esculenta	学		+	+	+	+	+	+	+	+	+
Araceae	Syngonium podophyllum	合果芋		+	+							
Araceae	Pistia stratiotes	大薸				+	+	+	+	+	+	+
Araliaceae	Schefflera heptaphylla	鴨腳木									+	+
Asteraceae	Bidens alba	白花鬼針草		+	++	+	++	++	++	++	++	++
Asteraceae	Synedrella nodiflora	金腰箭		+	+		+	+	+	+	+	+
Asteraceae	Mikania micrantha	薇甘菊		+	++	++	++	++	++	++	++	++
Asteraceae	Erigeron karvinskianus	加勒比飛蓬		+	+		+	+	+	+		
Asteraceae	Eclipta prostrata	鱧腸		+	+	+	+	+	+	+	+	+
Asteraceae	Gynura divaricata	白子菜		ļ	+		+	+	+	+		
Asteraceae	Ageratum conyzoides	勝紅薊			+	+	+	+	+	+	+	+
Asteraceae	Emilia sonchifolia	一點紅			+	+	+	+	+	+	+	+
Asteraceae Asteraceae	E rechtites hieraciifolius	梁子菜			+		+	+	+	+	+	+
Asteraceae	Y oungia japonica S pilanthes paniculata	黄鶴菜 金鈕扣			±	+	±	±	+	±	+	±
Asteraceae	Gnaphalium pensylvanicum	赴葉鼠麴草			т	Т.	т	т	т.	т	+	+
Asteraceae	Soliva anthemifolia	裸柱菊									+	+
Asteraceae	Conyza sumatrensis	蘇門白酒草									+	+
Asteraceae	Wedelia trilobata	三裂葉蟛蜞菊									+	+
Athyriaceae	Callipteris esculenta	菜蕨		+	+	+	+	+	+	+	++	++
Begoniaceae	Begonia cucullata var.hookeri	四季秋海棠			+							
Blechnaceae	Blechnum orientale	烏毛蕨			+							
Brassicaceae	Nasturtium officinale	西洋菜		+	+	+	+	+	++	++	+	+
Brassicaceae	R orippa indica	塘葛菜			+	+	+	+	+	+	+	+
Brassicaceae	C apsella bursa-pastoris	齊菜			+						+	+
Caesalpiniaceae	Bauhinia championii	缺葉藤				+	+	+	+	+		
	Bauhinia glauca	羊蹄甲藤									+	+
Caryophyllaceae	Drymaria diandra	荷蓮豆		+		+	+	+	+	+	+	+
Caryophyllaceae	Myosoton aquaticum	鵝腸菜			+	+	+	+	+	+	+	+
Chenopodiaceae Commelinaceae	Chenopodium ficifolium Commelina diffusa	小藜		+	++++	+++	+	+	++	++	+	++
Convolvulaceae	Pharbitis nil	牽牛		+	_	***	***	***	***	***	***	***
Convolvulaceae	Ipomoea cairica	五爪金龍		+	+	+	+	+	+	+	+	+
Convolvulaceae	Ipomoea aquatica	蕹菜			_				+	+	+	+
Cucurbitaceae	Solena amplexicaulis	茅瓜										
Cuscutaceae	Cuscuta australis	南方菟絲子		1	1	+	+	+	+	+		1
Cyperaceae	Cyperus sp.	莎草			+	+	+	+	+	+		
Cyperaceae	Cyperus involucratus	風車草			+	+	+	+	+	+	+	+
Cyperaceae	Mariscus cyperoides	磚子苗									+	+
Cyperaceae	Kyllinga polyphylla	水蜈蚣									+	+
Dicksoniaceae	Cibotium barometz	金毛狗	Cap.567, VU, CII								+	+
Euphorbiaceae	Macaranga tanarius	血桐		+	+	+	+	+	+	+	+	+
Euphorbiaceae	Aporusa dioica	銀柴		+								
Fabaceae	Mucuna championii	港油麻藤	EN	+						+	+	+
Fabaceae	Pueraria lobata	野葛		ſ	++	+	++	++	++	++	++	++
Fabaceae	Sesbania cannabina	田菁		+	†							
Lauraceae Lauraceae	Cinnamomum burmannii Litsea monopetala	陰香 假柿樹		·	т						+	+
	ънзеи топорении	假忡悃 刨花潤楠		 	 						+	+
	Machilus pauhoi		1	ļ		 	-	-	 	 	<u> </u>	
Lauraceae	Machilus pauhoi Lygodium japonicum				+	l			l			
Lauraceae Lygodiaceae	Lygodium japonicum	海金沙		+	+							
Lauraceae		海金沙 白蘭		+	+						+	+
Lauraceae Lygodiaceae Magnoliaceae Malvaceae	Lygodium japonicum Michelia alba	海金沙 白蘭 尚梵天花		+	+	+	+	+	+	+	+	+
Lauraceae Lygodiaceae Magnoliaceae Malvaceae Malvaceae	Lygodium japonicum Michelia alba Urena lobata	海金沙 白蘭		÷	+ + + + + + + + + + + + + + + + + + + +	+	+	+	+	+	+	++
Lauraceae Lygodiaceae Magnoliaceae Malvaceae Malvaceae Minosaceae	Lygodium japonicum Michelia alba Urena lobata Hibiscus rosa-sinensia	海金沙 白蘭 肖梵天花 大紅花		+ + + + +	+ + + + + + + + +	+	+	+	+	+	+ +	+ + +
Lauraceae Lygodiaceae Magnoliaceae	Lygodium japonicum Michelia alba Urena lobata Hibiscus rosa-sinensia Mimosa pudica	海金沙 白蘭 均梵天花 大紅花 含羞草		+ + + +	+ + + + + + + + + + + + + + + + + + + +	+	+ + +	+ + +	+ + +	+ +	+ + + + +	+ + + + + + + + + + + + + + + + + + + +

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

				Baseline	Detailed	survey 1	Detailed	survey 2	Detailed	l survey 3	Detailed	survey 4
Family	Sancino momo	Chinese name	Conservation Status	monitoring Jul to Aug 08	Dec-14	Jan-15	Jul-15	Aug 15	Dec-15	Jan-16	Jul-16	Aug 16
	Species name	Cliniese name	Conservation Status	Jui to Aug 08	Dec-14	Jan-13	Jul-13	Aug-15	Dec-13	Jan-10	Jul-10	Aug-16
Moraceae	Ficus hispida	對葉榕		+	+	+	+	+	+	+	+	+
Moraceae	Ficus pumila	薜荔		+	+							
Moraceae	Ficus variolosa	變葉榕		+							+	+
Moraceae	Ficus variegata	青果榕				+	+	+	+	+	+	+
Musaceae	Musa paradisiaca	大蕉		+	+		+	+	+	+	+	+
Myrsinaceae	Maesa perlarius	鲫魚胆		+								
Myrtaceae	Cleistocalyx operculatus	水翁		+	+		+	+	+	+	+	+
Onagraceae	Ludwigia hyssopidolia	草龍			+		+	+	+	+	+	+
Onagraceae	Ludwigia erecta	美洲水丁香			++	+	+	+	+	+		
Oxalidaceae	Averrhoa carambola	楊桃		+								
Oxalidaceae	Oxalis corniculata	酢醬草					+	+	+	+	+	+
Oxalidaceae	Oxalis debilis	紅花酢漿草									+	+
Plantaginaceae	Plantago major	車前草			+						+	+
Poaceae	Panicum maximum	大黍		+	+	+	+	+	+	+	+	+
Poaceae	Panicum repens	枯骨草		+	+	+	+	+	+	+	+	+
Poaceae	Brachiaria mutica	巴拉草			+++	+++	+++	+++	+++	+++	+++	+++
Poaceae	Pennisetum purpureum	象草		++	+	++	+	+	+	+	+	+
Poaceae	Coix lacryma-jobi	薏苡		+	+	+	+	+	+	+	+	+
Poaceae	Microstegium ciliatum	剛秀竹		++	++	+	+	+	+	+	+	+
Poaceae	Miscanthus floridulus	五節芒			+	+	+	+	+	+	+	+
Poaceae	Pennisetum alopecuroides	狼尾草			+		+	+	+	+	+	+
Poaceae	Digitaria radicosa	紅尾翎				+	+	+	+	+		
Poaceae	Imperata cylindrica	大白茅									+	+
Portulacaceae	Portulaca oleracea	馬齒莧									+	+
Polygonaceae	Polygonum hydropiper	水蓼		+	+	+	+	+	+	+	+	+
Polygonaceae	Polygonum glabrum	光蓼			<u> </u>	<u> </u>	+	+	+	+	+	+
Polygonaceae	Polygonum chinense	火炭母		+	+		+	+	+	+	+	+
Polygonaceae	Rumex trisetifer	假菠菜			+	+	+	+	+	+	+	+
Polygonaceae	Polygonum lapathifolium	大馬蓼			+		+	+	+	+		
Polygonaceae	Polygonum multiflorum	何首烏									+	+
Rubiaceae	Hedyotis corymbosa	傘房花耳草									+	+
Rubiaceae	Hedyotis hedyotidea	牛白藤		+								
Sapindaceae	Dimocarpus longan	能眼		+								
Solanaceae	Solanum torvum	水茄		+	+	+	+	+	+	+	+	+
Solanaceae	Solanum americanum	少花龍葵			+							
Thelypteridaceae	Cyclosorus parasiticus	華南毛蕨				+	+	+	+	+	+	+
Ulmaceae	Celtis sinensis	朴樹		+	+		+	+	+	+	+	+
Ulmaceae	Celtis timorensis	樟葉朴		+								
Ulmaceae	Trema orientalis	異色山黃麻			+							
Ulmaceae	Trema tomentosa	山黄麻			+							
Urticaceae	Boehmeria nivea	苧麻		+	+						+	+
Urticaceae	Pilea microphylla	透明草		+	+		+	+	+	+		
Urticaceae	Pouzolzia zeylanica	霧水葛		+	+							
Verbenaceae	Vitex quinata	山牡荆		+								
Polygonaceae	Polygonum perfoliatum	杠板歸			+	+	+	+	+	+		
Verbenaceae	Lantana camara	馬纓丹		+	+	+	+	+	+	+	+	+
Floating Plant												
Araceae	Pistia stratiotes	大薸							+	+	+	+
Lemnaceae	Lemna minor	浮萍		İ	+							
Submerged Plant	•			•								
Hydrocharitaceae	Hydrilla verticillata	黑藻			+		+	+	+	+	+	+
No. of Species	1	1		48	74	42	59	59	61	62	77	77
Note:			1									

[&]quot;+" - Species exists in the study area

[&]quot;++" - Species common in the study area

[&]quot;+++" - Species abundant/dominant in study area

EN- Endanered in China

VU- Vulnerable in China

CII- Wild plant under State protection (category II)

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)

						Baseline	monitoring									Detailed	Survey 1									
		Stream		J	ul-08			Aı	ıg-08				Dec						Jan-						Jul-1	
_		Transect	P1		1	P3	P1		1	P3	T1		T	2	T3	3	T1		T	2	T:	3	T1		7	Γ2
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	96	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Commelinaceae	Commelina diffusa	節節草			0.2	2 20			10	6	1	10	1	50	0.1	. 2	0.5	10	0.8	70	0.3	40			0.3	2
Poaceae	Panicum repens	枯骨草	0.3	3	5																					
Asteraceae	Mikania micrantha	薇甘菊							0.2	7	0.3	5	1	15	0.3	2	0.4	10	0.5	15			0.4	10	0.4	10
Brassicaceae	Nasturtium officinale	西洋菜																								
Moraceae	Ficus microcarpa	細葉榕			0.7	1 5	i		0.6	7																
Moraceae	Ficus hispida	對葉榕			3	3 10			3	10																
Poaceae	Microstegium ciliatum	剛秀竹	0.5	5	5		0.5	3	3																	
Fabaceae	Pueraria lobata	野葛			0.3	3 5	0.5	3	3 0.3	5																
Araceae	Colocasia esculenta	芋							0.2	. 5																
Urticaceae	Boehmeria nivea	苧麻	1.5	5 3	0		2		7																	
Asteraceae	Bidens alba	白花鬼針草									1	2	0.5	5	0.8	10							0.9	15	5	
Poaceae	Pennisetum purpureum	象草	3	3 5	0 1	60) 3	80	2	60																
Poaceae	Coix lacryma-jobi	薏苡													15	1							1	. 2	2	
Amaranthaceae	Alternanthera philoxeroides	空心蓮子草	0.2	2 1	0		0.2		7																	
Poaceae	Panicum maximum	大黍																								
Moraceae	Broussonetia papyrifera	構樹																								
Polygonaceae	Polygonum chinense	火炭母																								
Onagraceae	Ludwigia hyssopidolia	草龍																								
Cyperaceae	Cyperus sp.	莎草																								
Poaceae	Miscanthus floridulus	五節芒																								
Poaceae	Brachiaria mutica	巴拉草									1.8	70	1.8	25	1.5	8	1.5	80	1	. 5	1	25	0.8	60) 1	50
Blechnaceae	Blechnum orientale	烏毛蕨																								
Poaceae	Pennisetum alopecuroides	狼尾草									2	10	3	2												
Araceae	Alocasia macrorrhizos	海芋																								
Lemnaceae	L emna minor	浮萍																								
Polygonaceae	Polygonum hydropiper	水蓼											1	1												
Cyperaceae	Cyperus involucratus	風車草											1.7	1					1.5	5					1.2	. :
Onagraceae	Ludwigia erecta	美洲水丁香									1.5	1			2	2 5					2	10				
Convolvulaceae	Ipomoea cairica	五爪金龍																							0.3	
Bare Gound												2		1		72		n		5		25		17	3	1/

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

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

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

				Detailed S	Survey 2											De	etailed Sur	vey 3										Detail	ed Survey 4				
		Stream					Αι	ıg-15					D	ec-15						Jan	n-16					Jul-16					Aug-16		
		Transect		T3	T1			T2	1	Γ3	T1			T2		T3	3	T1		Т	72	1	T3	T1		T2		T3	T1		T2	T3	3
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Heigh	nt(m) %	Heig	ht(m) %	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	% F	Height(m)	% F	Height(m) %	Height(m)	% He	eight(m) %	Height(m)) %
Commelinaceae	Commelina diffusa	節節草					0.3		5					0.3	10	0.2	5			0.3	5	0.2	5	5		0.3	5	0.2	8		0.3 5	5 (0.2
Poaceae	Panicum repens	枯骨草																															Т
Asteraceae	Mikania micrantha	薇甘菊			0.5	10	0.4	1 5	5			0.5	10	0.5	10			0.5	10	0.5	5								0.	5 3	0.5 5	5	\Box
Brassicaceae	Nasturtium officinale	西洋菜																		0.3	10					0.3	5				0.3 5	j	
Moraceae	Ficus microcarpa	細葉榕																															
Moraceae	Ficus hispida	對葉榕																								0.3	5	0.3	15		0.3 5	, (0.3
Poaceae	Microstegium ciliatum	剛秀竹																															Т
Fabaceae	Pueraria lobata	野葛																															Т
Araceae	Colocasia esculenta	芋																															П
Urticaceae	Boehmeria nivea	苧麻																															
Asteraceae	Bidens alba	白花鬼針草	0.3	3	2 0.9	15	5		0.5	2	2	1	30					1	30)				1	15					1 15			П
Poaceae	Pennisetum purpureum	象草																															
Poaceae	Coix lacryma-jobi	薏苡			1	2	2					1	2					1	2	2				1	10					1 10			Т
Amaranthaceae	Alternanthera philoxeroides	空心蓮子草																															Т
Poaceae	Panicum maximum	大黍																															Т
Moraceae	Broussonetia papyrifera	構樹																															
Polygonaceae	Polygonum chinense	火炭母																															Т
Onagraceae	Ludwigia hyssopidolia	草龍																															
Cyperaceae	Cyperus sp.	莎草																															Т
Poaceae	Miscanthus floridulus	五節芒																								0.4	10	0.5	25		0.4 15	, (0.5 2
Poaceae	Brachiaria mutica	巴拉草	0.0	8 1	0.9	60) 1	1 35	0.9	10)	0.3	30	1	5	1	1	0.3	15	5 1	5	1	5	0.3	15	1	5	1	10 0.	3 15	1 10)	1 1
Blechnaceae	Blechnum orientale	烏毛蕨																															Т
Poaceae	Pennisetum alopecuroides	狼尾草																															
Araceae	Alocasia macrorrhizos	海芋																															
Lemnaceae	L emna minor	浮萍																															
Polygonaceae	Polygonum hydropiper	水蓼																															
Cyperaceae	Cyperus involucratus	風車草					1.2	2 5	5					1.2	5	0.4	2			1.2	5	0.4	2	2			\Box						T
Onagraceae	Ludwigia erecta	美洲水丁香	1.5	5 5	0				1.5	50)					0.3	5					0.3	5	5		0.2	. 5	0.3	5		0.2 5	, (0.3
Convolvulaceae	Ipomoea cairica	五爪金龍					0.3	3 5	5					0.3	5					0.3	5					0.3	5				0.3 5	,	T
Bare Gound				3	8	13		40)	38	3		28		70		87		43	3	70		83	3	60		65		37	57	50)	1

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)

						Int oc			10 No		D	. 14	- 1	ed Survey			+		Det		T .		5	_	D-			Surve		n 16	\neg	i	T.,1		tailed S		
Common Name	Species name	Chinese nome	Status	Commor		Jul-08			ıg-08	+		:-14			Jan-15		+		Jul-15			Aug-1		+	Dec			<u> </u>		n-16	\dashv		Jul-1		\dashv		Aug-
ommon Name	Species name	Chinese name	Status	Commonness	<u> </u>	bundan P1			ndance P1 P	3 C		dance T2	T3	С	Abundar T1 T:		,		undance T1 T2	тэ		Abunda	nce T2 T3	C	_	dance T2		С		ndance T2	T3	С	Abund T1		T3		Abund T1
shy Drongo	Dicrurus leucophaeus	灰卷尾	SWV, LC	U	-	PI	P3	-	PI P	3 C	11	12	13	C	11 1.	2 1	, ,		11 12	13	-	11	12 13	+	11	1	13	-	11	1.2	13	- 	-11	12	13		-11
arn Swallow	Hirundo rustica	家燕	PM	С													-	+	2	2	++	4								\vdash	\Box	++	5	\neg	\neg	++	2
lack Drongo	Dicrurus macrocercus	黑卷尾	Sv	С		H							1 1											++			7			\Box	Πİ		\neg				寸
lack Kite	Milvus lineatus	麻鷹	R, RC, Cap.586	С				+		+				+														+		2							\neg
lack-necked Starling	Sturnus nigricollis	黑領椋鳥	R	С	+			+	2	+	2			+	2	2	- +	+	2	2	++		3	+				+		\Box		++	\neg		3	++	
orack-inroated	Garrulax chinensis	黑喉噪鶥	R	С	1 1																+		1							П	П	П	\neg				\Box
uzzaru (Commo	Buteo buteo	普通鵟	WV, Cap 586	U	1 1									+										+			1			П	П	П	\neg				\Box
Chestnut Bulbul	Hemixos castanonotus	栗背短腳鵯	R,WV	С	1 1																							++		6	П	\Box					
Chinese Bulbul	Pycnonotus sinensis	白頭鵯	R	С	+		2	+		+		2	2	+	1	3	+	+	2 2	2	++		2 2	++		3	2	++	2	2	4	++	3	3	3	++	2
Chinese Pond Heron	Ardeola bacchus	池鷺	R,RC	С	++		3	+	1 2	. +		1		++	1 2	2		+		1	+	1		+			1	+		1	П	+			1	+	
Chinese Hwamei	Garrulax canorus	書眉	R, Cap 586	C	1 1																									П	П	\Box					
Common Emerald Dove	Chalcophaps indica	綠翅金鳩	R,VU	S																	+		1							\Box		\neg					
Common Kingfisher	Alcedo atthis	普通翠鳥	R	С	1 1										1	1								+		1		+		1	\Box	$\overline{}$	\neg	\neg	\neg	+	\neg
Common Koel	Eudynamys scolopacea	噪鶥	R	C	1 1						1																	+		\vdash	\Box	+		\neg	\neg		\neg
Common Sandpiper	Actitis hypoleucos	磯鷸	WV&PM	C	1 1					_	_	+	\vdash		_	+		+	_	1	+		1	+				<u> </u>		\vdash	\vdash		-	\rightarrow	\dashv	-+	\dashv
Common Tailorbird	Orthotomus sutorius	長尾縫葉鶯	R	C	_	1		+	1	++	. 1	1		++	2 1	1		+	2 2	Ť	++	2	2	+				+	1	2	-	+	-	1	1	+	\dashv
Crested bulbul	Pycnonotus jocosus	紅耳鵯	R	C	+	-	\vdash	++	3 2	. ++	-	3	1 2	+++	3 2	4		++	5 5	7	+++		3 8	444	. 7	6	7	+++	3	12	5	+++	7	- 8	2		9
Crested Goshawk	Accipiter trivirgatus	紅井鴨 鳳頭鷹	R, CR, Cap.586	11	+	$\vdash\vdash$	-	7.7	J 2	. ++	· -	,	-	+++	J 2	- 4	+		2 3	1	777	,	- I °	+++		Ü		1	,	12	- 1	777		0	-	. 77	7
	Accipiter trivirgatus Acridotheres cristatellus		к, ск, сар.586	C	+	$\vdash\vdash$	-	_	2	, .	٠,	+	\vdash	+	+	3	+	. +	2 2	1	 . 	+	3	+	+		1	+	\vdash	$\vdash \vdash$	┌─┤	اب	,—+	-	-	+	2
Crested Myna		八哥	K, VU, LC, Cap	21	+	\vdash		+		+	1	+	\vdash	+	_		-	+	2 2	1	++		. 3	+	+		-	+	<u> </u>	$\vdash \vdash \vdash$	⊢. ⊢	_+	\longrightarrow	-3	3	+	
Crested Serpent Eagle	Spilornis cheela	蛇鵰	596	U	+	⊢		_	.	_	_	+	\vdash	- +	+	+	+	-	-	+	+	+	1	+-	1		-	+	<u> </u>	$\vdash \vdash$	1		, 	\dashv	\dashv	+	\dashv
Domestic pigeon	Columba sp.	得 Special control	R	C	+	2		+	1 2		_	1	\vdash	++	.	_	\perp	_	. -	1	$\vdash \vdash$	_	.	_	1	_	١.	_	_	₩	ابيا	\longrightarrow		\dashv	\dashv	-	\dashv
Ousky Warbler	Phylloscopus fuscatus	褐柳鶯	WV	U	+					++			\vdash	++	1 2	_		_	1 1	_	+	_	1	+	_	1	1	+		1	1	+		\rightarrow	\rightarrow	+	_
durasian tree sparrow	Passer montanus	麻鵲	R	С	\perp	Ш		+	2	++	+	5	3	+++	2 4	3	- +	++	3 3	3	++	_	2 4	++		6	5	++	3	4	6	++	5	2	3	++	3
ork-tailed Sunbird	Aethopyga christinae	叉尾太陽鳥	R	C																	+		2					+		oxdot	ш	ш					
reat Coucal	Centropus sinensis	褐翅鴉鵑	R,VU	C	+	1	2	+	1 1	+				+	1						+		1					+		1	igspace						
reat Egret	Ardea alba	大白鷺	R,RC	U										+																	ш		لــــــا				
reat Tit	Parus major(commixtus)	大山雀	R	С																											П	П	-				
Green Sandpiper	Tringa ochropus	白腰草鷸	PM&WV	U																				+			1				П	+	-		1	+	
Grey Heron	Ardea cinerea	蒼鷺	WV,PRC	С																										\Box	П	П					
Grey Wagtail	Motacilla cinerea	灰鶺鴒	WV	С						+		1		+	1	2		+		1	+		1	+	1		1	+		\Box	1	+	\neg	1	1	+	2
apanese White Eye	Zosterops japonica(simplex)	暗綠繡眼鳥	R	С						+			3	+		- 4		+	3	3	+	3	3	++		5	3	++		7	6	++	\neg	3		++	
arge Hawk Cuckoo	Cuculus sparverioides	鷹鵑	SV	U	1 1					+			1 1		1										1					\Box	\Box	-1					
ittle Egret	Egretta garzetta	小白鷺	R,RC	С	+			+		+	2	1	1	+	1 2	1		+		1	+		1	+	1			+	1	\Box	\Box	+			1	+	
Magpie Robin	Copsychus saularis	鵲鴝	R	С	+	1		+	1	+		1		+	1 1	2		+	2	2	+		1 2	+		2		+		2	2	+	2	2		+	2
Night Heron	Nycticorax nycticorax	夜鷺	R,LC	U	1 1																									\vdash	\Box	-1	-	\neg	\neg		\neg
Olive Backed Pipit	Anthus hodgsoni	樹鷚	WV	C	1 1																									\vdash	\Box	-1	-	\neg	\neg		\neg
Oriental Dollarbird	Eurystomus orientalis	三寶島	PM	II	1 1	H					_	1				_	_	-		1	+	_	1	+						\vdash	-	-	-	-+	-+		\dashv
Plaintive Cuckoo	Cacomantis merulinus	八聲杜鵑	SV	C	1 1					+	_		1 1		_	+			_		H .	_	-		1					\vdash	$\overline{}$	$\overline{}$	-	\rightarrow	-	_	\dashv
Plain Prinia	Prinia inornata	八耸杠胸	D	C	+ +	\vdash		-	+	+	_	+	+	-	+	+	+	+	_	+	\vdash	-	+	+	+		 	+	 	\vdash	\vdash	 		\dashv	\dashv	-	\dashv
	<u> </u>		K WALE DAY	C	+			-	-	+	+	+	\vdash		_	_	_		_	-			_	++			_	+		\vdash	\vdash	+	\rightarrow	\rightarrow	\rightarrow	+	\rightarrow
ted-flanked Bluetail	Tarsiger cyanurus	红脇藍尾鴝	WV&PM	C	+ - 1			_	-	+-	+	+	\vdash		_	_	_	_	,	-		,	_	+-			_	—		\vdash	 		\rightarrow	\rightarrow	\rightarrow	-	\rightarrow
Rufous-backed Shrike	Lanius schach	棕背伯勞	K	C	+	$\vdash\vdash$		+	-	+	_	+	\vdash	+	+	+	+	+	1	+	+	1		+	1		-	+	<u> </u>	$\vdash \vdash$	1	+	, 	\dashv	\dashv	+	\dashv
Rufous-capped Babbler	Stachyridopsis ruficeps	紅頭穗鶥	K	C .	+	$\vdash \vdash$	\vdash		+	+	_	1	\vdash	+	-	+		+	1		+		1	_	1		_	+	<u> </u>	$\vdash \vdash$	\vdash	+	\longrightarrow	\rightarrow	\rightarrow	+	\dashv
Scarlet Minivet	Pericrocotus speciosus	赤紅山椒鳥	R	C	+	\sqcup		_	_	4	4	1	\vdash			_		_		₩	$\vdash \vdash$	\dashv	+	4_	1		<u> </u>	_	<u> </u>	igspace	igspace	ightharpoonup	Д	\dashv	—	_	—
ooty-headed Bulbul	Pycnonotus aurigaster	白喉紅臀鵯	R	C	+	\sqcup		_	_	-	4	1	\vdash		_	_		_	_	₩	$\vdash \vdash$	_	+	4_	1		<u> </u>	_	!	\sqcup	اجہ	ightharpoonup	لیے	<u></u>	<u> </u>	_	<u></u>
potted Dove	Streptopelia chinensis	珠頸斑鳩	R	C	+	\sqcup	1	+	2 1	+	1	2	2	+	2 3			++	3 3	4	++	2	3 2	++	1	3	4	++	3	1	4	++	4	2	5	++	3
potted Munia	Lonchura punctulata	斑文鳥	R	U	\perp	Ш				+	5	1_	\sqcup	+	5					_	\sqcup							<u> </u>		ш	ш	لـــــا	Ш,				
tejneger's Stonechat	Saxicola stejnegeri	黑喉石䳭	PM,WV	C		Ш						_	\sqcup				_	_		_	\sqcup			+				+		ш	ш	لــــا				_	
Vhite Wagtail	Motacilla alba	白鶺鴒	WV	C				+	1	++	. 1	2	2	++	1 2	2		+	1	1	+		1	+	1		1	+	1	ш	1	+		1	1	+	1
Vhite-breasted Waterhen	Amaurornis phoenicurus	白胸苦惡鳥	R	C	+	$oxed{oxed}$		+					$oxed{\Box}$	+																╙	لـــــا	لــــا				+	[
ellow Bellid Prinia	Prinia flaviventris	黄腹鷦鶯	R	C								oxdot	\Box					+	1	1	+		1	+			匸	+	oxdot	LJ	匚	+	\Box		$oldsymbol{oldsymbol{oldsymbol{oldsymbol{\Box}}}$	+	\Box
Jumber of birds						5	8	П	15 1	0	15	19	15	T	15 10	5 1	7	T:	21 24	33		17	31 23		10	27	34		14	42	32	, T	26	26	25	Т	26
o. of species	1				11	4	4	-	10 6	5 21	-		7		10 13	_	1 1	_	10 12	_	-		19 8	_	4	8	12	27	_	13	_	21	6		_	_	9
	Winter visitor; PM – Passage mig	rant: C = Common: I	I _ Uncommon: S_	Scarce	11	7	7	10	10 0	, 21			I ' I	24	10 1.	, , ,			10 12	13	2.5	0	0	21	7	0	12	27		1.5				10	12	23	
occurred; ++, common; commonness and status we all bird species are under p indangered Species of Ania C: Regional concern Fellow C: Local Concern Fellow	es et al (2002) cern Fellowes et al (2002)	s in the the study area iodiversity website (v ction Ordinance (Cap	ı www.hkbiodiversity																																		

Table 4.4. Odonate species recorded at the She Shan River

					Baseline m	nonitoring	Detailed	Survey 1	Detailed	Sruvey 2	Detailed	Sruvey 3	Detailed	Sruvey 4
Species	Common name	Chinese name	Status	Commo nness	Jul-08	Aug-08	Dec-14	Jan-15	Jul-15	Aug-15	Dec-15	Jan-16	Jul-16	Aug-16
Agriocnemis pygmnalis	Wandering Midget	黄尾小蟌	NP	VC										
Brachythemis contaminata	Asian Amberwing	黃翅蜻	NP	VC										
Burmagomphus vermicularis	Dog-legged Clubtail	聯紋緬春蜓	P, LC											
Ceriagrion auranticum ryukyuanum	Orange-tailed Sprite	琉球橘黃蟌	NP	VC					+	+			+	+
Copera ciliata	Black-knees Featherlegs		NP	VC									+	+
Copera marginipes	Yellow Featherlegs	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	C					+	+			+	+
Ischnura senegalensis	Common Bluetail	褐斑異痣蟌	NP	VC										+
Nannophya pygmaea	Scarlet Dwarf	侏紅小蜻	NP	С		ĺ								
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		ĺ			+				+	+
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		ĺ								
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	4	2	2	13	13	2	3	14	14

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

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)

[&]quot;VC" – Very Common; "UC" – Uncommon; "C" - Common "+" – Species exists in the study area

[&]quot;++" – Species common in the study area

[&]quot;+++" – Species abundance in the study area

Table 4.5 Aquatic Macro invertebrates recorded at She Shan River.

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

				В	aseline	monitor	ing			D	etailed	Survey 1						D	etailed S	Survey 2						D	Detailed	Survey 3				Post con	structio	on moni	toring	Post cons	structio	n moni	toring
Species	Status usks donta woodiana 背角無齒蚌 NP uphalaria sp NP ia hainanensis NP iicula fluminea 河蜆 NP moides tuberculata 箱擬黑螺 NP acea canaliculata 蘋果螺 NP taia quadrata 田螺 NP cts iis sp NP monomus sp. 蟒幼虫 NP				1-08	Au	g-08		Dec-1	4			Jan-1	5			Jul-1	5			Aug-	15			Dec-	15			Jan-	16			Jul-1	16			Aug-	16	
		Status	Common - ness	Upper stream	Lower		Lower stream	Reference	T1	T2	Т3	Reference	T1	T2	Т3	Referenc	e T1	T2	Т3	Referenc	€T1	T2	Т3	Reference	T1	T2	Т3	Reference	e T1	T2	Т3	Reference	T1	T2	Т3	Reference	T1	T2	Т3
Mollusks	•	•	•	•	•			•	•		•		•		•		•		•				•			•				•	•	-	-	-					
Anodonta woodiana	背角無齒蚌	NP	VC																															T '					
Biomphalaria sp.		NP	VC	+	+	+	+		+				+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
Brotia hainanensis		NP	VC	+	+	+	+	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
Corbicula fluminea	河蜆	NP	VC			†				+			1					+				+				+			1	+	1		†	+				+	
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>			•		•							•	•	•												•		•		•	<u> </u>							
Baetis sp.		NP	VC	+	+	+	+			+				+				+				+				+				+				+				+	
Caenis sp.		NP	VC	+	+	+	+																													1			
Chironomus sp.	蠓幼虫	NP	VC	+	+	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Euphaea sp.		NP	VC							+				+			+	+			+	+			+	+			+	+			+	+			+	+	
Indobaetis sp.		NP	VC	+	+	+	+	+		+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
Odonate larvae		NP	VC																			+			+	+			+	+		<u> </u>	+	+	<u> </u>		+	+	
Orthetrum spp.		NP	VC					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Pseudagrion spp.		NP	UC					+		+		+	+	+			+	+			+	+			+	+			+	+			+	+			+	+	
Pseudocloeon sp.		NP	VC	+	+	+	+	+		+		+		+																		<u> </u>	<u> </u>	'	<u> </u>			'	
Serratella sp.		NP	VC	+	+	+	+						+	+			+				+				+				+				+				+		
Crustaceans																																							
Caridina cantanensis	廣東米蝦	NP	VC															+				+			+	+			+	+			+	+			+	+	
Cryptopotamon anacoluthon	鰓刺溪蟹	NP	VC																$ \neg $							+				+				+				+	
No. of species				12	12	12	12	11	12	15	8	13	11	15	10	13	14	14	10	15	14	15	10	9	14	16	6	9	14	16	6	9	14	16	6	9	14	16	6

Note: NP – Not protected in H₁P - protected species in Hong Kong

[&]quot;VC" - Very Common; "UC" - Uncommon; "C" - Common

[&]quot;+" - Species exists in the study area

[&]quot;++" - Species common in the study area

[&]quot;+++" - Species abundance in the study area

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

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

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

					Baseline 1	nonitorin	g		1	Detailed	1 Survey 1					Detailed	Survey 2						Detaile	ed Survey 3							Detaile	ed Survey 4			
				Ju	1-08	Aug	g-08	1	Dec-14		J	an-15			Jul-15			Aug-15			Dec-1	5			Jan-1	16			Jı	ıl-16			A	ug-16	
Species		Status	Commonness	Upper stream	Lower stream	Upper stream	Lower stream	Reference	eT1 T	2 T3	Reference	1 T2	T3	Referen	ce T1	T2 T3	Referenc	e T1	Г2 Т3	Reference	T1	T2	Т3	Reference	Т1	T2	Т3	Reference	T1	T2	Т3	Reference	T1	T2	Т3
Channa maculata	斑鱧	NP	C									+				+			+			+				+				+	T.			+	
Clarias gariepinus	革胡子鯰	NP	VC						+	+		+	-			+ +			+ +			+	+			+	+			+	+			+	
Gambusia affinis	食蚊魚	NP	VC			++	++	+	+ +	+ +	+	+ +	+	+	+	+ +	+	+	+ +	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Misgurnus anguillicaudatus	泥鳅	NP	C						-	+		+ +	-	+	+	+	+	+	+	+	+	+		+	+	+		+	+	+		+	+	+	
Oreochromis niloticus	尼羅口孵非鯽	NP	C			+	++	+	+ +	+ +	+	+ +	+	+	+	++ ++	+	++	++	+	++	++		+	++	++	+	+	++	++	+	+	++	++	+
Parazacco spilurus	異鱲	NP, V	C	+	++	+	++	+	+ +	+ +	+	+ +	+	+	+	+ +	+	+	+ +	+	+	+		+	+	+		+	+	+	+	+	+	+	+
Poecilia reticulata	孔雀花魚將	NP	VC			++	++			+			+			+ +			+ +			+	+			+	+			+	+			+	
Pterocryptis cochinchinensis	越南隱鰭鯰	NP	C						-	+		+	-			+			+			+													
Puntius semifasciolatus	七星魚	NP	C	+++	++	+++	+++	+	+ +	+ +	+	+ +	+	+	+	+ +	+	+	+	+	+	+		+	+	+		+	+	+		+	+	+	
Rhinogobius spp.	鰕虎魚	NP	C			+	+	+	+ +	+ +	+	+ +	+	+	+	+ +	+	+	+ +	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Xiphophorus hellerii	劍尾魚	NP	C	+	+	++	++	+	-	+ +	+	+	+	+	+	+ +	+	+	+	+	+	+		+	+	+		+	+	+		+	+	+	
Xiphophorus variatus	雜色劍尾魚	NP	C			+	+		+	+		+	-			+ +			+ +			+	+			+	+			+	+			+	
Zacco platypus	寬鰭鱲	NP	C	++	+	+	+	+	++ +	+ +	+	++ +-	+ +	+	+	++ +	+	+	++ +	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+
	•	2x2m fis	h number	80	60	80	60	60	50 5	50 40	50	40 40	0 50	15	8	15 8	20	10	20 10	55	50	40	35	55	45	35	25	20	15	20	3	20	10	15	5
Amphibian																																			
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 Protcetion 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

	Baseline monitoring			Detailed	Survey 1					Detailed	Survey 2					Detailed	Survey 3					Detailed	Survey 4		
Stream	Aug-08		Dec-14			Jan-15			Jul-15			Aug-15			Dec-15			Jan-16			Jul-16			Aug-16	
Replicate		T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
DO (mg/L)	8.9	8.5	8.6	8.6	8.6	8.6	8.7	8.2	8.0	8.2	8.1	8.0	8.1	8	7.8	8	7.8	7.7	7.8	8.1	8.0	8.0	8.0	8.1	8.0
pН	7.29	8.2	8.5	8.4	9.0	8.8	8.8	7.8	7.7	7.9	7.6	7.7	7.6	7.6	7.6	7.5	7.9	7.8	7.8	7.6	7.6	7.6	7.5	7.7	7.7
Nitrate (mg N/L)	0.5	0.4	0.4	0.4	0.4	0.5	0.4	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5
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	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	<0.1	0.02	0.02	0.02	0.03	0.03	0.03	0.02	0.02	0.02	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.02
Conductivity (µS/cm)	90	127	132	121	156	162	147	39	45	28	32	38	46	32	29	42	29	35	32	33	33	34	29	36	37
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.1-0.3	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	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)	0.4-0.5	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	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 (%)	55	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Stone (%)	25	80	80	30	80	80	30	80	80	30	80	80	30	80	80	30	80	80	30	80	80	30	80	80	30
Mud (%)	30	5	5	2	5	5	2	5	5	2	5	5	2	5	5	2	5	5	2	5	5	2	5	5	2
Concrete (%)	0	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63