Issue No. : Issue 1
Issue Date : Sep 2016
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

POST-CONSTRUCTION ECOLOGICAL MONITORING REPORT (NO. 26)

Prepared By:

ALLIED ENVIRONMENTAL CONSULTANTS LTD.

For:

Drainage Services Department

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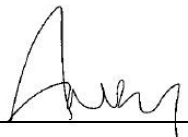
Checked: 

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BEAM Pro CAP

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

Post-Construction Ecological Monitoring Report (No. 26)
Upper Lam Tsuen River

February 2016

Prepared by: Mike pang		February 26, 2016
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		Ecology Team: China-Hong Kong Ecology Consultants

Post-Construction Ecological Monitoring Report (No. 26)

Upper Lam Tsuen River

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Introduction

1.1 Agreement No. CE65/2013(EP) Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River – Investigation required a post-construction ecological monitoring programme when the project completed. The collected data are mainly used to assess ecological recovery process and effectiveness of ecological migration proposed and enforced during the construction period.

1.2 The scope of the ecological monitoring was detailed in EM & A Manual of the project. In brief, the survey aimed to collect data on abiotic factors such as water quality, substratum characteristics, water flow as well as flora and fauna.

1.3 China Hong Kong Ecology Consultants Ltd. was committed by Allied Environmental Consultants Ltd (AEC) to undertake the ecological monitoring tasks for the project for December 2014.

1.4 This is the number 26 post-construction ecological monitoring report for the project conducted **on 12th of February 2016**. It contains the following subsections:

- Summary of major points
- Monitoring Methods and Results
- Summary and Comments

2 Summary of Major Points

- Field ecological monitoring was undertaken **on 12th of February 2016**;
- Fauna and flora along the drainage project sections is in a process of re-establishing or restoration; Plants on river bed was experiencing seasonal changes in abundance and phonological appearance;
- The species richness of odonata was low during current dry season;
- Bird diversity and abundance was in natural fluctuation;
- Abundance of a target river fauna (i.e. *Paramesotriton hongkongensis* adult was recorded in medium abundance along the Lam Tsuen River); and
- Fish abundance was higher than last month.

3 Monitoring Methodology

3.1 Riparian Vegetation

Riparian vegetation, including aquatic and emergent, was sampled using line transects along the affected river channel and riparian habitat. Species, relative abundance and average heights were recorded. Vegetation surveys were conducted at four selected belt transects with two located at the lower portion (T3 and T4) of the river channel and another two at the upper section (T1 and T2) of the river respectively (**Figure 1**). The belt transects was run across the river channel in order to collect quantitative data of the vegetation, e.g., species inventory, height, percentage cover. Qualitative data of plants was collected by recording plant species, relative abundance along line transect. Nomenclature and protection status of the species followed those documented in Lai *et al.* (2004) and Hong Kong Herbarium (2015).

3.2 Avifauna

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

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

3.3 Adult Odonata Survey

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

3.4 Aquatic Macro-invertebrates

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

3.5 Fish and Newt

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

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

3.6 Abiotic Data Collection

3.6.1 Water Quality Monitoring

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

3.6.2 Sediment Characteristics

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

3.6.3 Water Flow

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

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

4 Monitoring Results

4.1 Vegetation

Vegetation has generally covered the gabion along Lam Tsuen River. The vegetation coverage should be high in the river bed due to less flooding events in current season. However, the observed river was sparsely covered with vegetation in the river bed because vegetation clearance work has been carried out along the river (Photos 1-4). In total, 64 flora species were recorded within the survey transects along the river course. The dominant species *Brachiaria*

mutica was observed regenerating after large scale vegetation clearance. The recorded floras were generally in good health, and the height of the dominated riparian grass and herb species were in a range from 0.2m to 2m as observed along survey transect. Dominant flora species were shown in the **Table 4.1** marked with relative abundance sign "+++". Results of vegetation survey and belt transect survey were presented in **Table 4.1** and **Table 4.2**. **Figure 1** shows the transect line for the flora surveys.

4.2 Fauna

4.2.1 Avifauna

An avifauna survey was undertaken along survey transects and at four selected point count locations. In total, 22 species of birds were recorded during the bird survey and 6 of the total were wetland dependent species including *Motacilla cinerea*, *Egretta garzetta* (Photo 5), *Alcedo atthis* (Photo 6), *Ardeola bacchus* (Photo 7), *Tringa ochropus* and *Motacilla alba*, they were commonly observed foraging in the river channel. *Pycnonotus jocosus* was a dominated species along the river. All the birds in Hong Kong are under protection of Wild Animals Protection Ordinance (Cap. 170). Among the recorded species, *Ardeola bacchus* and *Egretta garzetta* are both classified as Regional Concern by Fellowes *et al.* (2002). Apart from above mentioned species, the others recorded in Lam Tsuen River were common species in Hong Kong. Transect and Point Count locations were shown on **Figure 1**. Result of bird survey was presented in the **Table 4.3**.

4.2.2 Adult Odonata Survey

Odonata survey was performed, and a list of recorded odonata species at Upper Lam Tsuen River is shown in **Table 4.4**. In total, only 1 odonata species were recorded during the survey and the recorded species was common species and widely distributed in Hong Kong. The result obtained this month is similar to previous surveys conducted in approximate period of last year. Species richness gradually decreased by 2 species in this month compared with last month. Low abundance of odonata as the peak of emergence has ended up in late autumn for most of the species in Hong Kong. The remaining species recorded from survey of this month have no specific emergence period, they could be seen throughout the year (Wilson *et al.*, 2004 & Tam *et al.*, 2011). Sampling location was shown in **Figure 1**.

4.2.3 Aquatic Macro-invertebrates

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

4.2.4 Hong Kong Newt

Surveys of Hong Kong Newt were conducted (Photo 8) at Upper Lam Tsuen River. Adult *Paramesotriton hongkongensis* was observed at the Lam Tsuen River where the habitat consisted of riparian vegetation during the survey (Photo 9). As the time of conducting survey was within the breeding period of Hong Kong Newt, their individuals were easier being found within a short transect distance compared to their non-breeding season. They were captured in all sampling points. They will stay in the river during their breeding period from September to March (Dudgeon, 2003). Riparian vegetation grown along the channel especially along water margin could provide shelter and breeding habitat for Hong Kong Newt. Hong Kong Newt is listed in Wild Animals Protection Ordinance (Cap. 170) and classified as "Near Threatened" under IUCN Red List Status and as "Potential Global Concern" by Fellowes *et al.* (2002). Record of Hong Kong Newts can be referred to **Table 4.6.**

4.2.5 River Fish Fauna

Fish surveys were performed at Upper Lam Tsuen River during field monitoring. In total, 16 species of freshwater fish, including species recorded from reference site, were recorded. *Oreochromis niloticus, Zacco platypus* (Photo 10) and *Rhinogobius* spp were the dominated species in the river. *Acrossocheilus parallens* is a rare freshwater fish that only recorded in few of reservoir catchments and streams in Hong Kong (Lee *et al.*, 2004) and listed as Global Concern by Fellowes (2002). It was observed along the surveyed river with pool. Except *Acrossocheilus parallens, Parazacco spilurus* is classified as Vulnerable in China Red Data Book and observed along the river with low abundance. Fish counting at 2 x 2 meter area were performed and number of fish individuals was recorded with increased abundance compared to last month due to less flooding events during current dry season. Details of recorded of fish fauna refers to **Table 4.6.** Sampling location was shown on **Figure 1**.

4.3 Abiotic Data

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

Generally, the water was clean and nutrient levels were generally low. Results of water test were presented in the **Table 4.7.**

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

5 Summary and Commentary

Post construction ecological monitoring was carried out in February 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. Mature individual of amphibian *Paramesotriton hongkongensis* were recorded

medium in abundance at river channel where the river margin covered with riparian vegetation. *Acrossocheilus parallens*, a rare freshwater fish species in Hong Kong, was observed at a few locations in the river channel with pool. Except *Acrossocheilus parallens, Parazacco spilurus* recorded in the river is also considered with conservation interest and observed along the river with low abundance. Decreased species richness of odonata and higher abundance of fishes were observed in this month due to seasonality.

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

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

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FIGURES

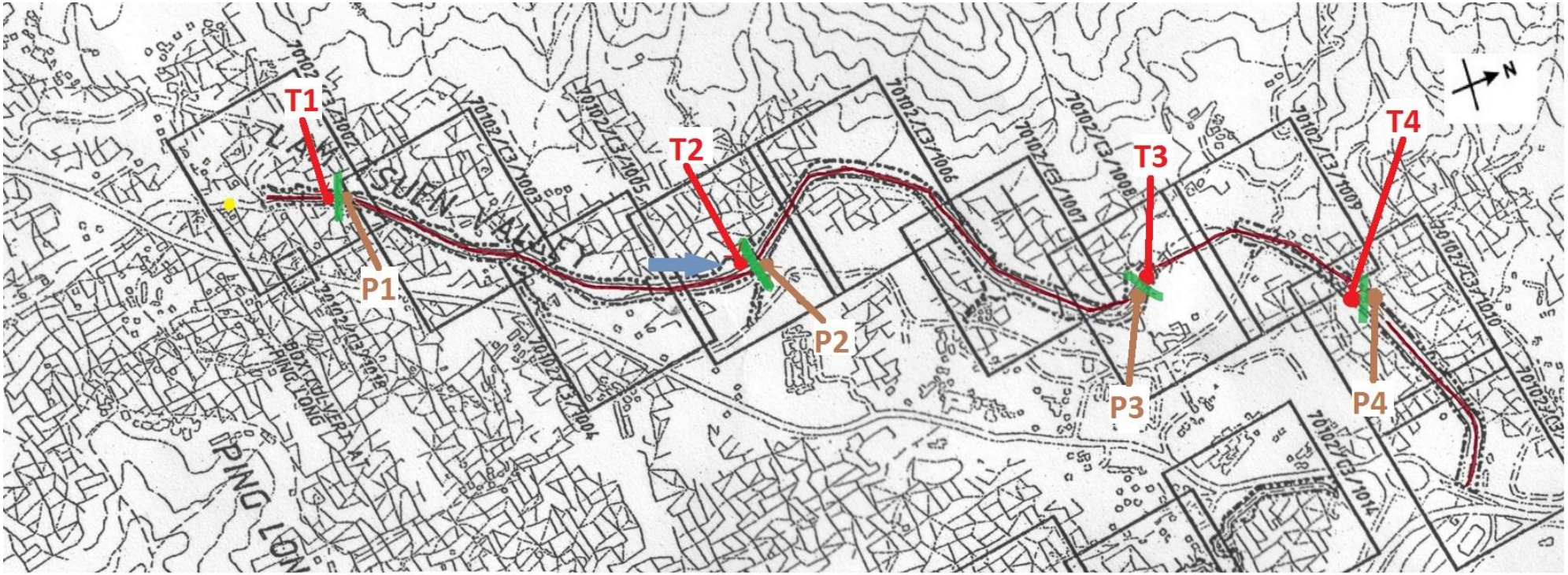

Figure1. Sampling Location of Ecological Survey and Monitoring at Upper Lam Tsuen River, Tai Po.

PHOTOS

	
Photo 1: General view of the river (Lower section)	Photo 2: General view of the river (Middle section)
	
Photo 3: General view of the river (Upper section)	Photo 4: Vegetation clearance at middle section
	
Photo 5: Avifauna - *Egretta garzetta*	Photo 6: Avifauna - *Alcedo atthis*

	
Photo 7: Avifauna - *Ardeola bacchus*	Photo 8: Kick sampling
	
Photo 9: Hong Kong Newt	Photo 10: Aquatic samples

TABLE

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

			Baseline monitoring	Impact monitoring						Impact monitoring				Post Construction monitoring			Post Construction monitoring							Post Construction monitoring									Post Construction monitoring						Post Construction monitoring			Post Construction monitoring			Post Construction monitoring		
Family	Species name	Species name in Chinese	Jul to Aug 08	Jan-09	Jul-09	Jan-10	Jul-10	Jan-11	Jul-11	Jan-12	Jul-12	Aug-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-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*	大漂		+		+	+	+							+	+				+	+	+	+	+	+		+	+	+																			
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*	蜈蚣菊		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	++	++	++	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Asteraceae	*Erechtites hieracifolia*	革命菜		+	+	+	+	+	+					+	+	+	+	+	+	+	+	+	+	+	+																									
Asteraceae	*Conyza canadensis*	小蓬草							+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Asteraceae	*Youngia japonica*	黃鵌菜												+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Asteraceae	*Eclipta prostrata*	鱧腸												+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Asteraceae	*Spilanthes paniculata*	金鈕扣												+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Athyriaceae	*Callipteris esculenta*	菜蕨														+	+	+	+	+	+	+	+	+	+	+	+	+																				
Blechnaceae	*Blechnum orientale*	烏毛蕨											+	+	+	+	+	+	+	+	+	+	+	+																									
Brassicaceae	*Cardamine flexuosa*	碎米薺		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Brassicaceae	*Nasturtium officinale*	西洋菜		+	+	+	+	+		+			+	+++	+++	+++	+	+	+	+	+	++	++	++	++	+	++	++	++	+	+	+	+	+	+	+	++	+	+	+	+	+	+	+	+	+	+	+
Brassicaceae	*Rorippa indica*	塘葛菜							+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Brassicaceae	*Capsella bursa-pastoris*	薺菜												+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Buddlejaceae	*Buddleja asiatica*	白背楓												+	+	+	+	+	+	+	+	+	+	+	+																									
Caesalpiniaceae	*Cassia alata*	翅荚決明	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Caryophyllaceae	*Drymaria cordata*	荷蓮豆												+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Caryophyllaceae	*Myosoton aquaticum*	鵝腸菜												+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
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															+	+	+	+	+	+	+	+	+																									
Cuscutaceae	*Cuscuta australis*	南方菟絲子																							+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
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	*Pueraria lobata var.thomsonii*	粉葛																							+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Magnoliaceae	*Michelia alba*	白蘭	+	+	+	+	+	+							+	+	+	+	+	+	+	+	+	+	+																									
Malvaceae	*Hibiscus rosa-sinensia*	大紅花															+	+	+	+	+	+	+	+																									
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	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Moraceae	*Ficus variegata*	青果榕																								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
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		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

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

			Baseline monitoring	Impact monitoring						Impact monitoring				Post Construction monitoring			Post Construction monitoring							Post Construction monitoring							Post Construction monitoring				Post Construction monitoring			Post Construction monitoring		
Family	Species name	Species name in Chinese	Jul to Aug 08	Jan-09	Jul-09	Jan-10	Jul-10	Jan-11	Jul-11	Jan-12	Jul-12	Aug-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16
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															+	+	+	+	+	+	+	+	+														
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															+	+	+	+	+	+	+	+	+														
Polygonaceae	*Polygonum lapathifolium*	大馬蓼															+	+	+	+	+	+	+	+	+														
Portulacaceae	*Portulaca oleracea*	馬齒莧							+	+	+						+		+	+	+	+	+	+	+														
Ranunculaceae	*Ranunculus sceleratus*	石龍芮														+	++	+	+			+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+
Rubiaceae	*Adina pilulifera*	水團花															+	+	+	+	+	+	+	+	+														
Sapindaceae	*Dimocarpus longan*	龍眼		+	+	+	+	+							+	+	+	+	+	+	+	+	+	+	+														
Scrophulariaceae	*Scoparia dulcis*	野甘草															+	+	+	+	+	+	+	+	+														
Scrophulariaceae	*Lindernia anagallis*	長蕊母草															+	+	+	+	+	+	+	+	+														
Solanaceae	*Solanum nigrum*	龍葵					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+														
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															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Thelypteridaceae	*Macrothelypteris torresiana*	普通針毛蕨															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ulmaceae	*Celtis sinensis*	朴樹	+	+	+	+	+	+						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ulmaceae	*Trema orientalis*	異色山黃麻																+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ulmaceae	*Trema tomentosa*	山黃麻										+	+	+	+	+	+	+	+	+	+	+	+	+	+														
Urticaceae	*Pilea microphylla*	透明草			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Verbenaceae	*Duranta erecta*	假連翹																								+	+	+	+	+	+	+	+	+	+	+	+	+
Urticaceae	*Boehmeria nivea*	苧麻			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Verbenaceae	*Lantana camara*	馬纓丹	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Floating Plant																																							
Lemnaceae	*Lemna minor*	浮萍		+											+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Submerged Plant																																							
Hydrocharitaceae	*Hydrilla verticillata*	黑藻														+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
No. of species			21	37	39	43	43	41	33	39	36	38	46	48	55	61	90	91	92	93	93	93	93	93	95	62	63	63	65	63	63	63	63	63	64	64	64	64	64

Note:

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

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

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

			Baseline monitoring								Impact monitoring				Impact monitoring				Impact monitoring								Impact monitoring							
		Stream	Jul-08				Aug-08				Jan-09				Jan-09				Jul-09								Jan-10							
		Transect	P1		P4		P1		P4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4	
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Poaceae	*Microstegium ciliatum*	蔄秀竹	0.4	40			0.4	40			0.4	30	0.5	5	1.5	5	1	15																
Fabaceae	*Pueraria lobata*	野葛	0.5	30			0.5	30							0.2	5			0.5	50			0.5	20					0.5	5			0.5	2
Poaceae	*Pennisetum purpureum*	象草	3	20			3	20																									2	5
Araceae	*Alocasia odora*	海芋	1	10			1	10			0.5	2					0.3	<1															1	5
Caesalpiniaceae	*Cassia alata*	翅荚決明			1.2	10			1.2	10																								
Magnoliaceae	*Michelia alba*	白蘭			6	10			6	10																								
Poaceae	*Brachiaria mutica*	巴拉草			1.2	70			1.2	70	1.5	30							0.5	20			1.2	5	1	40	0.8	40	0.9	50	1	15		
Moraceae	*Ficus hispida*	對葉榕									1.5	5							1.5	5	4	5									4	5	0.5	30
Asteraceae	*Mikania micrantha*	薇甘菊									0.4	20					0.5	1	0.5	5	0.3	15	0.5	30					0.5	30	0.3	25		
Musaceae	*Musa paradisiaca*	大蕉													3	5							1.5	5									0.5	2
Ulmaceae	*Celtis sinensis*	朴樹			6	10			6	10							4	10							6	50								
Araceae	*Pistia stratiotes L.*	大漂																											0.05	5				2
Urticaceae	*Boehmeria nivea*	苧麻																													0.3	5		
Asteraceae	*Bidens alba*	白花鬼針草											0.5	5													0.4	50			0.3	5		
Poaceae	*Coix lacryma-jobi*	薏苡																													1.5	2		
Solanaceae	*Solanum nigrum*	龍葵																																
Cyperaceae	*Cyperus flabelliformis*	風車草																															1	30
Poaceae	*Miscanthus floridulus*	五節芒																					1.2	2										
Euphorbiaceae	*Macaranga tanarius*	血桐											3	5																				
Asteraceae	*Wedelia chinensis*	蜈蚣菊															0.2	10																
Commelinaceae	*Commelina diffusa*	節節草															0.2	<1																
Asteraceae	*Erechtites hieracifolia*	革命菜															0.5	<1																
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																																
Onagraceae	*Ludwigia erecta*	美洲水丁香																																
Poaceae	*Pennisetum alopecuroides*	狼尾草																																
Amaranthaceae	*Celosia argentea*	青葙																																
Bare Gound												13		85		85		64		20		80		38		10		50		10		43		24

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

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

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

			Impact monitoring				Impact monitoring				Impact monitoring								Impact monitoring								Impact monitoring							
		Stream	Jul-10				Jul-10				Jan-11								Jul-11								Jan-12							
		Transect	T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4	
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Poaceae	*Microstegium ciliatum*	剛秀竹															0.8	5																
Fabaceae	*Pueraria lobata*	野葛			0.5	5													0.3	10							0.3	10					0.3	5
Poaceae	*Pennisetum purpureum*	象草											1.2	10							1.2	2	2.5	10					2.5	5	2.5	5		
Araceae	*Alocasia odora*	海芋					1	10									0.5	3															2	5
Caesalpiniaceae	*Cassia alata*	翅荚決明																																
Magnoliaceae	*Michelia alba*	白蘭																																
Poaceae	*Brachiaria mutica*	巴拉草	0.8	20	0.9	30	1	60	1.5	30	0.8	5			1	30	1	15	0.8	10	1	5					0.8	10	1	2	1.5	60		
Moraceae	*Ficus hispida*	對葉榕					4	5							4	5																		
Asteraceae	*Mikania micrantha*	薇甘菊			0.5	20	0.3	5			0.4	10	0.5	5	0.3	5	0.4	8	0.4	5	0.5	3			0.4	2	0.4	5	0.5	3			0.4	2
Musaceae	*Musa paradisiaca*	大蕉																																
Ulmaceae	*Celtis sinensis*	朴樹																																
Araceae	*Pistia stratiotes L.*	大漂																																
Urticaceae	*Boehmeria nivea*	苧麻																					1.5	10										
Asteraceae	*Bidens alba*	白花鬼針草	0.4	20					0.5	10	0.4	10	0.4	20	0.5	5			0.4	2	0.4	5	0.5	2	0.5	10	0.4	2	0.4	5	0.5	2	0.5	10	0.4	5	0.4	5	0.5	5	0.5	2
Poaceae	*Coix lacryma-jobi*	薏苡																																
Solanaceae	*Solanum nigrum*	龍葵																					2	3										
Cyperaceae	*Cyperus flabelliformis*	風車草															1	5																
Poaceae	*Miscanthus floridulus*	五節芒																																
Euphorbiaceae	*Macaranga tanarius*	血桐																																
Asteraceae	*Wedelia chinensis*	蜈蚣菊															0.5	5																
Commelinaceae	*Commelina diffusa*	節節草							0.5	20					0.4	10							0.4	10					0.3	3	0.4	5		
Asteraceae	*Erechtites hieracifolia*	革命菜																															0.4	2
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨															0.5	5															0.3	5
Convolvulaceae	*Pharbitis nil*	牽牛							0.5	10																								
Verbenaceae	*Lantana camara*	馬纓丹																					0.5	2										
Mimosaceae	*Leucaena leucocephala*	銀合歡																																
Brassicaceae	*Nasturtium officinale*	西洋菜																																
Onagraceae	*Ludwigia erecta*	美洲水丁香																																
Poaceae	*Pennisetum alopecuroides*	狼尾草																																
Amaranthaceae	*Celosia argentea*	青葙																																
Bare Gound				60		45		20		30		75		65		45		54		73		85		65		88		73		82		28		88		75		82		58		92

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

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

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

			Impact monitoring								Impact monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring							
		Stream	Aug-13								Dec-13								Jan-14								Feb-14								Mar-14							
		Transect	T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4	
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Poaceae	*Microstegium ciliatum*	蜈蚣竹			0.5	5																																				
Fabaceae	*Pueraria lobata*	野葛	0.3	15	0.3	5			0.3	10							0.3	10							0.3	10					0.3	10							0.3	10		
Poaceae	*Pennisetum purpureum*	象草															1.5	5							1.5	5					1.5	5							1.5	5		
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	0.8	5	1	10	1	15	0.8	10	0.8	10					0.8	10	0.8	10					0.8	10	0.8	10					1	13	1	13				
Moraceae	*Ficus hispida*	對葉榕																																								
Asteraceae	*Mikania micrantha*	薇甘菊	0.5	25	0.5	10	0.5	10	0.4	3	0.5	10	0.5	5	0.5	10	0.4	10	0.5	10	0.5	5	0.5	10	0.4	10	0.5	10	0.5	5	0.5	10	0.4	10	0.5	10	0.5	5	0.5	10	0.4	10
Musaceae	*Musa paradisiaca*	大蕉																																								
Ulmaceae	*Celtis sinensis*	朴樹																																								
Araceae	*Pistia stratiotes L.*	大漂																																								
Urticaceae	*Boehmeria nivea*	苧麻					0.8	2																																		
Asteraceae	*Bidens alba*	白花鬼針草	0.4	5	0.4	20	0.5	10	0.5	2	0.4	5			0.5	10			0.4	5			0.5	10			0.4	5			0.5	10			0.4	5			0.5	10		
Poaceae	*Coix lacryma-jobi*	薏苡																																								
Solanaceae	*Solanum nigrum*	龍葵																																								
Cyperaceae	*Cyperus flabelliformis*	風車草																																								
Poaceae	*Miscanthus floridulus*	五節芒																																								
Euphorbiaceae	*Macaranga tanarius*	血桐																																								
Asteraceae	*Wedelia chinensis*	蟛蜞菊																																								
Commelinaceae	*Commelina diffusa*	節節草													0.3	5							0.3	5							0.3	5							0.3	5		
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							1.2	5																																
Brassicaceae	*Nasturtium officinale*	西洋菜																																								
Onagraceae	*Ludwigia erecta*	美洲水丁香																																								
Poaceae	*Pennisetum alopecuroides*	狼尾草																																								
Amaranthaceae	*Celosia argentea*	青葙													1	2							1	2							1	2							1	2		
Bare Gound				50		55		68		70		75		85		73		75		75		85		73		75		75		85		73		75		72		82		73		75

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

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

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

			Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring							
		Stream	Apr-14								May-14								Jun-14								Jul-14								Aug-14							
		Transect	T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4	
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Poaceae	*Microstegium ciliatum*	剛秀竹	0.3	2							0.3	2							0.3	2							0.5	4							0.7	5						
Fabaceae	*Pueraria lobata*	野葛					0.3	5	0.3	5					0.3	5	0.3	5					0.3	5	0.3	5					0.3	5	0.3	5					0.3	5	0.3	5
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	0.5	5	0.6	10			0.6	10	0.5	5	0.6	6			0.6	6	0.5	5	0.6	8			0.6	6	0.6	10	0.8	10			0.8	6	0.6	10	0.8	12			0.8	8
Moraceae	*Ficus hispida*	對葉榕																																								
Asteraceae	*Mikania micrantha*	薇甘菊			0.3	5	0.3	15	0.3	5			0.3	5	0.3	15	0.3	5			0.3	6	0.3	15	0.3	8			0.3	6	0.3	15	0.3	8			0.3	6	0.3	15	0.3	8
Musaceae	*Musa paradisiaca*	大蕉																																								
Ulmaceae	*Celtis sinensis*	朴樹																																								
Araceae	*Pistia stratiotes L.*	大漂																																								
Urticaceae	*Boehmeria nivea*	苧麻																																								
Asteraceae	*Bidens alba*	白花鬼針草	0.5	20	0.5	10	0.7	15	0.6	10	0.5	20	0.5	10	0.7	15	0.6	10	0.5	20	0.5	10	0.7	15	0.6	10	0.5	20	0.5	12	0.7	18	0.6	10	0.5	20	0.6	12	0.7	15	0.6	10
Poaceae	*Coix lacryma-jobi*	薏苡																																								
Solanaceae	*Solanum nigrum*	龍葵																																								
Cyperaceae	*Cyperus flabelliformis*	風車草																																								
Poaceae	*Miscanthus floridulus*	五節芒																																								
Euphorbiaceae	*Macaranga tanarius*	血桐																																								
Asteraceae	*Wedelia chinensis*	蜈蚣菊																																								
Commelinaceae	*Commelina diffusa*	節節草	0.2	10			0.3	3			0.2	8			0.3	3			0.2	8			0.3	3			0.2	8			0.3	3			0.3	10			0.3	5		
Asteraceae	*Erechtites hieracifolia*	革命菜																																								
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨																																								
Convolvulaceae	*Pharbitis nil*	牽牛																																								
Verbenaceae	*Lantana camara*	馬纓丹																																								
Mimosaceae	*Leucaena leucocephala*	銀合歡																																								
Brassicaceae	*Nasturtium officinale*	西洋菜			0.2	5	0.2	50	0.2	5			0.2	2	0.2	2	0.2	1			0.2	2	0.2	2	0.2	1			0.3	1	0.3	1	0.3	1			0.3	1	0.3	1	0.3	1
Onagraceae	*Ludwigia erecta*	美洲水丁香																																								
Poaceae	*Pennisetum alopecuroides*	狼尾草																																								
Amaranthaceae	*Celosia argentea*	青葙																																								
Bare Gound				63		70		12		65		65		77		60		73		65		74		60		70		58		71		58		70		55		69		59		68

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

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

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

			Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring							
		Stream	Sep-14								Oct-14								Nov-14								Dec-14								Jan-15								Feb-15								Mar-15							
		Transect	T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4	
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height (m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Poaceae	*Microstegium ciliatum*	剛秀竹	0.7	5																																															
Fabaceae	*Pueraria lobata*	野葛					0.3	5	0.3	5							0.6	10							0.6	10							0.6	10							0.6	10							0.6	10
Poaceae	*Pennisetum purpureum*	象草																																			3	15									3	15		
Araceae	*Alocasia odora*	海芋															1.8	1							1.8	1							1.8	1							1.8	1							1.8	1
Caesalpiniaceae	*Cassia alata*	翅荚決明																																															
Magnoliaceae	*Michelia alba*	白蘭																																															
Poaceae	*Brachiaria mutica*	巴拉草	0.6	10	0.8	12			0.8	8	1	10	1.5	15	1.3	30	1	5	1	10	1.5	15	1.3	30	1	5	1	10	1.5	15	1.3	30	1	5	1	20	1	20	1.3	20	1	10	1	20	1	20	1.3	20	1	10	1	20	1.2	20	1.4	20	1	10
Moraceae	*Ficus hispida*	對葉榕																																															
Asteraceae	*Mikania micrantha*	薇甘菊			0.3	8	0.3	15	0.3	10	0.3	15	0.3	15	0.3	15	0.3	15	0.3	18	0.3	18	0.3	18	0.3	18	0.3	18	0.3	18	0.3	18	0.3	18	0.4	10	0.4	15	0.3	5	0.3	20	0.4	10	0.4	15	0.3	5	0.3	20	0.4	10	0.4	15	0.3	5	0.3	20
Musaceae	*Musa paradisiaca*	大蕉																																														
Ulmaceae	*Celtis sinensis*	朴樹																																														
Araceae	*Pistia stratiotes L.*	大漂																																														
Urticaceae	*Boehmeria nivea*	苧麻																																														
Asteraceae	*Bidens alba*	白花鬼針草	0.5	20	0.6	12	0.7	15	0.6	10	0.5	5	0.8	12	0.7	10			0.5	5	0.8	12	0.7	10			0.5	5	0.8	12	0.7	10			1	10	0.4	15	1	15			1	10	0.7	15	1	15			1	10	0.7	15	1	15		
Poaceae	*Coix lacryma-jobi*	薏苡									2	5							2	5							2	5																								
Solanaceae	*Solanum nigrum*	龍葵																																															
Cyperaceae	*Cyperus flabelliformis*	風車草																																															
Poaceae	*Miscanthus floridulus*	五節芒																																															
Euphorbiaceae	*Macaranga tanarius*	血桐																																															
Asteraceae	*Wedelia chinensis*	蜈蚣菊																																															
Commelinaceae	*Commelina diffusa*	節節草	0.3	10			0.3	5			0.3	10	0.8	20			0.3	20	0.3	12	0.8	22			0.3	20	0.3	12	0.8	22			0.3	20	0.4	10	0.4	20			0.3	20	0.5	10	0.5	20			0.3	20	0.5	10	0.4	20			0.3	20
Asteraceae	*Erechtites hieracifolia*	革命菜																																															
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨																																															
Convolvulaceae	*Pharbitis nil*	牽牛																																															
Verbenaceae	*Lantana camara*	馬纓丹																																															
Mimosaceae	*Leucaena leucocephala*	銀合歡																																															
Brassicaceae	*Nasturtium officinale*	西洋菜			0.3	1	0.3	2	0.3	1					0.3	2	0.1	1					0.3	2	0.1	1					0.3	2	0.1	1					0.3	10	0.1	15					0.3	10	0.2	15			0.3	10	0.2	15
Onagraceae	*Ludwigia erecta*	美洲水丁香									2	30	2	15	2	10	1.8	5	2	25	2	13	2	10	1.8	5	2	25	2	13	2	10	1.8	5	2	30	2	10	2	5	1.8	5	2	30	2	10	2	5	2	5	2	30	2	10	2	5	2	5
Poaceae	*Pennisetum alopecuroides*	狼尾草																																															
Amaranthaceae	*Celosia argentea*	青葙													1.5	15							1.5	15																												
Bare Gound				55		67		58		66		25		23		18		43		25		20		15		40		25		20		15		40		20		20		30		19		20		20		30		19		20		20		30		19

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

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

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

			Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring							
		Stream	Apr-15								May-15								Jun-15								Jul-15								Aug-15							
		Transect	T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4	
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Poaceae	*Microstegium ciliatum*	剛秀竹																																									
Fabaceae	*Pueraria lobata*	野葛							0.6	10							0.3	5						0.3	5	0.5	10					0.4	5	0.5	10					0.4	5
Poaceae	*Pennisetum purpureum*	象草					3	15							2	15							2	15																		
Araceae	*Alocasia odora*	海芋							1.8	1							0.8	1							0.8	1																
Caesalpiniaceae	*Cassia alata*	翅荚決明																																								
Magnoliaceae	*Michelia alba*	白蘭																																								
Poaceae	*Brachiaria mutica*	巴拉草	1.1	20	1.2	20	1.4	20	1	10	0.9	15	1	18	0.8	20	1	10	0.9	15	1	18	0.8	20	1	10	0.9	30	1.5	30	0.5	70	1	15	1	30	1.5	30	0.8	70	1	15
Moraceae	*Ficus hispida*	對葉榕																																								
Asteraceae	*Mikania micrantha*	薇甘菊	0.4	10	0.4	15	0.3	5	0.3	20	0.3	5	0.4	10	0.3	5	0.3	10	0.3	5	0.4	10	0.3	5	0.3	10	0.3	5	0.2	5	0.3	5	0.4	5	0.3	5	0.2	5	0.3	5	0.4	5
Musaceae	*Musa paradisiaca*	大蕉																																								
Ulmaceae	*Celtis sinensis*	朴樹																																								
Araceae	*Pistia stratiotes L.*	大漂																																								
Urticaceae	*Boehmeria nivea*	苧麻																																								
Asteraceae	*Bidens alba*	白花鬼針草	1	10	0.7	15	1	15			0.8	5	0.7	10	0.8	15			0.8	5	0.7	10	0.8	15							0.3	5							0.4	5		
Poaceae	*Coix lacryma-jobi*	薏苡																																								
Solanaceae	*Solanum nigrum*	龍葵																																								
Cyperaceae	*Cyperus flabelliformis*	風車草																																								
Poaceae	*Miscanthus floridulus*	五節芒																																								
Euphorbiaceae	*Macaranga tanarius*	血桐																																								
Asteraceae	*Wedelia chinensis*	蟛蜞菊																									0.3	20	0.2	10					0.4	20	0.2	10				
Commelinaceae	*Commelina diffusa*	節節草	0.5	10	0.4	20			0.3	20	0.5	5	0.4	10			0.3	10	0.5	5	0.4	10			0.3	10	0.3	20	0.2	20	0.2	5	0.4	20	0.3	20	0.2	20	0.2	5	0.4	20
Asteraceae	*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	10	0.2	15																																		
Onagraceae	*Ludwigia erecta*	美洲水丁香	2	30	2	10	2	5	2	5	1.2	10	1.1	5	1.4	5	1.3	5	1.2	10	1.1	5	1.4	5	1.3	5																
Poaceae	*Pennisetum alopecuroides*	狼尾草																													0.5	5	2	5					0.8	5	2	5
Amaranthaceae	*Celosia argentea*	青葙																																								
Bare Gound				20		20		30		19		60		47		40		59		60		47		40		59		15		35		13		55		15		35		13		55

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

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

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

			Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring							
		Stream	Sep-15								Oct-15								Nov-15								Dec-15								Jan-16								Feb-16							
		Transect	T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4	
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Poaceae	*Microstegium ciliatum*	蒯秀竹																																															
Fabaceae	*Pueraria lobata*	野葛	0.5	10					0.4	5	0.5	10					0.4	5	0.5	10					0.4	5	0.5	10					0.4	5	0.5	10					0.4	5	0.5	10					0.4	5
Poaceae	*Pennisetum purpureum*	象草																																															
Araceae	*Alocasia odora*	海芋																																														
Caesalpiniaceae	*Cassia alata*	翅荚决明																																														
Magnoliaceae	*Michelia alba*	白蘭																																														
Poaceae	*Brachiaria mutica*	巴拉草	1.1	30	1.5	35	1	70	1.2	15	0.7	5	1.5	30	1	60	1.2	15	0.7	5	1.5	35	1	60	1.2	20	0.8	5	1.5	35	1.2	60	1.2	20	0.3	5	0.3	20	0.3	30	0.3	10	0.3	5	0.3	20	0.3	30	0.3	10
Moraceae	*Ficus hispida*	對葉榕																																														
Asteraceae	*Mikania micrantha*	薇甘菊	0.3	5	0.2	5	0.3	5	0.4	5	0.3	5	0.2	5	0.3	5	0.4	5	0.3	5	0.2	5	0.3	5	0.4	5	0.3	5	0.2	5	0.3	5	0.4	5	0.3	5	0.2	5	0.3	5	0.4	5	0.3	5	0.2	5	0.3	5	0.4	5
Musaceae	*Musa paradisiaca*	大蕉																																														
Ulmaceae	*Celtis sinensis*	朴樹																																														
Araceae	*Pistia stratiotes L.*	大漂																																														
Urticaceae	*Boehmeria nivea*	苧麻																																														
Asteraceae	*Bidens alba*	白花鬼針草					0.4	5							0.4	10							0.4	10							0.4	10									0.4	10						
Poaceae	*Coix lacryma-jobi*	薏苡									1	5							1	5							1	5							1	5							1	5						
Solanaceae	*Solanum nigrum*	龍葵																																														
Cyperaceae	*Cyperus flabelliformis*	風車草					0.6	2																																								
Poaceae	*Miscanthus floridulus*	五節芒									1	10							1	10							1	10							1	10							1	10						
Euphorbiaceae	*Macaranga tanarius*	血桐																																														
Asteraceae	*Wedelia chinensis*	蟛蜞菊	0.4	20	0.2	10					0.4	5							0.4	5							0.4	5							0.4	5							0.4	5						
Commelinaceae	*Commelina diffusa*	節節草	0.3	20	0.2	20	0.2	5	0.4	20	0.3	10	0.2	20	0.2	5	0.4	20	0.3	10	0.2	20	0.2	5	0.4	25	0.3	10	0.2	20	0.2	5	0.4	25	0.3	10	0.2	20	0.2	5	0.4	25	0.3	10	0.2	20	0.2	5	0.4	25
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																																														
Onagraceae	*Ludwigia erecta*	美洲水丁香																																														
Poaceae	*Pennisetum alopecuroides*	狼尾草					0.8	5	2	5					1.5	10	2	5					1.5	10	2	5					1.5	10	2	5							1.5	10	2	5						
Amaranthaceae	*Celosia argentea*	青葙													0.4	5							0.4	5							0.4	5							0.4	5						
Acanthaceae	*Dicliptera chinensis*	狗肝菜									0.3	20							0.3	20							0.3	20							0.3	20							0.3	20						
Bare Gound				15		30		13		55		30		45		20		55		30		40		20		45		30		40		20		35		30		55		50		45		30		55		50		45

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)

					Post construction monitoring				
Common Name	**Species name**	**Chinese name**	**Status**	**Commonness**	Feb-16				
					Abundance				
					C	T1	T2	T3	T4
Barn Swallow	*Hirundo rustica*	家燕	PM	C					
Black Drongo	*Dicrurus macrocercus*	黑卷尾	Sv	C					
Black Kite	*Milvus lineatus*	麻鷹	R, RC, Cap.586	C					
Black-faced bunting	*Emberiza spodocephala*	灰頭鵐	WV&PM	C					
Black-necked Starling	*Sturnus nigricollis*	黑領椋鳥	R	C	++			2	3
Black-winged Cuckoo-shrike	*Coracina melaschistos*	暗灰鵙鶲	PM	C					
Brown Shrike	*Lanius cristatus*	紅尾伯勞	PM	C					
Buzzard (Common Buzzard)	*Buteo buteo*	普通鵟	WV,Cap.586	C					
Chinese Bulbul	*Pycnonotus sinensis*	白頭鵯	R	C	++	3	2		3
Chinese Pond Heron	*Ardeola bacchus*	池鷺	R,RC	C	+			1	1
Common Kingfisher	*Alcedo atthis*	普通翠鳥	R	C	+				2
Common Koel	*Eudynamys scolopacea*	噪鵑	R	C	+	1			
Common Sandpiper	*Actitis hypoleucos*	磯鷸	WV&PM	C					
Common Tailorbird	*Orthotomus sutorius*	長尾縫葉鶯	R	C	++	1	1		
Crested bulbul	*Pycnonotus jocosus*	紅耳鵯	R	C	+++	5	5	5	10
Crested Goshawk	*Accipiter trivirgatus*	鳳頭鷹	R, CR, Cap.586	U					
Crested Myna	*Acridotheres cristatellus*	八哥	R	C	++	2	2		
Crested Serpent Eagle	*Spilornis cheela*	蛇鵰	R, VU, LC	U					
Daurian redstart	*Phoenicurus auroreus*	北紅尾鴝	WV	C	+				
Domestic pigeon	*Columba sp.*	鴿	R	C					
Dusky Warbler	*Phylloscopus fuscatus*	褐柳鶯	WV	C	+				
Eurasian tree sparrow	*Passer montanus*	麻鵲	R	C	++		3	2	4
Great Coucal	*Centropus sinensis*	褐翅鴉鵑	R,VU	C					
Great Tit	*Parus major(commixtus)*	大山雀	R	C					
Green Sandpiper	*Tringa ochropus*	白腰草鷸	PM&WV	C	+				
Grey Heron	*Ardea cinerea*	蒼鷺	WV,PRC	C					
Grey Wagtail	*Motacilla cinerea*	灰鶺鴒	WV	C	+	1		1	1
Japanese White Eye	*Zosterops japonica(simplex)*	暗綠繡眼鳥	R	C	++	2	1	5	5
Jungle Crow	*Corvus macrorhynchus*	大咀烏鴉	R	C					
Large Hawk Cuckoo	*Cuculus sparverioides*	鷹鵑	SV	U					
Lesser Coucal	*Centropus bengalensis*	小鴉鵑	R, VU	C					
Little Egret	*Egretta garzetta*	小白鷺	R, RC	C	+		1		1
Great Egret	*Ardea alba*	大白鷺	R,WV, RC	C					
Little Swift	*Apus affinis*	小白腰雨燕	R,SpM	C	++				
Magpie	*Pica pica*	喜鵲	R	C					

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)

					Post construction monitoring				
Common Name	**Species name**	**Chinese name**	**Status**	**Commonness**	Feb-16				
					Abundance				
					C	T1	T2	T3	T4
Magpie Robin	*Copsychus saularis*	鵲鴝	R	C	+	1	2		2
Mandarin Duck	*Aix galericulata*	鴛鴦	WV	U					
Masked Laughing Thrush	*Garrulax perspicillatus*	黑臉噪鸝	R	C					
Night Heron	*Nycticorax nycticorax*	夜鷺	R&WV, LC	C					
Northern Shoveler	*Anas clypeata*	琵嘴鴨	WV	C					
Olive Backed Pipit	*Anthus hodgsoni*	樹鷚	WV	C					
Plaintive Cuckoo	*Cacomantis merulinus*	八聲杜鵑	SV	C					
Red-billed Blue Magpie	*Urocissa erythrorhyncha*	紅咀藍鵲	R	C					
Red-flanked Bluetail	*Tarsiger cyanurus*	紅脇藍尾鴝	PM&WV	C					
Rufous Turtle Dove	*Streptopelia orientalis*	山斑鳩	R	C					
Rufous-backed Shrike	*Lanius schach*	棕背伯勞	R	C	+			1	1
Rufous-capped Babbler	*Stachyridopsis ruficeps*	紅頭穗鸝	R	C					
Scarlet Minivet	*Pericrocotus flammeus*	赤紅山椒鳥	R	C					
Siberian Stonechat	*Saxicola maurus*	黑喉石鵐	WV	C	+		1		
Sooty-headed Bulbul	*Pycnonotus aurigaster*	白喉紅臀鵯	R	U					
Spotted Dove	*Streptopelia chinensis*	珠頸斑鳩	R	C	++	1	2	1	6
Spotted Munia	*Lonchura punctulata*	斑文鳥	R	C					
Velvet-fronted Nuthatch	*Sitta frontalis*	絨額鴷	R	C					
White Wagtail	*Motacilla alba*	白鶺鴒	WV	C	+	1	1	1	
White-breasted Waterhen	*Amaurornis phoenicurus*	白胸苦惡鳥	R	C					
White-throated Kingfisher	*Halcyon smyrnensis*	白胸翡翠	R, LC	C					
White-rumped Munia	*Lonchura striata*	白腰文鳥	R	C					
Yellow Bellid Prinia	*Prinia flaviventris*	黃腹鷦鶯	R	C	+				
Yellow Wagtail	*Motacilla flava*	黃鶺鴒	WV&PM	U					
Zitting cisticola	*Cisticola juncidis*	棕扇尾鶯	WV&PM	C					
Number of birds						18	21	19	39
No. of species					22	10	11	9	12

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. Odonate species recorded at the Upper Lam Tsuen River

					Baseline monitoring		Impact monitoring								Impact monitoring		Post construction monitoring						
Species name	Common name	Chinese name	Status	Commonness	Jul-08	Aug-08	Jan-09	Jul-09	Jan-10	Jul-10	Jan-11	Jul-11	Jan-12	Jul-12	Aug-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14
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	紅蜻	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	烏嶺原蟌	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	3	4	0	6	0	7	1	7	5	3	2	1	3	12	9	14	13

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

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

"+" – Species exists in the study area

"++" – Species common in the study area

"+++" – Species abundant/dominant in study area

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

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

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

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

					Post construction monitoring							Post construction monitoring							Post construction monitoring				
Species name	Common name	Chinese name	Status	Commonness	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-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	紅蜻	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	暮尾蟌	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					15	11	13	9	4	3	2	4	9	11	13	14	15	13	9	7	2	3	1

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

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

"+" – Species exists in the study area

"++" – Species common in the study area

"+++" – Species abundant/dominant in study area

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

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

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

Table 4.5 Aquatic Macro invertebrates recorded at Lam Tsuen River

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

				Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring				
				Oct-15					Nov-15					Dec-15					Jan-16					Feb-16				
		Sampling point		Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4
Species name	Chinese name	Status	Commonness																									
Molluscs																												
Biomphalaria sp.	--	NP	VC					+					+					+					+					+
Brotia hainanensis	--	NP	VC	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
Melanoides tuberculata	瘤擬黑螺	NP	VC				+	+				+	+				+	+				+	++				+	++
Pomacea canaliculata	蘋果螺	NP	VC	++	++	++	++	+++	++	++	++	++	+++	++	++	++	++	+++	++	++	++	++	+++	++	++	++	+++	+++
Radix plicatulus	羅白螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Sinotaia quadrata	田螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Insects																												
Baetis sp.	--	NP	VC	+			+	+	+			+	+	+			+	+	+			+	+	+			+	+
Caenis sp.	--	NP	VC											+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Chironomus sp.	蠓幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+		+	+	+	+	
Electrogenas sp.	--	NP	VC	+	+	+	+		+	+	+	+		+	+	+			+	+	+			+	+	+		
Hydropsyche sp.	--	NP	VC	+	+	+			+	+	+			+	+	+		+	+	+	+		+	+	+	+		+
Indobaetis sp.	--	NP	VC	+	+	+		+	+	+	+		+				+					+					+	
Mnais sp.	--	NP	VC				+					+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Orthetrum sp.	--	NP	VC			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+
Crustaceans																												
Caridina cantanensis	廣東米蝦	NP	VC	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
Cryptopotamon anacoluthon	鰓刺溪蟹	NP	VC				+	+				+	+				+	+				+	+				+	+
Macrobrachium hainanense	海南沼蝦	NP	VC	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+
Somanniathelphusa zanklon	束腰蟹	NP	VC																									
No. of species				11	9	11	13	13	11	9	11	13	13	12	10	11	13	13	12	10	11	13	13	12	10	11	13	13

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

Reference point was the sampling location outside the works area.

Table 4.6 Fish species and amphibians at Upper Lam Tsuen River

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

				Baseline monitoring				Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring				
				Jul-08		Aug-08		Jan-09					Jul-09					Jan-10					Jul-10					Jan-11					Jul-11					Jan-12					Jul-12				
			Sampling point	Upper stream	Lower stream	Upper stream	Lower stream	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4
Species	Chinese name	Status	Commonnes																																											
Fish																																														
Acrossocheilus parallens	側條光唇魚	P, PGC	R		+		+				+					+																													
Channa maculate	斑鱧	NP	C				+																																						
Cirrhina molitorella	鯪魚	NP	C																					+				+																	
Clarias fuscus	胡子鯰	NP	C																						+																				
Cyprinus carpio var. viridiviolaceus	錦鯉	NP	C																						+																				
Gambusia affinis	食蚊魚	NP	VC			+	+	+			+	++	+		+	+		+					+		+	++	++	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+
Liniparhomaloptera disparis	擬平鰍	NP	C																																									
Misgurnus anguillicaudatus	泥鰍	NP	C	+		+																	+			+						+					+								
Oreochromis niloticus	尼羅口孵非鯽	NP	C		+		+									+									+	+	++				+	+	+	+	+	+	+	+	+	+	+	+	+	+
Parazacco spilurus	異鱲	V and NP	C	+		+																	+	+				+																	
Poecilia reticulate	孔雀花魚將	NP	VC			+	+								+										+	+				+					+										
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	C		+	+	+	++	++	++	+		++	++	+	+	+	++	++				++	+++	+	+		++	+				++	+				+					+				
Pterocryptis cochinchinensis	黃鮠	NP	C																																									
Puntius semifasciolatus	七星魚	NP	C	++	+	++	+	+	+		++					+	++						+	+	+	+	+	+				+	+				+					+	+	+		
Rhinogobius spp.	鰕虎魚	NP	C/UN/R		+	+	+	+	+		+			+					+					+	+	+	+	+	+	+	+		+					+	+	+			+	+	+	+
Schistura fasciolata	橫紋南鰍	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 fish counting		No. of fish		70	60	75	60	38	45	40	40	8	38	20	5	15	7	38	20	5	15	7	32	12	6	10	20	30	22	10	7	5	10	4	2	0	0	6	3	1	0	0	8	5	2	0	0
No. of species				5	8	11	12	7	7	4	8	2	5	3	3	5	6	5	3	2	2	2	9	8	10	13	9	9	7	4	4	8	10	8	9	5	3	12	8	6	4	3	14	10	10	4	3
Amphibian																																														
Paramesotriton hongkongensis	香港瘰螈	P (Cap 170, NT, PGC)	R	+		+	+	+	+			+	+				+	+	+		+	+	+					+			+	+						+			+	+			+	
Fejervarya limnocharis	澤蛙	NP	VC																																										
No. of species				1	0	1	1	1	1	0	0	1	1	0	0	0	1	1	1	0	1	1	1	0	0	0	0	1	0	0	1	0	0	0	0	0	1	0	1	1	0	0	0	0	1	0

Note: NP – Not protected in Hong Kong

“VC” – Very Common; “UC” – Uncommon; “C” - Common; "R" - Rare

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

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

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

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

"NT" - Near Treatened in IUCN Red List Status

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

Table 4.6 Fish species and amphibians at Upper Lam Tsuen River

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

				Impact monitoring					Impact monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring				
				Aug-13					Dec-13					Jan-14					Feb-14					Mar-14					Apr-14					May-14					Jun-14					Jul-14					Aug-14					Sep-14				
			Sampling point	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4
Species	Chinese name	Status	Commonnes																																																				
Fish																																																						
Acrossocheilus parallens	側條光唇魚	P, PGC	R	+	+	+			+	+	+	+		+	+	+	+		+	+	++	+++	+	+	++	++	+++	++		++	++	+++	++		+	+	+	+		+	++	++	++		++	++	++	++	+		++	++	++	+		++	++	++	++	+
Channa maculate	斑鱧	NP	C																																																			
Cirrhina molitorella	鯪魚	NP	C																						+																												
Clarias fuscus	胡子鯰	NP	C	+					+		+			+			+		+					+			+	+			+	+							+					+										+
Cyprinus carpio var. viridiviolaceus	錦鯉	NP	C								+					+					+					+																												
Gambusia affinis	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Liniparhomaloptera disparis	擬平鰍	NP	C																				+	+	+	+		+	+	+	+		+	+	+			+	+	+			+	+	+			+	+	+	+	
Misgurnus anguillicaudatus	泥鰍	NP	C	+					+					+			+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Oreochromis niloticus	尼羅口孵非鯽	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Parazacco spilurus	異鱲	V and NP	C	+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poecilia reticulate	孔雀花魚將	NP	VC	+	+	+										+	+								+	+	+				+	+								+											+	+	+	+
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	C	+					+					+					+	+	+			+	+	+				+	+			+	+				+	+				+	+	+			+	+	+	+	
Pterocryptis cochinchinensis	黃鮠	NP	C						+					+			+		+			+		+			+					+					+					+					+					+	+	+	
Puntius semifasciolatus	七星魚	NP	C	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Rhinogobius spp.	鰕虎魚	NP	C/UN/R	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Schistura fasciolata	橫紋南鰍	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 fish counting		No. of fish		5	2	3	2	3	5	2	3	2	3	6	20	60	20	10	16	40	70	40	30	60	70	80	90	80	40	50	60	60	50	20	30	30	20	20	6	12	10	6	8	8	16	15	5	10	10	12	18	10	12	20	30	30	20	20
No. of species				14	11	11	6	4	14	9	12	8	6	14	10	13	11	6	14	10	15	11	7	15	11	16	14	11	11	12	16	14	12	13	13	13	12	11	10	12	13	11	11	11	12	13	12	11	10	12	13	13	11	11	13	14	15	13
Amphibian																																																						
Paramesotriton hongkongensis	香港瘰螈	P (Cap 170, NT, PGC)	R	+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Fejervarya limnocharis	澤蛙	NP	VC																																																		
No. of species				1	0	1	1	0	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Note: NP – Not protected in Hong Kong

“VC” – Very Common; “UC” – Uncommon; “C” - Common; "R" - Rare

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

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

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

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

"NT" - Near Treatened in IUCN Red List Status

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

Table 4.6 Fish species and amphibians at Upper Lam Tsuen River

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

				Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring				
				Oct-14					Nov-14					Dec-14					Jan-15					Feb-15					Mar-15					Apr-15					May-15					Jun-15					Jul-15				
			Sampling point	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4
Species	Chinese name	Status	Commonnes																																														
Fish																																																	
Acrossocheilus parallens	側條光唇魚	P, PGC	R		++	++	++	+		++	++	++	++		++	++	++	++		++	++	++	++		++	++	++	++		++	++	++	++		++	++	++	++		+	+	++	++		+	+	+	+	+
Channa maculate	斑鱧	NP	C																																														+
Cirrhina molitorella	鯪魚	NP	C																																														
Clarias fuscus	胡子鯰	NP	C					+					+					+					+					+					+					+					+					+				+
Cyprinus carpio var. viridiviolaceus	錦鯉	NP	C																																				+												
Gambusia affinis	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Liniparhomaloptera disparis	擬平鰍	NP	C	+	+	+	+		+	+	+			+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+		+	+		+	+	+	+		+	+	+	+		+	+	+	+	
Misgurnus anguillicaudatus	泥鰍	NP	C	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+				+	+				+	+				+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Oreochromis niloticus	尼羅口孵非鯽	NP	C		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	++	+	+	+	++	++	++	++
Parazacco spilurus	異鱲	V and NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poecilia reticulate	孔雀花魚將	NP	VC				+	+				+	+				+	+				+					+					+	+				+					+					+				+	+	+
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	C	+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+				+	+				+	+				+	+			
Pterocryptis cochinchinensis	黃鮠	NP	C	+	+	+	+		+	+	+			+	+	+			+		+	+		+	+	+	+		+	+	+	+		+	+				+					+					+				
Puntius semifasciolatus	七星魚	NP	C	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+
Rhinogobius spp.	鰕虎魚	NP	C/UN/R	+	+	+	+	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++
Schistura fasciolata	橫紋南鰍	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 fish counting		No. of fish		30	40	40	30	30	50	70	70	60	60	60	60	60	50	50	50	50	60	60	60	40	50	60	60	60	40	40	50	55	50	40	20	30	30	20	20	20	30	30	20	20	12	15	18	8	7
No. of species				11	13	14	15	12	11	13	14	13	11	11	13	14	14	11	10	11	12	13	10	10	11	12	14	10	10	13	13	14	11	13	12	14	15	11	13	12	14	12	13	12	13	13	13	12	12	12	13	13	12
Amphibian																																																		
Paramesotriton hongkongensis	香港瘰螈	P (Cap 170, NT, PGC)	R	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Fejervarya limnocharis	澤蛙	NP	VC																																															
No. of species				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Note: NP – Not protected in Hong Kong

“VC” – Very Common; “UC” – Uncommon; “C” - Common; "R" - Rare

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

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Table 4.6 Fish species and amphibians at Upper Lam Tsuen River

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

				Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring				
				Aug-15					Sep-15					Oct-15					Nov-15					Dec-15					Jan-16					Feb-16				
			Sampling point	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4	Reference	T1	T2	T3	T4
Species	Chinese name	Status	Commonnes																																			
Fish																																						
Acrossocheilus parallens	側條光唇魚	P, PGC	R		+	+	+	+			+	+	+			+	+	+			+	+	+			+	+	++			+	+	++			+	+	++
Channa maculate	斑鱧	NP	C					+					+					+					+					+										
Cirrhina molitorella	鯪魚	NP	C																																			
Clarias fuscus	胡子鯰	NP	C					+					+					+					+					+										
Cyprinus carpio var. viridiviolaceus	錦鯉	NP	C				+					+					+					+								+					+			
Gambusia affinis	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Liniparhomaloptera disparis	擬平鰍	NP	C	+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+	
Misgurnus anguillicaudatus	泥鰍	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Oreochromis niloticus	尼羅口孵非鯽	NP	C	+	++	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++	+	+	++	++	++
Parazacco spilurus	異鱲	V and NP	C	+	+	+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+		+	+	+
Poecilia reticulate	孔雀花魚將	NP	VC			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	C	+	+				+	+				+	+				+	+				+	+				+	+				+	+			
Pterocryptis cochinchinensis	黃鮠	NP	C	+					+					+					+					+					+					+				
Puntius semifasciolatus	七星魚	NP	C	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+
Rhinogobius spp.	鰕虎魚	NP	C/UN/R	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++
Schistura fasciolata	橫紋南鰍	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 fish counting		No. of fish		15	12	16	10	10	18	15	20	15	15	25	20	22	18	20	40	35	40	35	40	55	40	45	45	40	60	50	50	50	40	65	55	55	55	40
No. of species				12	12	13	13	12	12	10	13	13	12	12	10	13	13	12	12	10	13	13	12	12	10	13	12	12	12	10	14	13	10	12	10	14	13	10
Amphibian																																						
Paramesotriton hongkongensis	香港瘰螈	P (Cap 170, NT, PGC)	R	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Fejervarya limnocharis	澤蛙	NP	VC																																			
No. of species				1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1	1

Note: NP – Not protected in Hong Kong

“VC” – Very Common; “UC” – Uncommon; “C” - Common; "R" - Rare

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

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

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

"Cap 170" - List in Wild Animials Protcetion 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- located at upper river channel sampling site to T4 - located at lower river Channel sampling site)

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

Table 4.7 Abotic data for Upper Lam Tsuen River

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

	Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Post construction monitoring				Post construction monitoring			
Parameter / date	Jan-12				Jul-12				Aug-13				Dec-13				Jan-14				Feb-14			
Replicate	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
DO (mg/L)	9.4	9.2	9.4	9.2	8.2	8	7.8	7.3	8.9	8.5	8.7	8.8	9.3	8.6	8.8	8.7	9.1	9.0	8.6	8.5	7.8	8.7	9.8	9.8
pH	7.2	6.9	6.8	6.7	6.8	7.1	7.3	7.6	6.5	6.8	6.8	7.1	6.2	6.9	7.1	7.1	6.2	6.9	7.1	7.1	8.2	8.5	8	7.8
Nitrate (mg N/L)	0.2	0.3	0.5	0.6	0.13	0.67	0.62	0.82	0.74	0.72	0.83	0.79	0.48	0.57	0.77	0.89	0.9	0.8	1.3	1.26	1.3	1.8	1.6	2.1
Ammonia (mg/L)	0.04	0.05	0.06	0.2	0.01	0.02	0.04	0.03	0.02	0.03	0.03	0.04	<0.01	<0.01	<0.01	<0.01	0.04	0.1	0.12	0.15	0.05	0.04	0.1	0.12
Salinity (ppt)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conductivity (µS/cm)	92	84	96	110	41	38	73	86	67	77	74	75	62	64	90	110	72	78	88	108	78	87	118	119
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2			
Water flow at riffle (m/s)	0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6			
Sand (%)	10	15	10	10	10	10	10	10	10	10	10	10	5	5	5	5	5	5	5	5	5	5	5	5
Stone (%)	80	70	80	70	60	60	60	60	75	75	75	75	90	85	85	85	90	85	85	85	90	85	85	85
Mud (%)	10	15	10	20	30	30	30	30	15	15	15	15	5	10	10	10	5	10	10	10	5	10	10	10

Table 4.7 Abotic data for Upper Lam Tsuen River

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

	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
Parameter / date	Mar-14				Apr-14				May-14				Jun-14				Jul-14				Aug-14				Sep-14				Oct-14			
Replicate	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
DO (mg/L)	7.5	7.8	8.2	8.1	7.7	7.6	7.8	8.0	8.2	7.8	8.1	8.2	7.6	7.8	7.4	7.2	7.6	7.2	7.6	7.5	7.6	7.4	7.3	7.6	8.7	8.7	8.4	8.6	7.2	7.3	8.1	7.6
pH	8.3	8.2	7.6	7.2	7.6	7.8	8.2	7.8	7.7	7.8	7.9	8.2	7.6	7.8	7.8	8.1	7.6	7.7	7.8	8	7.8	7.5	7.6	7.8	8.4	8.1	8.4	8.0	8.4	8.2	8.1	8.0
Nitrate (mg N/L)	1.2	1.4	1.1	1.3	1.5	1.5	1.3	1.2	0.9	0.7	0.6	0.7	0.8	0.8	0.9	0.9	0.8	1.1	1.1	0.8	1.2	1.1	0.9	1.1	1.2	1.3	1.2	1.2	0.9	1	0.9	1
Ammonia (mg/L)	0.06	0.04	0.04	0.1	0.1	0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	0	0	0	0	0	0	0	0	0.02	0.02	0.03	0.03	0.01	0.02	0.03	0.03	0	0	0	0	0	0	0	0	0	0	0	0	0.01	0.01	0.02	0.02
Conductivity (µS/cm)	120	123	125	123	96	114	120	122	82	80	72	66	39	58	69	70	43	85	72	75	75	78	82	86	73	77	74	72	47	50	80	88
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.01-0.2				0.01-0.2				0.01-0.2				0.03-0.2				0.03-0.2				0.03-0.2				0.03-0.2				0.03-0.2			
Water flow at riffle (m/s)	0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6			
Sand (%)	5	5	5	5	5	5	5	10	5	5	5	10	5	5	5	10	5	5	5	10	5	5	8	10	5	5	8	10	5	5	8	10
Stone (%)	90	85	85	80	90	85	85	75	90	85	85	75	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75
Mud (%)	5	10	10	15	5	10	10	15	5	10	10	15	2	5	5	15	2	5	5	15	2	5	2	15	2	5	2	15	2	5	2	15

Table 4.7 Abotic data for Upper Lam Tsuen River

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

	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
Parameter / date	Nov-14				Dec-14				Jan-15				Mar-15				Apr-15				May-15				Jun-15				Jul-15				Aug-15			
Replicate	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
DO (mg/L)	7.3	7.3	8.2	7.8	7.2	8.1	8.2	8.2	8.9	9.2	9.3	9.2	9.2	9.1	9	9.3	8.2	8.1	8.1	8.3	8.3	8.1	8.1	8.2	8.0	8.2	8.3	8.2	8.3	8.2	8.0	8.3	8.4	8.3	8.3	8.3
pH	8.1	8.3	8.1	8.3	8.5	8.4	8.2	8.2	7.9	8.2	8.3	7.9	7.9	8.2	8.1	7.8	8.2	8.0	8.0	8.1	7.9	8.0	7.9	8.1	7.8	7.9	7.9	8.1	7.7	7.8	7.8	7.8	7.7	7.7	7.6	7.7
Nitrate (mg N/L)	1	1	0.9	0.9	0.9	1	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.9	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.9
Ammonia (mg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 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	< 0.1	< 0.1
Salinity (ppt)	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02	0.03	0.03	0.03	0.03	0.01	0.02	0.02	0.02	0.01	0.02	0.02	0.02	0.01	0.01	0.01	0.01	0.01	0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Conductivity (µS/cm)	52	56	82	84	112	92	86	67	156	153	152	163	45	89	92	94	45	89	92	94	35	45	50	43	35	45	50	43	42	32	35	55	36	42	46	38
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	<2	<2	<2
Water flow at pool (m/s)	0.03-0.2				0.03-0.2				0.03-0.2				0.03-0.2				0.03-0.2				0.03-0.2				0.03-0.2				0.03-0.2				0.03-0.2			
Water flow at riffle (m/s)	0.2-0.6				0.2-0.5				0.2-0.5				0.2-0.5				0.2-0.5				0.2-0.5				0.2-0.5				0.2-0.5				0.2-0.5			
Sand (%)	5	5	8	10	5	5	8	10	5	5	8	10	5	5	8	10	5	5	8	10	5	5	8	10	5	5	8	10	5	5	8	10	5	5	8	10
Stone (%)	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75
Mud (%)	2	5	2	15	2	5	2	15	2	5	2	15	2	5	2	15	2	5	2	15	2	5	2	15	2	5	2	15	2	5	2	15	2	5	2	15

Table 4.7 Abotic data for Upper Lam Tsuen River

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

	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
Parameter / date	Sep-15				Oct-15				Nov-15				Dec-15				Jan-16				Feb-16			
Replicate	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
DO (mg/L)	8.3	8.2	8.2	8.2	8.1.	8.2	8.2	8.2	7.9	8.0	8.0	8.1	8.0	8.1	7.9	8.1	7.9	7.8	8.2	8.1	8.1	8.0	8.2	8.2
pH	7.5	7.7	7.6	7.6	7.5	7.6	7.7	7.6	7.6	7.5	7.6	7.7	7.7	7.5	7.6	7.6	7.8	7.9	7.7	7.7	7.7	7.8	7.7	7.6
Nitrate (mg N/L)	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	0.8	0.8	0.8	0.9	0.8	0.8	0.8	0.9
Ammonia (mg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	0.0	0.0	0.0	0.0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Conductivity (µS/cm)	33.0	39.0	42.0	43.0	36.0	38.0	44.0	46.0	34.0	32.0	37.0	40.0	36.0	33.0	42.0	62.0	32.0	36.0	40.0	45.0	34.0	32.0	42.0	43.0
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
Water flow at pool (m/s)	0.03-0.2				0.03-0.2				0.03-0.2				0.03-0.2				0.03-0.2				0.03-0.2			
Water flow at riffle (m/s)	0.2-0.5				0.2-0.5				0.2-0.5				0.2-0.5				0.2-0.5				0.2-0.5			
Sand (%)	5	5	8	10	5	5	8	10	5	5	8	10	5	5	8	10	5	5	8	10	5	5	8	10
Stone (%)	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75
Mud (%)	2	5	2	15	2	5	2	15	2	5	2	15	2	5	2	15	2	5	2	15	2	5	2	15

Agreement No. CE65/2013(EP)
Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River – Investigation
Post-Construction Ecological Monitoring Report (No.26)
She Shan River

February 2016

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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

Post-Construction Ecological Monitoring Report (No.26) She Shan River

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1 Introduction

1.1 Agreement No. CE65/2013(EP) Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River – Investigation required a post-construction ecological monitoring programme when the project completed. The collected data are mainly used to assess ecological recovery process and effectiveness of ecological migration proposed and enforced during the construction period.

1.2 The scope of the ecological monitoring was detailed in EM & A Manual of the project. In brief, the survey aimed to collect data on abiotic factors such as water quality, substratum characteristics, water flow as well as flora and fauna.

1.3 China Hong Kong Ecology Consultants Ltd. was committed by Allied Environmental Consultants Ltd (AEC) to undertake the ecological monitoring tasks for the project from December 2014.

1.4 This is the number 26 post-construction ecological monitoring report for the project conducted **on 15th of February 2016**. It contains the following subsections:

- Summary of major points
- Monitoring Methods and Results
- Summary and Comments

2 Summary of Major Points

- Field ecological monitoring was undertaken **on 15th of February 2016**;
- Fauna and flora along the drainage project sections is in a process of re-establishing or restoration;
- Fish kept in high abundance during current dry season;
- Bird diversity and abundance was in natural fluctuation; and
- Odonata abundance was gradually decreased compared to last month. *Paramesotriton hongkongensis* was found during the survey.

3 Monitoring Methodology

3.1 Riparian Vegetation

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

3.2 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 (www.hkbiodiversity.net), Wilson *et al.* (2004) and Tam *et al.* (2011). Adult Odonata survey was conducted along line transects in parallel with river channel within the works area where access was permitted.

3.4 Aquatic Macro-invertebrates

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

3.5 Fish Population and Hong Kong Newt

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

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

sampling sites covered major type of stream habitats, e.g. river pool and riffle (**Figure 1**). The number of the observed fish was estimated and recorded. Nomenclature and protection status of the species has followed those documented in the AFCD website (www.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^{o}C and was performed using model: DO-5510 for measuring dissolved oxygen. Nutrient levels including nitrate and ammonia were performed in laboratory by applying the In-house method SOP056 (FIA) and SOP057 (FIA) respectively.

3.6.2 Sediment Characteristics

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

3.6.3 Water Flow

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

4 Monitoring Results

4.1 Vegetation

In total, 62 flora species was recorded within the survey transects along the river course. The recorded floras were generally common wetland species. The height of the dominated riparian grass and herb species were in a range from 0.3m to 1.2m 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. Vegetation in lower to middle section was observed in regenerating after clearance work conducted in previous months. Aquatic plants *Brachiaria mutica* was the most abundant plants found along the river channel. *Mucuna championii* is classified as endangered status in China, was recorded in the woodland adjacent to She Shan River. Results of vegetation survey and belt transect survey were presented in **Table 4.1** and **Table 4.2**. **Figure 1** shows the transect line for the flora surveys.

4.2 Fauna

4.2.1 Avifauna

An avifauna survey was undertaken along survey transects and at three selected point count locations. In total, 27 species of birds were recorded during the bird surveys within project area. 4 recorded species were wetland dependant birds and observed foraging in the river channel including *Motacilla cinerea* (Photo 4), *Ardeola bacchus* (Photo 5), *Egretta garzetta* and *Motacilla alba.* The dominant species of the river was a common species *Pycnonotus jocosus.* All the birds in Hong Kong are under protection of Wild Animals Protection Ordinance (Cap. 170). Some of wetland dependent species with conservation interest including *Ardeola bacchus* and *Egretta garzetta* were observed foraging in the river. *Ardeola bacchus* and *Egretta garzetta* are considered as Regional Concern by Fellowes *et al.* (2002). A raptor was recorded during the survey, which was *Buteo buteo* (Photo 6). It was scheduled under Endangered Species of Animals and Plants Ordinance (Cap. 586). In addition, 3 individuals of *Centropus sinensis* (Photo 7) were recorded at upper section of the river, which is considered as Vulnerable in Red China Data Book. Except foraging and roosting behaviour of some birds were observed, no other remarkable behaviour was noticed. Transect and Point Count locations were shown on **Figure 1**. Result of bird survey was presented in the **Table 4.3**.

4.2.2 Adult Odonata Survey

Odonata survey was performed and a list of recorded odonata species at She Shan River is shown in **Table 4.4**. The number of odonata species was gradually decreased by 2 species compared to last month. The abundance was still low during current dry season. Their emerging peak usually ends up with late autumn (Wilson *et al.,* 2003 & Tam *et al.,* 2011). A total of 1 species was recorded, those recorded species were common species in Hong Kong and the result was similar to approximate period of last year. Sampling location was shown on **Figure 1**.

4.2.3 Aquatic Macro-invertebrates

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

4.2.4 Hong Kong Newt

Survey of Hong Kong Newt was performed (Photo 8). Hong Kong Newt was captured only in middle section where covered with dense vegetation (Photo 9). The Newt restricted in middle section of the river because only where can provide ideal conditions for Newt to colonize such as dense vegetation, slow flowing water, pool areas. In addition, lower section is fully covered with concrete, where Newt were not likely to present due to its limited food source and artificial structure. Although upper section has more natural environment in terms of natural river bed and dense vegetation, Newt were not found in there as high density of vegetation has limited diversity of mirco-habitats such as riffle and pool areas, remaining straight and narrow stream that is not

preferable for Newt. It was absent in previous surveys during wet season. The presence of Hong Kong Newt in this month is related to their breeding behavior, they are usually breeding in the river during dry season from September to March (Dudgeon, 2003). Hong Kong Newt is listed in Wild Animals Protection Ordinance (Cap. 170) and classified as "Near Threatened" under IUCN Red List Status and as "Potential Global Concern" by Fellowes *et al.* (2002). Record of Hong Kong Newts can be referred to **Table 4.6.**

4.2.5 Fish Fauna

Fish surveys were performed at She Shan River and total 12 species of freshwater fish were recorded. Native fish *Zacco platypus* and *Oreochromis niloticus* (Photo 10) were abundant species dominating in the river channel. Among the recorded fish, *Parazacco spilurus* is classified as "Vulnerable" in Red China Data Book, it was commonly observed along the river with low abundance. The number of fish increased compared to last month assuming that less flooding events during current dry season. Details of recorded of fish fauna refers to **Table 4.6.** Sampling location was shown on **Figure 1**.

4.3 Abiotic Data

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

Generally, the water was clean and nutrient levels were low even though there were cultivation activities observed nearby the river. Results of water test are presented in the **Table 4.7.**

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

5 Summary and Commentary

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

Aquatic plants and riparian vegetation were generally established at new drainage channel. Vegetation has completely covered the gabion wall mainly in upper sections River and partially covered the river bed along the river channel.

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

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FIGURE

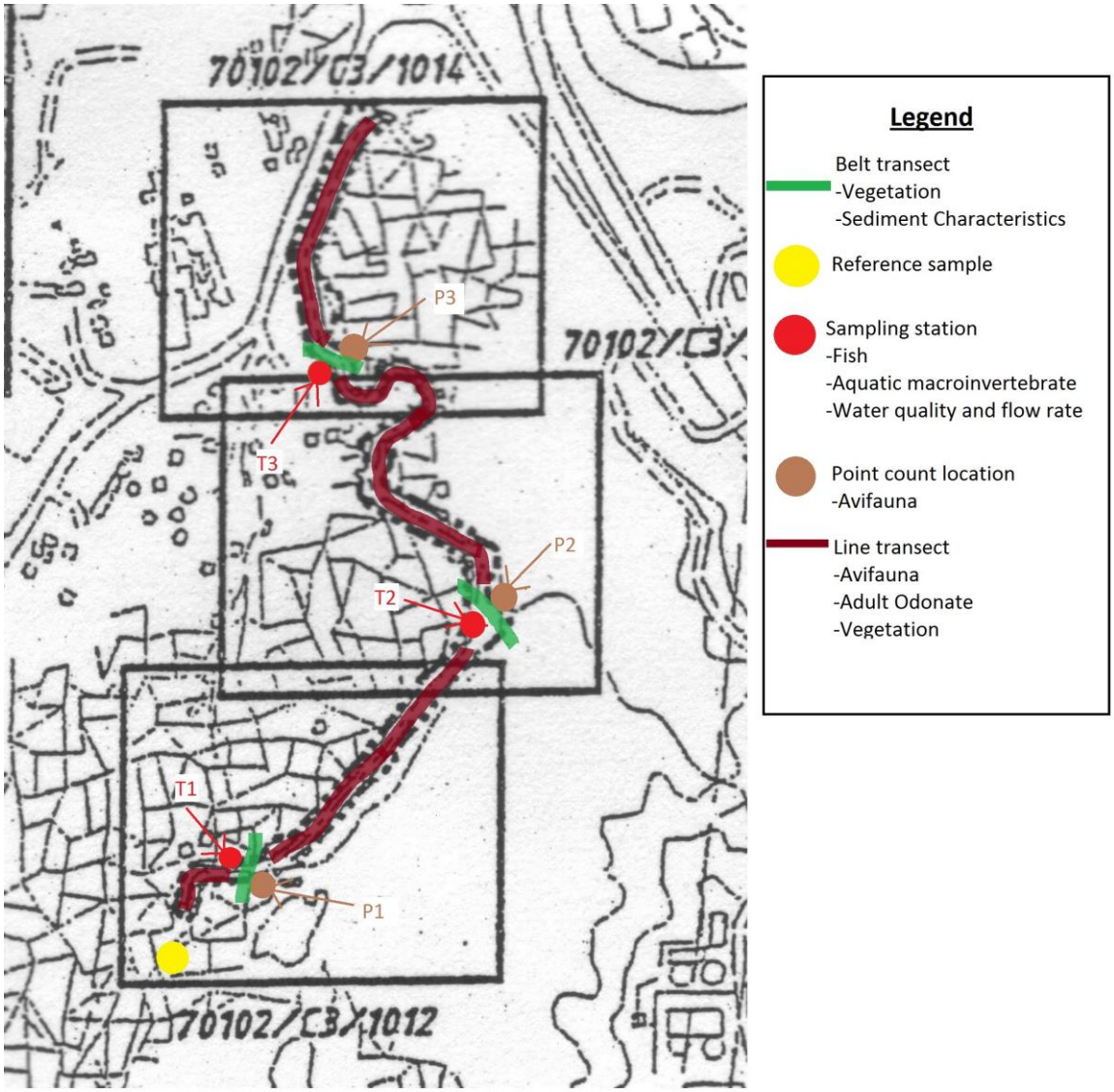

Figure 1. Sampling Location of Ecological Survey and Monitoring at She Shan River, Tai Po.

PHOTOS

	
Photo 1: General view of the river habitat (Lower section).	Photo 2: General view of the river habitat (Middle section).
	
Photo 3: General view of the river habitat (Upper section)	Photo 4: Avifauna - *Motacilla cinerea*
	
Photo 5: Avifauna - *Ardeola bacchus*	Photo 6 : Avifauna - *Buteo buteo*

	
Photo 7: Avifauna - *Centropus sinensis*	Photo 8: Kick Sampling
	
Photo 9: Hong Kong Newt	Photo 10: Fish - *Oreochromis niloticus*

TABLE

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

				Baseline monitoring	Impact monitoring				Impact monitoring						Post construction monitoring					Post construction monitoring					Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring		
Family	Species name	Chinese name	Conservation Status	Jul to Aug 08	Jan-09	Jul-09	Jan-10	Jul-10	Jan-11	Jul-11	Jan-12	Jul-12	Jul-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16
Riparian Plant																																							
Acanthaceae	*Dicliptera chinensis*	狗肝菜			+	+	+	+										+	+	+	+	+	+	+	+	+													
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	*Ilex rotunda*	鐵冬青		+	+	+	+	+	+																														
Araceae	*Alocasia odora*	海芋		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Araceae	*Colocasia esculenta*	芋		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Araceae	*Syngonium podophyllum*	合果芋		+	+	+	+	+	+												+	+	+	+	+	+													
Araceae	*Pistia stratiotes*	大薸																									+	+	+	+	+	+	+	+	+	+	+	+	+
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			+	+	+	+								+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+
Asteraceae	*Ageratum conyzoides*	勝紅薊									+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Asteraceae	*Emilia sonchifolia*	一點紅									+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Asteraceae	*Erechtites hieraciifolius*	梁子菜																+	+	+	+	+	+	+							+	+	+	+	+	+	+	+	+
Asteraceae	*Youngia japonica*	黃鵪菜																+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+
Asteraceae	*Spilanthes paniculata*	金鈕扣																+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+
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	*Rorippa indica*	塘蒿菜																+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+
Brassicaceae	*Capsella bursa-pastoris*	薺菜																+	+	+	+	+	+	+	+	+													
Caesalpiniaceae	*Bauhinia championii*	缺葉藤																								+	+	+	+	+	+	+	+	+	+	+	+	+	+
Caryophyllaceae	*Drymaria diandra*	荷蓮豆		+	+	+	+	+	+							+	+	+	+	+	+	+	+	+	+				+	+	+	+	+	+	+	+	+	+	+
Caryophyllaceae	*Myosoton aquaticum*	鵝腸菜			+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Chenopodiaceae	*Chenopodium ficifolium*	小藜																+	+	+	+	+	+	+	+	+				+	+	+	+	+	+	+	+	+	+
Commelinaceae	*Commelina diffusa*	節節草		+	+	+	+	++	+	+	+++	++	++	++	+++	+++	++ +	+++	++	++	++	+++	++	+++	++ +	++ +	+++	+++	+++	+++	+++	+++	++	++	++	++	++	++	++	++
Convolvulaceae	*Pharbitis nil*	牽牛		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+													
Convolvulaceae	*Ipomoea cairica*	五爪金龍		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Convolvulaceae	*Ipomoea aquatica*	蕹菜																																					
Cucurbitaceae	*Solena amplexicaulis*	羅瓜			+	+	+	+	+																														
Cuscutaceae	*Cuscuta australis*	南方菟絲子																									+	+	+	+	+	+	+	+	+	+	+	+	+
Cyperaceae	*Cyperus sp.*	莎草						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Cyperaceae	*Cyperus involucratus*	風車草															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Euphorbiaceae	*Macaranga tanarius*	血桐		+	+	+	+	+	+	+	+	+						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Euphorbiaceae	*Aporusa dioica*	銀柴		+	+	+	+	+	+																+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Fabaceae	*Mucuna championii*	港油麻藤	EN																																		+	+	+
Fabaceae	*Pueraria lobata*	野葛		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	++	++	++	++	++	++	+	+	+	+	++	++	++	++	++	++	++	++	++	++
Fabaceae	*Sesbania cannabina*	田菁									+	+	+	+	+	+						+	+	+	+														
Lauraceae	*Cinnamomum burmannii*	陰香		+	+	+	+	+							+	+					+	+	+	+	+														
Lygodiaceae	*Lygodium japonicum*	海金沙			+	+	+	+	+								+	+	+	+	+	+	+	+	+														
Magnoliaceae	*Michelia alba*	白蘭		+	+	+	+	+	+							+	+		+	+	+	+	+	+	+														
Malvaceae	*Hibiscus rosa-sinensis*	大紅花																								+	+	+	+	+	+	+	+	+	+	+	+	+	+
Mimosaceae	*Mimosa pudica*	含羞草		+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+														
Mimosaceae	*Leucaena leucocephala*	銀合歡		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+
Mimosaceae	*Calliandra haematocephala*	紅絨球																+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Moraceae	*Broussonetia papyrifera*	構樹		+	+	+	+	+							+	+																								
Moraceae	*Ficus hispida*	對葉榕		+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Moraceae	*Ficus pumila*	薜荔		+	+	+	+	+	+												+	+	+	+	+														
Moraceae	*Ficus variolosa*	變葉榕		+	+	+	+	+	+																															
Moraceae	*Ficus variegata*	青葉榕																								+	+	+	+	+	+	+	+	+	+	+	+	+	+
Musaceae	*Musa paradisiaca*	大蕉		+	+	+	+	+							+	+	+	+	+	+	+	+	+	+	+	+				+	+	+	+	+	+	+	+	+	+
Myrsinaceae	*Maesa perlarius*	鯽魚胆		+	+	+	+	+																															
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			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+					+	+	+	+	+	+	+	+	+	+	+
Plantaginaceae	*Plantago major*	車前草																				+	+	+	+														
Poaceae	*Panicum maximum*	大黍		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Panicum repens*	結骨草		+	++	++	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

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

				Baseline monitoring	Impact monitoring				Impact monitoring						Post construction monitoring					Post construction monitoring					Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring		
Family	Species name	Chinese name	Conservation Status	Jul to Aug 08	Jan-09	Jul-09	Jan-10	Jul-10	Jan-11	Jul-11	Jan-12	Jul-12	Jul-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16
Poaceae	*Brachiaria mutica*	巴拉草			++				++	++	++	++			++	++	++	++	++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
Poaceae	*Pennisetum purpureum*	象草		++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Coix lacryma-jobi*	薏苡		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Microstegium ciliatum*	刚秀竹		++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	++	++	++	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Miscanthus floridulus*	五節芒						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Pennisetum alopecuroides*	狼尾草																+	+	+	+	+	+	+	+	+					+	+	+	+	+	+	+	+	+
Poaceae	*Digitaria radicosa*	紅尾雞																									+	+	+	+	+	+	+	+	+	+	+	+	+
Polygonaceae	*Polygonum hydropiper*	水蓼		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Polygonaceae	*Polygonum glabrum*	光蓼																														+	+	+	+	+	+	+	+
Polygonaceae	*Polygonum chinense*	火炭母		+	+	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			+	+	+	+	+	+	+	+	+	+
Polygonaceae	*Rumex trisetifer*	假蔥菜																+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+
Polygonaceae	*Polygonum lapathifolium*	大馬蓼																+	+	+	+	+	+	+	+	+					+	+	+	+	+	+	+	+	+	+
Rubiaceae	*Hedyotis hedyotidea*	牛白藤		+	+	+	+	+	+																															
Sapindaceae	*Dimocarpus longan*	龍眼		+	+	+	+	+	+																															
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*	棒葉朴		+	+	+	+	+	+																															
Ulmaceae	*Trema orientalis*	異色山黃麻																	+	+	+	+	+	+	+	+														
Ulmaceae	*Trema tomentosa*	山黃麻								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+														
Urticaceae	*Boehmeria nivea*	苧麻		+	+	+	+	+						+	+	+	+	+	+	+	+	+	+	+	+	+														
Urticaceae	*Pilea microphylla*	透明草		+	+	+	+	+	+						+	+	+	+	+	+	+	+	+	+	+	+					+	+	+	+	+	+	+	+	+
Urticaceae	*Pouzolzia zeylanica*	雪水蕨		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+														
Verbenaceae	*Vitex quinata*	山牡荊		+	+	+	+	+																																
Polygonaceae	*Polygonum perfoliatum*	杠板歸																+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Verbenaceae	*Lantana camara*	馬纓丹		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Floating Plant																																							
Araceae	*Pistia stratiotes*	大漂																																	+	+	+	+	+
Lemnaceae	*Lemna minor*	浮萍			+	+	+	+	+					+	+	+	+	+	+	+	+	+	+	+	+	+														
Submerged Plant																																							
Hydrocharitaceae	*Hydrilla verticillata*	黑藻															+	+	+	+	+	+	+	+	+	+				+	+	+	+	+	+	+	+	+	+
No. of Species				48	54	54	54	57	46	23	36	36	36	40	41	51	54	67	69	69	73	74	74	74	74	74	42	46	46	51	57	57	59	59	59	61	61	61	62	62

Note:

"+" – Species exists in the study area

"++" – Species common in the study area

"+++" – Species abundant/dominant in study area

EN- Endanered in China

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								Impact monitoring								Impact monitoring								Impact monitoring								Impact monitoring								Impact monitoring								Impact monitoring								
		Stream	Jul-08				Aug-08				Jan-09				Jul-09				Jan-10				Jul-10				Jan-11				Jul-11																									
		Transect	P1		P3		P1		P3		T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3			
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(cm	%	Height(cm)	%	Height(cm)	%	Height(cm	%	Height(cm)	%	Height(cm)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%		
Commelinaceae	*Commelina diffusa*	節節草			0.2	20			10	6	0.2	2	0.1	5	0.2	5					0.2	10	0.3	60							0.5	50	0.5	50	0.2	45	0.2	10			0.2	5	0.8	40										
Poaceae	*Panicum repens*	枯普草	0.3	5											0.2	5			0.6	5					0.6	25									0.3	30					0.5	20										
Asteraceae	*Mikania micrantha*	薇甘菊							0.2	7															0.2	5							1	20	0.3	5					0.3	30										
Brassicaceae	*Nasturtium officinale*	西洋菜																																	0.2	5																
Moraceae	*Ficus microcarpa*	細葉榕			0.7	5			0.6	7																																											
Moraceae	*Ficus hispida*	對葉榕			3	10			3	10																																										
Poaceae	*Microstegium ciliatum*	刚秀竹	0.5	5			0.5	3																							1.5	30					1.5	30					1.5	15										
Fabaceae	*Pueraria lobata*	野葛			0.3	5	0.5	3	0.3	5			0.2	5	0.2	5																							0.3	2														
Araceae	*Colocasia esculenta*	芋							0.2	5																																											
Urticaceae	*Boehmeria nivea*	苧麻	1.5	30			2	7							3	10					2	5																															
Asteraceae	*Bidens alba*	白花鬼針草																			0.3	5	1	5					0.5	5									0.5	2													Channelised
Poaceae	*Pennisetum purpureum*	象草	3	50	1	60	3	80	2	60					4	40					2	50																					1.5	20			0.5	2						
Poaceae	*Coix lacryma-jobi*	薏苡																					1.5	20																					1	1						
Amaranthaceae	*Alternanthera philoxeroides*	空心蓮子草	0.2	10			0.2	7													0.3	20																														
Poaceae	*Panicum maximum*	大黍											0.5	5															0.4	5			1.5	5							0.4	2	1	15						
Moraceae	*Broussonetia papyrifera*	構樹													6	5																																				
Polygonaceae	*Polygonum chinense*	火炭母											0.1	10																																						
Onagraceae	*Ludwigia hyssopidolia*	草龍																											0.4	5																						
Cyperaceae	*Cyperus sp.*	莎草																											0.5	5																						
Poaceae	*Miscanthus floridulus*	五節芒																													1.5	5																				
Poaceae	*Brachiaria mutica*	巴拉草																																																1.5	20	
Blechnaceae	*Blechnum orientale*	烏毛蕨																																																	
Poaceae	*Pennisetum alopecuroides*	狼尾草																																																
Araceae	*Alocasia macrorrhizos*	海芋																																																
Lemnaceae	*Lemna minor*	浮萍																																																
Polygonaceae	*Polygonum hydropiper*	水蓼																																															
Cyperaceae	*Cyperus involucratus*	風車草																																															
Onagraceae	*Ludwigia erecta*	美洲水丁香																																															
Convolvulaceae	*Ipomoea cairica*	五爪金龍																																															
Bare Gound												98		75		30		##		95		10		15		70		##		80		15		25		15		40		93		30		10		##			

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

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

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

			Impact monitoring								Impact monitoring								Impact monitoring								Impact monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring							
		Stream	Jan-12								Jul-12								Jul-13								Dec-13								Jan-14								Feb-14								Mar-14								Apr-14							
		Transect	T1		T2		T3				T1		T2		T3				T1		T2		T3				T1		T2		T3				T1		T2		T3				T1		T2		T3				T1		T2		T3			
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%			Height(m)	%	Height(m)	%	Height(m)	%			Height(m)	%	Height(m)	%	Height(m)	%			Height(m)	%	Height(m)	%	Height(m)	%			Height(m)	%	Height(m)	%	Height(m)	%			Height(m)	%	Height(m)	%	Height(m)	%			Height(m)	%	Height(m)	%	Height(m)	%			Height(m)	%	Height(m)	%	Height(m)	%	
Commelinaceae	*Commelina diffusa*	節節草	0.3	25	0.3	40					0.3	2	0.3	30	0.3	20			0.3	15	0.3	5					0.1	10	0.5	30	0.1	1			0.2	15	0.5	30	0.2	1			0.2	20	0.5	30	0.2	5			0.3	20	0.5	35	0.3	6					0.5	30		
Poaceae	*Panicum repens*	枯普草																													0.2	1							0.2	1							0.2	1							0.4	1						
Asteraceae	*Mikania micrantha*	薇甘菊	0.2	15							0.2	2															0.1	10			0.2	1			0.1	10			0.2	1			0.1	10			0.2	1			0.1	10			0.2	1			0.3	10	0.3	10	0.3	1
Brassicaceae	*Nasturtium officinale*	西洋菜																																																									0.3	20			0.3	5
Moraceae	*Ficus microcarpa*	細葉榕																																																										
Moraceae	*Ficus hispida*	對葉榕																																																									
Poaceae	*Microstegium ciliatum*	刚秀竹	1	45	0.8	5							0.8	30							0.8	35																																												
Fabaceae	*Pueraria lobata*	野葛																																																														
Araceae	*Colocasia esculenta*	芋																																																													
Urticaceae	*Boehmeria nivea*	苧麻																																																													
Asteraceae	*Bidens alba*	白花鬼針草	1	5				Channelised							0.3	10							0.3	1							0.3	1							0.4	1							0.4	1									0.3	5	0.8	1
Poaceae	*Pennisetum purpureum*	象草	2.5	5	2.5	25					2.5	1	2.5	5					2.5	5							1.5	10	1.5	10					1.5	10	1.5	10					1.5	10	1.5	10					1.5	5	1.5	5						
Poaceae	*Coix lacryma-jobi*	薏苡	2.5	2																																																											0.8	1
Amaranthaceae	*Alternanthera philoxeroides*	空心蓮子草													0.1	5																																														
Poaceae	*Panicum maximum*	大黍																																																													
Moraceae	*Broussonetia papyrifera*	構樹																																																												
Polygonaceae	*Polygonum chinense*	火炭母									0.2	2																																																			
Onagraceae	*Ludwigia hyssopidolia*	草龍																													0.3	2							0.3	2							0.4	1							0.4	1						
Cyperaceae	*Cyperus sp.*	莎草													1	5																																														
Poaceae	*Miscanthus floridulus*	五節芒																																																													
Poaceae	*Brachiaria mutica*	巴拉草			1	15							1	15	1	10	1	20	1	50					1.5	60	0.8	20			1.5	60	0.8	20			1.5	55	0.8	25			1.5	60	0.8	30			1.5	50	1	50				
Blechnaceae	*Blechnum orientale*	烏毛蕨																			0.3	1																																									
Poaceae	*Pennisetum alopecuroides*	狼尾草																																																										2	20				
Araceae	*Alocasia macrorrhizos*	海芋																																																											0.8	1
Lemnaceae	*Lemna minor*	浮萍																																																											N.A	5
Polygonaceae	*Polygonum hydropiper*	水蓼																																																											
Cyperaceae	*Cyperus involucratus*	風車草																																																											
Onagraceae	*Ludwigia erecta*	美洲水丁香															0.8	3			0.5	5					0.8	30							0.8	30							0.8	30							0.8	25					1	2
Convolvulaceae	*Ipomoea cairica*	五爪金龍																																																											
Bare Gound				3		15		100				93		20		50		65		5		94		10		10		94		5		10		94		5		5		91		5		5		90		0		5		84	

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

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

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

			Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring					
		Stream	May-14						Jun-14						Jul-14						Aug-14						Sep-14					
		Transect	T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3	
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Commelinaceae	*Commelina diffusa*	節節草			0.5	20					0.5	25					0.5	25					0.5	25					0.5	25		
Poaceae	*Panicum repens*	枯骨草																														
Asteraceae	*Mikania micrantha*	薇甘菊	0.3	10	0.3	10	0.3	1	0.3	10	0.3	10	0.3	1	0.3	10	0.3	10	0.3	2	0.3	12	0.3	12	0.3	5	0.3	12	0.3	12	0.3	5
Brassicaceae	*Nasturtium officinale*	西洋菜	0.3	5			0.3	5	0.3	5			0.3	5	0.3	2			0.3	2	0.3	1			0.3	1	0.3	1			0.3	1
Moraceae	*Ficus microcarpa*	細葉榕																														
Moraceae	*Ficus hispida*	對葉榕																														
Poaceae	*Microstegium ciliatum*	剛秀竹																														
Fabaceae	*Pueraria lobata*	野葛																														
Araceae	*Colocasia esculenta*	芋																														
Urticaceae	*Boehmeria nivea*	苧麻																														
Asteraceae	*Bidens alba*	白花鬼針草			0.3	5	0.8	1			0.3	5	0.8	1			0.3	5	0.8	2			0.3	5	0.8	5			0.5	5	0.8	5
Poaceae	*Pennisetum purpureum*	象草																														
Poaceae	*Coix lacryma-jobi*	薏苡					0.8	1					0.8	1					0.8	1					1.2	1					1.5	1
Amaranthaceae	*Alternanthera philoxeroides*	空心蓮子草																														
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	1.5	40	1	40			1.5	45	1	45			1.5	45	1	45			1.5	50	1	50			1.5	50	1	50		
Blechnaceae	*Blechnum orientale*	烏毛蕨																														
Poaceae	*Pennisetum alopecuroides*	狼尾草	2	15					2	15					2	12					2	10					2	10				
Araceae	*Alocasia macrorrhizos*	海芋					0.8	1					0.8	1					0.8	1					0.8	1					0.8	1
Lemnaceae	*L emna minor*	浮萍					N.A	5					N.A	5					N.A	1					N.A	1					N.A	1
Polygonaceae	*Polygonum hydropiper*	水蓼																														
Cyperaceae	*Cyperus involucratus*	風車草																														
Onagraceae	*Ludwigia erecta*	美洲水丁香					1	2					1	2					1	4					1	6					1	6
Convolvulaceae	*Ipomoea cairica*	五爪金龍																														
Bare Gound				30		25		84		25		15		84		31		15		87		27		8		#		27		8		80

			Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring					
		Stream	Oct-14						Nov-14						Dec-14						Jan-15						Feb-15					
		Transect	T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3	
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Commelinaceae	*Commelina diffusa*	節節草	1	10	1	50	0.1	2	1	10	1	50	0.1	2	1	10	1	50	0.1	2	0.5	10	0.8	70	0.3	40	0.6	10	1	70	0.4	40
Poaceae	*Panicum repens*	枯骨草																														
Asteraceae	*Mikania micrantha*	薇甘菊	0.3	5	1	15	0.3	2	0.3	5	1	15	0.3	2	0.3	5	1	15	0.3	2	0.4	10	0.5	15			0.4	10	0.5	15		
Brassicaceae	*Nasturtium officinale*	西洋菜																														
Moraceae	*Ficus microcarpa*	細葉榕																														
Moraceae	*Ficus hispida*	對葉榕																														
Poaceae	*Microstegium ciliatum*	剛秀竹																														
Fabaceae	*Pueraria lobata*	野葛																														
Araceae	*Colocasia esculenta*	芋																														
Urticaceae	*Boehmeria nivea*	苧麻																														
Asteraceae	*Bidens alba*	白花鬼針草	1	2	0.5	5	0.8	10	1	2	0.5	5	0.8	10	1	2	0.5	5	0.8	10												
Poaceae	*Pennisetum purpureum*	象草																														
Poaceae	*Coix lacryma-jobi*	薏苡					1..5	1					1..5	1					1..5	1												
Amaranthaceae	*Alternanthera philoxeroides*	空心蓮子草																														
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	65	1.8	20	1.5	5	1.8	70	1.8	25	1.5	8	1.8	70	1.8	25	1.5	8	1.5	80	1	5	1	25	1.5	80	1.3	5	1.3	25
Blechnaceae	*Blechnum orientale*	烏毛蕨																														
Poaceae	*Pennisetum alopecuroides*	狼尾草	2	15	3	5			2	10	3	2			2	10	3	2														
Araceae	*Alocasia macrorrhizos*	海芋																														
Lemnaceae	*L emna minor*	浮萍																														
Polygonaceae	*Polygonum hydropiper*	水蓼			1	3					1	1					1	1														
Cyperaceae	*Cyperus involucratus*	風車草			1.7	2					1.7	1					1.7	1					1.5	5					1.5	5		
Onagraceae	*Ludwigia erecta*	美洲水丁香	1.5	1			2	5	1.5	1			2	5	1.5	1			2	5					2	10					2	10
Convolvulaceae	*Ipomoea cairica*	五爪金龍																														
Bare Gound				2		0		75		2		1		72		2		1		72		0		5		25		0		5		25

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

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

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

			Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring					
		Stream	Mar-15						Apr-15						May-15						Jun-15						Jul-15						Aug-15						Sep-15					
		Transect	T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3	
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Commelinaceae	*Commelina diffusa*	節節草	0.6	10	1	70	0.5	40	0.6	10	1	70	0.5	40	0.3	5	0.7	50	0.5	25	0.3	5	0.7	50	0.5	25			0.3	25					0.3	15					0.3	17		
Poaceae	*Panicum repens*	枯普草																																										
Asteraceae	*Mikania micrantha*	薇甘菊	0.4	10	0.5	15			0.4	10	0.5	15			0.3	5	0.5	10			0.3	5	0.5	10			0.4	10	0.4	10			0.5	10	0.4	5			0.5	10	0.4	5		
Brassicaceae	*Nasturtium officinale*	西洋菜																																										
Moraceae	*Ficus microcarpa*	細葉榕																																										
Moraceae	*Ficus hispida*	對葉榕																																										
Poaceae	*Microstegium ciliatum*	刚秀竹																																										
Fabaceae	*Pueraria lobata*	野葛																																										
Araceae	*Colocasia esculenta*	芋																																										
Urticaceae	*Boehmeria nivea*	苧麻																																										
Asteraceae	*Bidens alba*	白花鬼針草																									0.9	15			0.3	2	0.9	15			0.5	2	0.9	15			0.5	2
Poaceae	*Pennisetum purpureum*	象草																																										
Poaceae	*Coix lacryma-jobi*	薏苡																									1	2					1	2					1	2				
Amaranthaceae	*Alternanthera philoxeroides*	空心蓮子草																																										
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	1.5	80	1.3	5	1.3	25	1.5	80	1.4	5	1.4	25	1.5	40	1.2	5	1.2	15	1.5	45	1.2	10	1.2	20	0.8	60	1	50	0.8	10	0.9	60	1	35	0.9	10	0.9	60	1	38	0.9	10
Blechnaceae	*Blechnum orientale*	烏毛蕨																																										
Poaceae	*Pennisetum alopecuroides*	狼尾草																																										
Araceae	*Alocasia macrorrhizos*	海芋																																										
Lemnaceae	*Lemna minor*	浮萍																																										
Polygonaceae	*Polygonum hydropiper*	水蓼																																										
Cyperaceae	*Cyperus involucratus*	風車草			1.5	5					1.5	5					1.4	5					1.4	5					1.2	5					1.2	5					1.2	5		
Onagraceae	*Ludwigia erecta*	美洲水丁香					2	10					2	10					1.6	5					1.6	5					1.5	50					1.5	50					1.5	50
Convolvulaceae	*Ipomoea cairica*	五爪金龍																											0.3	5					0.3	5					0.3	5		
Bare Gound				0		5		25		0		5		25		50		30		55		45		25		50		13		10		38		13		40		38		13		35		38

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

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

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

			Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring					
		Stream	Oct-15						Nov-15						Dec-15						Jan-16						Feb-16					
		Transect	T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3		T1		T2		T3	
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Commelinaceae	*Commelina diffusa*	節節草			0.3	17	0.2	10			0.3	17	0.2	10			0.3	10	0.2	5			0.3	5	0.2	5			0.3	5	0.2	5
Poaceae	*Panicum repens*	枯普草																														
Asteraceae	*Mikania micrantha*	薇甘菊	0.5	10	0.4	20			0.5	10	0.4	20			0.5	10	0.5	10			0.5	10	0.5	5			0.5	10	0.5	5		
Brassicaceae	*Nasturtium officinale*	西洋菜																					0.3	10					0.3	10		
Moraceae	*Ficus microcarpa*	細葉榕																														
Moraceae	*Ficus hispida*	對葉榕																														
Poaceae	*Microstegium ciliatum*	刚秀竹																														
Fabaceae	*Pueraria lobata*	野葛																														
Araceae	*Colocasia esculenta*	芋																														
Urticaceae	*Boehmeria nivea*	苧麻																														
Asteraceae	*Bidens alba*	白花鬼針草	0.9	30					0.9	30					1	30					1	30					1	30				
Poaceae	*Pennisetum purpureum*	象草																														
Poaceae	*Coix lacryma-jobi*	薏苡	1	2					1	2					1	2					1	2					1	2				
Amaranthaceae	*Alternanthera philoxeroides*	空心蓮子草																														
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	0.3	30	1	15	0.9	1	0.3	30	1	15	0.9	1	0.3	30	1	5	1	1	0.3	15	1	5	1	5	0.3	15	1	5	1	5
Blechnaceae	*Blechnum orientale*	烏毛蕨																														
Poaceae	*Pennisetum alopecuroides*	狼尾草																														
Araceae	*Alocasia macrorrhizos*	海芋																														
Lemnaceae	*Lemna minor*	浮萍																														
Polygonaceae	*Polygonum hydropiper*	水蓼																														
Cyperaceae	*Cyperus involucratus*	風車草			1.2	5	0.4	2			1.2	5	0.4	2			1.2	5	0.4	2			1.2	5	0.4	2			1.2	5	0.4	2
Onagraceae	*Ludwigia erecta*	美洲水丁香					0.3	15					0.3	15					0.3	5					0.3	5					0.3	5
Convolvulaceae	*Ipomoea cairica*	五爪金龍			0.3	5					0.3	5					0.3	5					0.3	5					0.3	5		
Bare Gound				28		43		72		28		43		72		28		70		87		43		70		83		43		70		83

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

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

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

Common Name	Species name	Chinese name	Status	Commonness	Baseline monitoring						Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Post construction monitoring				Post construction monitoring			
					Jul-08			Aug-08			Jan-09				Jul-09				Jan-10				Jul-10				Jan-11				Jul-11				Jan-12				Jul-12				Jul-13				Dec-13				Jan-14				Feb-14			
					Abundance			Abundance			Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance			
					C	P1	P3	C	P1	P3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3
Ashy Drongo	*Dicrurus leucophaeus*	灰卷尾	SWV, LC	U																																																			
Barn Swallow	*Hirundo rustica*	家燕	PM	C																																																		
Black Drongo	*Dicrurus macrocercus*	黑卷尾	Sv	C																																																		
Black Kite	*Milvus lineatus*	麻鷹	R, RC, Cap.586	C				+			+								+				+				+				+																							
Black-necked Starling	*Sturnus nigricollis*	黑領椋鳥	R	C	+			+	2		+				+			2	+		1		+			1	+				+			1	+	2	1		+			1	+				+				+				+			
Black-throated Laughingthrush	*Garrulax chinensis*	黑喉噪鹛	R	C																																																		
Buzzard (Common Buzzard)	*Buteo buteo*	普通鵟	WV, Cap.586	U																																																		
Chestnut Bulbul	*Hemixos castanonotus*	栗背短脚鵯	R,WV	C																																																		
Chinese Bulbul	*Pycnonotus sinensis*	白頭鵯	R	C	+		2	+			++	1		3	++			2	++	3	4	2	++	5	3	1	+	3	3	5	+	2	3	1	+				++	2	5	1	+		1	1	++		2	3	+	1		2	+	2	3	4
Chinese Pond Heron	*Ardeola bacchus*	池鷺	R,RC	C	++		3	+	1	2	+			1	+	1		1	+		1		+	2	1	1	+	1	1	1	+	1	1		+	1		1	+	1			+	1	2	1	+	1	2	2	+	1	3	2	+	1	2	3
Common Emerald Dove	*Chalcophaps indica*	綠翅金鳩	R,VU	U																																																		
Common Kingfisher	*Alcedo atthis*	普通翠鳥	R	C																							+	1			+				+												+			1	+				+			
Common Koel	*Eudynamys scolopacea*	噪鵑	R	C																							+								+								+				+				+			
Common Sandpiper	*Actitis hypoleucos*	磯鷸	WV&PM	C																							+								+								+				+				+			
Common Tailorbird	*Orthotomus sutorius*	長尾縫葉鶯	R	C	+	1		+	1		+		1		+			1	+				+				+		1	+			1		+				+			1	+				+	1	1	1	+	1	1	1	+	1		1
Crested bulbul	*Pycnonotus jocosus*	紅耳鵯	R	C				++	3	2	++	2	1	3	++	3	2	3	++	4		2	++	2	4	2	+	3	3	1	+	2	4	1	+		2		+++	4	5	3	+++	2	2	3	+++	3	2	5	++	2	4	6	++	2	2	8
Crested Goshawk	*Accipiter trivirgatus*	鳳頭鷹	R, CR, Cap.586	U																																																	
Crested Myna	*Acridotheres cristatellus*	八哥	R	C				+		2	+	2		1	++	2			+				+		1		+		1	2	+	3			+		3		+		2		++				++			2	+		3	2	+			3
Crested Serpent Eagle	*Spilornis cheela*	蛇鵬	R, VU, LC, Cap 586	U																																																	
Domestic pigeon	*Columba sp.*	鴿	R	C	+	2		+	1	2	+				++			3	+				+																				+		1	2	+		2											
Dusky Warbler	*Phylloscopus fuscatus*	褐柳鶯	WV	C																																															+		1		+		1	1	+		2	1
Eurasian tree sparrow	*Passer montanus*	麻鷯	R	C				+	2		+				+			1	+	2			++	2	3	5	+				+			2	+	2			++	2		3	+	2			+				+				+			
Fork-tailed Sunbird	*Aethopyga christinae*	叉尾太陽鳥	R	C																																																		
Great Coucal	*Centropus sinensis*	褐翅鴉鵑	R,VU	C	+	1	2	+	1	1	+				+			1	+				+		1		+				+								+				+				+				+			
Great Egret	*Ardea alba*	大白鷺	R,RC	C																																															1	+			1	+			1
Great Tit	*Parus major(commixtus)*	大山雀	R	C																																																+				+			
Green Sandpiper	*Tringa ochropus*	白腰草鷸	PM&WV	C																																																			
Grey Heron	*Ardea cinerea*	蒼鷺	WV,PRC	C																																																		
Grey Wagtail	*Motacilla cinerea*	灰鶺鴒	WV	C							+			1																																					++	2	3	3	++	2	3	3	++		2	2
Japanese White Eye	*Zosterops japonica(simplex)*	暗綠繡眼鳥	R	C																																																++			5	++			5	++			3
Large Hawk Cuckoo	*Cuculus sparverioides*	鷹鵑	SV	U																																																		
Little Egret	*Egretta garzetta*	小白鷺	R,RC	C	+			+			+		1		+		1	1	+		1		+		1	1	+	1		1	+	1			+			1	1	+				+	2	1	1	+	1	2	2	+		2	3	+	1	2	2
Magpie Robin	*Copsychus saularis*	鵲鴝	R	C	+	1		+	1		+		1	1	+	1	1	2	+		1	1	+			1	+	2	1	1	+	1		1	1	+	1			+	1		1	+			1	1	+	1	1	2	+		1	1	+		2	
Night Heron	*Nycticorax nycticorax*	夜鷺	R,LC	C																							+																+				2											
Olive Backed Pipit	*Anthus hodgsoni*	樹鷚	WV	C																							+								+				+								++		3	2	+		1		+			
Oriental Dollarbird	*Eurystomus orientalis*	三寶鳥	PM	U																																																	
Plaintive Cuckoo	*Cacomantis merulinus*	八聲杜鵑	SV	C																																														+							
Plain Prinia	*Prinia inornata*	純色鷦鶯	R	C																																																		
Red-flanked Bluetail	*Tarsiger cyanurus*	紅脇藍尾鴝	WV&PM	C																																																	
Rufous-backed Shrike	*Lanius schach*	棕背伯勞	R	C	+			+			+				+	1			+				+								+								+	1			+				+				+			
Rufous-capped Babbler	*Stachyridopsis ruficeps*	紅頭穗鶥	R, LC	U																																															+		1		+				+			
Scarlet Minivet	*Pericrocotus speciosus*	赤紅山椒鳥	R	C																																																		
Sooty-headed Bulbul	*Pycnonotus aurigaster*	白喉紅臀鵯	R	C																											+	2			+				+															
Spotted Dove	*Streptopelia chinensis*	珠頸斑鳩	R	C	+		1	+	2	1	+++	1	3	4	+	1		2	+			1	+		1		+	2	2	3	+	1		1	+			1	+	1	2		+	1	1	2	++	2	4	3	++	3	2	4	++	2	6	5
Spotted Munia	*Lonchura punctulata*	斑文鳥	R	C																							+				+				+		5		++				++				++				++		7	
Stejneger's Stonechat	*Saxicola stejnegeri*	黑喉石鵖	PM,WV	C																																																	
White Wagtail	*Motacilla alba*	白鶺鴒	WV	C				+	1		+				+			1	+	1			+				+	1	1	1	+		3	1	+				++	2	1	1	+	2		1	++	2	4	2	+		2	1	+		1	2
White-breasted Waterhen	*Amaurornis phoenicurus*	白胸苦惡鳥	R	C	+			+			+				+			1	+				+				+				+				+				+				+				+		1		+				+			
Yellow Bellid Prinia	*Prinia flaviventris*	黃腹鷦鶯	R	C							+							1	+			1	+				+				+	1	1		+				+				+				+	1	1		+		1	3	2
Number of birds						5	8		15	10		5	4	10	0	8	4	17	0	9	8	5	0	11	14	12	0	9	12	13	0	10	9	6	0	7	9	3	0	15	22	11		10	10	14		13	30	34		11	26	32		10	34	37
No. of species					11	4	4	16	10	6	18	3	4	6	0	5	3	10	17	3	5	3	17	4	7	7	21	6	7	8	18	8	5	7	18	5	6	4	20	9	8	7	22	6	8	9	31	9	14	16	32	11	16	17	33	11	18	18

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

SpM – Spring migrant; Sv - Summer visitor

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

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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)

					Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
Common Name	**Species name**	**Chinese name**	**Status**	**Commonness**	Mar-14				Apr-14				May-14				Jun-14				Jul-14				Aug-14				Sep-14				Oct-14				Nov-14				Dec-14				Jan-15				Feb-15			
					Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance			
					C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3
Ashy Drongo	*Dicrurus leucophaeus*	灰卷尾	SWV, LC	U																																															
Barn Swallow	*Hirundo rustica*	家燕	PM	C	+	2	2	1	++	1	3	4	++	3	4	4	+	2		1																															
Black Drongo	*Dicrurus macrocercus*	黑卷尾	Sv	C																																														
Black Kite	*Milvus lineatus*	麻鷹	R, RC, Cap.586	C	+																						+								+				+				+				+			
Black-necked Starling	*Sturnus nigricollis*	黑領椋鳥	R	C	+		2		+			2	+		1	2	+	2		1	+	2	1	2	+	2		2	+	1	2	2	+	2		1	+		2		+	2			+			2	2	+			
Black-throated Laughingthrush	*Garrulax chinensis*	黑喉噪鹛	R	C																																														
Buzzard (Common Buzzard)	*Buteo buteo*	普通鵟	WV, Cap.586	U	+																																								+				+			
Chestnut Bulbul	*Hemixos castanonotus*	栗背短腳鵯	R,WV	C																																														
Chinese Bulbul	*Pycnonotus sinensis*	白頭鵯	R	C	++		2	3	+			2	+				+				+			1	+			2	+	2		3	+			2	+	1		3	+		2	2	+	1		3	+	1		2
Chinese Pond Heron	*Ardeola bacchus*	池鷺	R,RC	C	+	1	3	2	+	1	2	1	+	1	1		+	1	2		+	2	2	1	++	1	2	2	++	2	1	1	++	2	2		++	1			+		1		++	1	2	2	++	1	1	
Common Emerald Dove	*Chalcophaps indica*	綠翅金鳩	R,VU	U																																														
Common Kingfisher	*Alcedo atthis*	普通翠鳥	R	C	+				+				+				+										+				+				+														
Common Koel	*Eudynamys scolopacea*	噪鵑	R	C	+				+				+				+				+								+				+				+												
Common Sandpiper	*Actitis hypoleucos*	磯鷸	WV&PM	C	+				+				+				+																																	
Common Tailorbird	*Orthotomus sutorius*	長尾縫葉鶯	R	C	+	1	2	1	+	1	1		+	1	2	1	+		1		+	1	1	1	+	1	1		+	1	2	1	+		1	1	+	1			++	1	1		++	2	1	1	+	1	1	
Crested bulbul	*Pycnonotus jocosus*	紅耳鵯	R	C	++	3	4	6	++	2	2	5	++	2		4	++	3	2	3	++	2	4	5	++	3	2	4	++	2	4	3	++	3	1	4	++	2	1	3	+++	2	3	2	+++	3	2	4	+++	2	2	4
Crested Goshawk	*Accipiter trivirgatus*	鳳頭鷹	R, CR, Cap.586	U																																														
Crested Myna	*Acridotheres cristatellus*	八哥	R	C	+		2		+				+				+			2	+		3	2	+	2	2	3	+		3	2	+		2	4	+	3	2		+	1			+			2	+			2
Crested Serpent Eagle	*Spilornis cheela*	蛇鵰	R, VU, LC, Cap 586	U	+																																													
Domestic pigeon	*Columba sp.*	鴿	R	C																																											++				++				++			
Dusky Warbler	*Phylloscopus fuscatus*	褐柳鶯	WV	C	+	1	1		+		1		+				+				+				+		1		+	1			+	1	1		+	1		1	++				++	1	2	1	++		1	
Eurasian tree sparrow	*Passer montanus*	麻鷓	R	C	+		2		+				+	2			+		2	1	+	2		1	+		3	2	+	3	2		+	2		3	+			2	+++		5	3	+++	2	4	3	+++		3	2
Fork-tailed Sunbird	*Aethopyga christinae*	叉尾太陽鳥	R	C																																														
Great Coucal	*Centropus sinensis*	褐翅鴉鵑	R,VU	C	+				+				+				+				+				+		1		+	1			+		1		+				+				+		1		+		1	
Great Egret	*Ardea alba*	大白鷺	R,RC	C	+			1	+																																						+				+			
Great Tit	*Parus major(commixtus)*	大山雀	R	C	+				+																																											
Green Sandpiper	*Tringa ochropus*	白腰草鷸	PM&WV	C	+				+				+				+																																			
Grey Heron	*Ardea cinerea*	蒼鷺	WV,PRC	C																																															
Grey Wagtail	*Motacilla cinerea*	灰鶺鴒	WV	C	++	1	3	2	+		1	1	+								+				+		1	1	+			1	+		1		+		1	2	+	1	2	1								
Japanese White Eye	*Zosterops japonica(simplex)*	暗綠繡眼鳥	R	C	++			6	+	3		4	+			6	++	4	2	3	++			4	++	2	2	5	+			3	+				+			+			3	+			4	+			3			
Large Hawk Cuckoo	*Cuculus sparverioides*	鷹鵑	SV	U									+																															+							
Little Egret	*Egretta garzetta*	小白鷺	R,RC	C	+	1	1	2	+		1	1	+	1	2	1	+		2	2	+	1	2	1	+	1	2	2	+	2	3	2	+	1	2	1	+	1	2	2	+	2	1	1	+	1	2	1	+	2	1	1
Magpie Robin	*Copsychus saularis*	鵲鴝	R	C	+	1	2	1	+	1	1	2	+	1	1	1	+	1	2	2	+	1	1	1	+	1	1	1	+	1	2	1	+	1		1	+	1	1	1	+		1		+	1	1	2	+	1		1
Night Heron	*Nycticorax nycticorax*	夜鷺	R,LC	C																																														
Olive Backed Pipit	*Anthus hodgsoni*	樹鷚	WV	C	+																																													
Oriental Dollarbird	*Eurystomus orientalis*	三寶鳥	PM	U																																													
Plaintive Cuckoo	*Cacomantis merulinus*	八聲杜鵑	SV	C	+				+				+				+																																	
Plain Prinia	*Prinia inornata*	純色鷦鶯	R	C																																													
Red-flanked Bluetail	*Tarsiger cyanurus*	紅脇藍尾鴝	WV&PM	C																																													
Rufous-backed Shrike	*Lanius schach*	棕背伯勞	R	C	+				+				+				+				+	1			+		1		+				+				+	1			+				+			1				
Rufous-capped Babbler	*Stachyridopsis ruficeps*	紅頭穗鶥	R, LC	U	+				+				+								+				+				+				+				+				+				+							
Scarlet Minivet	*Pericrocotus speciosus*	赤紅山椒鳥	R	C																																														
Sooty-headed Bulbul	*Pycnonotus aurigaster*	白喉紅臀鵯	R	C																																														
Spotted Dove	*Streptopelia chinensis*	珠頸斑鳩	R	C	++	3	4	4	++	2	3	4	++	3	4	3	++	2	3	1	++	3	4	4	++	2	3	3	++	3	3	5	++	4	2	3	++	3	3	4	+	1	2	2	+	2	3	4	++	2	3	3
Spotted Munia	*Lonchura punctulata*	斑文鳥	R	C	++		4		++		6		++		8						+		2		+		3		+		6		+		7		+	6	5		+	5			+		5		+			
Stejneger's Stonechat	*Saxicola stejnegeri*	黑喉石鵖	PM,WV	C																																														
White Wagtail	*Motacilla alba*	白鶺鴒	WV	C	+	1	2	1	+		1	1	+		2	1	+		1		+	1	2	2	+	2	2	1	+	2	2	1	+	1	2	2	++	1	2	2	++	1	2	2	++	1	2	2
White-breasted Waterhen	*Amaurornis phoenicurus*	白胸苦惡鳥	R	C	+				+				+				+				+				+				+				+				+				+				+			1				
Yellow Bellid Prinia	*Prinia flaviventris*	黃腹鷦鶯	R	C	+	1	2	1	+	1		1	+	1	1	1	+		1	1	+	1	1	1	+	1	1		+	1	2	1	+	1	1	1	+		1	1	+				+				+			
Number of birds						16	38	31		12	22	28		15	26	24		15	18	17		16	24	26		18	28	28		23	35	28		19	24	23		21	20	20		15	19	15		15	16	17		12	19	21
No. of species					34	13	19	17	32	9	11	12	27	9	10	10	23	8	11	10	20	12	14	14	20	13	17	15	23	17	17	15	23	17	17	15	23	19	17	16	21	9	11	7	24	10	13	14	25	9	12	10

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

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

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

Common Name	Species name	Chinese name	Status	Commonness	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
					Mar-15				Apr-15				May-15				Jun-15				Jul-15				Aug-15				Sep-15				Oct-15				Nov-15				Dec-15				Jan-16				Feb-16			
					Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance				Abundance			
					C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3	C	T1	T2	T3
Ashy Drongo	*Dicrurus leucophaeus*	灰卷尾	SWV, LC	U																																	+		1						+			1				
Barn Swallow	*Hirundo rustica*	家燕	PM	C	+	1	2		++		2	2	++	2		2	++	2		2	++		2	2	++	4			++			4																				
Black Drongo	*Dicrurus macrocercus*	黑卷尾	Sv	C													+			2																					++			7								
Black Kite	*Milvus lineatus*	麻鷹	R, RC, Cap.586	C	+		1		+		1																																+		2							
Black-necked Starling	*Sturnus nigricollis*	黑領椋鳥	R	C	++		2	2	++		2	2	++	2	2	2	++	1		2	++	2		2	++		3		++		2	2	++		3		+				1	+				+				+	3		
Black-throated Laughingthrush	*Garrulax chinensis*	黑喉噪鹛	R	C					+		1		+		2		+				2				+		1		+		1		+		1																
Buzzard (Common Buzzard)	*Buteo buteo*	普通鵟	WV, Cap 586	U																																					+			1					+							
Chestnut Bulbul	*Hemixos castanonotus*	栗背短脚鵯	R,WV	C																																								++			6		++			5		
Chinese Bulbul	*Pycnonotus sinensis*	白頭鵯	R	C	++	2		3	++	1		2	++	2		2	++	3	1	2	++	2	2	2	++		2	2	+		3		++	3	3		++		3	2	++		3	2	++	2	2	4	++	3	3	4
Chinese Pond Heron	*Ardeola bacchus*	池鷺	R,RC	C	+	1	1		+	1			+	1			+	1				+			1	+	1			+			1	+			+				1	+			1	+		1		+			
Common Emerald Dove	*Chalcophaps indica*	綠翅金鳩	R,VU	U																					+		1																								
Common Kingfisher	*Alcedo atthis*	普通翠鳥	R	C													+	1																							+		1		+		1						
Common Koel	*Eudynamys scolopacea*	噪鵑	R	C	+		1		+		1		+		1		+		1	1																							+				+						
Common Sandpiper	*Actitis hypoleucos*	磯鷸	WV&PM	C																	+			1	+		1																								
Common Tailorbird	*Orthotomus sutorius*	長尾縫葉鶯	R	C	+	1	1		+	1		1	+	1		1	+		1	1	+	2	2		++	2	2		++	1	2		++				++		1	1	+				+	1	2		+		2	1
Crested bulbul	*Pycnonotus jocosus*	紅耳鵯	R	C	+++	3	1	4	+++	3	2	3	+++	4	3	3	+++	5	4	4	+++	5	5	7	+++	3	3	8	+++	5	9	5	+++	5	5	7	+++	7	3	4	+++	7	6	7	+++	3	12	5	+++	2	15	3
Crested Goshawk	*Accipiter trivirgatus*	鳳頭鷹	R, CR, Cap.586	U					+			1																				+										+										
Crested Myna	*Acridotheres cristatellus*	八哥	R	C	++		2	3	++		1	3	++		2	3	++	3	2	3	++	2	2	1	++			3	++			2	+		3		+		3						+				+			
Crested Serpent Eagle	*Spilornis cheela*	蛇鵬	R, VU, LC, Cap 586	U	+								+												+		1		+		1		+		1										+			1				
Domestic pigeon	*Columba sp.*	鴿	R	C																																																
Dusky Warbler	*Phylloscopus fuscatus*	褐柳鶯	WV	C	+		1		+		1		+		1		+		1		+	1	1		+	1	1		+	1	1		+	1	1		+		1	1	+		1	1	+		3				
Eurasian tree sparrow	*Passer montanus*	麻鷯	R	C	++	2		2	++	2	2	2	++	3	2	2	++	2	3	3	++	3	3	3	++		2	4	++		3	3	+++		6	3	++		3	4	++		6	5	++	3	4	6	++	4		5
Fork-tailed Sunbird	*Aethopyga christinae*	叉尾太陽鳥	R	C					+			2													+		2		+		1												+				+				
Great Coucal	*Centropus sinensis*	褐翅鴉鵑	R,VU	C	+		1		+		1		+		1										+		1																+		1		+			3	
Great Egret	*Ardea alba*	大白鷺	R,RC	C																									+	1																				
Great Tit	*Parus major(commixtus)*	大山雀	R	C																																															
Green Sandpiper	*Tringa ochropus*	白腰草鷸	PM&WV	C																																	+		1		+			1	+			1				
Grey Heron	*Ardea cinerea*	蒼鷺	WV,PRC	C					+			1																													+				1							
Grey Wagtail	*Motacilla cinerea*	灰鶺鴒	WV	C	+		1	1	+		1	1	+		1	1	+		1		+			1	+			1	+	1		1	+				+	1			+	1		1	+			1	+	1		
Japanese White Eye	*Zosterops japonica(simplex)*	暗綠繡眼鳥	R	C	+			4	+			3	+		2	3	+			3	+		3	3	+	3	3		+	3	3										++		5	3	++		7	6	++	3		4
Large Hawk Cuckoo	*Cuculus sparverioides*	鷹鵑	SV	U	+				+				+				+																																			
Little Egret	*Egretta garzetta*	小白鷺	R,RC	C	+	1	1	2	+		1	1	+	1		1	+	1			1	+			1	+						+		1		1	+			1	+	1			+	1			+	1		
Magpie Robin	*Copsychus saularis*	鵲鴝	R	C	++	1	2	1	+	1	2	1	+	2	2	1	+	1	2	2	+	2		2	+		1	2	+		2	2	+	1	2		+	1	2	1	+		2		+		2	2	+		2	2
Night Heron	*Nycticorax nycticorax*	夜鷺	R,LC	C																																															
Olive Backed Pipit	*Anthus hodgsoni*	樹鷚	WV	C																																													++			
Oriental Dollarbird	*Eurystomus orientalis*	三寶鳥	PM	U																					+		1		+		3																			
Plaintive Cuckoo	*Cacomantis merulinus*	八聲杜鵑	SV	C	+				+																																										
Plain Prinia	*Prinia inornata*	純色鷦鶯	R	C																																				++				+				+			
Red-flanked Bluetail	*Tarsiger cyanurus*	紅脇藍尾鴝	WV&PM	C																																												+		1	
Rufous-backed Shrike	*Lanius schach*	棕背伯勞	R	C	+		1		+			1	+			1	+			1	+	1			+	1			+		1	+	1		1	+		1	+				+			1	+			1
Rufous-capped Babbler	*Stachyridopsis ruficeps*	紅頭穗鹛	R, LC	U	+				+				+				+					+		1	+		1		+			1											+				+				
Scarlet Minivet	*Pericrocotus speciosus*	赤紅山椒鳥	R	C	+																																															
Sooty-headed Bulbul	*Pycnonotus aurigaster*	白喉紅臀鵯	R	C													+				1																															
Spotted Dove	*Streptopelia chinensis*	珠頸斑鳩	R	C	++	3	3	1	++	3	1	2	++	2	2	2	++	2	2	2	++	3	3	4	++	2	3	2	++	3	3	4	++	3	5	5	++		2	5	++		3	4	++	3	1	4	++	4	2	5
Spotted Munia	*Lonchura punctulata*	斑文鳥	R	C																									+			3	+		4		++		5												
Stejneger's Stonechat	*Saxicola stejnegeri*	黑喉石鵖	PM,WV	C																																	+								+						
White Wagtail	*Motacilla alba*	白鶺鴒	WV	C	+		1	2	+		1	1	+		1	1	+		1	1	+		1	1	+		1		+			1	+			3	+			1	+	1		1	+	1		1	+	1		
White-breasted Waterhen	*Amaurornis phoenicurus*	白胸苦惡鳥	R	C	+		1		+		1		+		1		+		1										+		1																			
Yellow Bellid Prinia	*Prinia flaviventris*	黃腹鷦鶯	R	C	+	1	1		+		1		+		1		+		1		1	1	+				+			1			+										+				+				
Number of birds						12	19	21		12	21	29		20	24	25		24	24	34		21	24	33		17	31	23		14	37	29		15	35	21		10	25	24		10	27	34		14	42	32		22	34	28
No. of species					26	9	12	10	28	8	18	18	24	11	15	14	25	11	13	18	19	10	12	15	25	8	19	8	24	6	16	11	21	7	12	7	20	4	11	13	21	4	8	12	27	7	13	11	27	9	9	9

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

SpM – Spring migrant; Sv - Summer visitor

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

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

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

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

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

RC : Regional concern Fellowes *et al* (2002)

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

PRC: Potential Regional concern Fellowes *et al* (2002)

CR: Rare in China Red Data Book Status

VU: Vulnerable in China Red Data Book Status

Table 4.4. Odonate species recorded at the She Shan River

					Baseline monitoring		Impact monitoring				Impact monitoring						Post construction monitoring								
Species name	Common name	Chinese name	Status	Commo--nness	Jul-08	Aug-08	Jan-09	Jul-09	Jan-10	Jul-10	Jan-11	Jul-11	Jan-12	Jul-12	Jul-13	Dec-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14
Agriocnemis pygmnalis	Wandering Midget	黃尾小蟌	NP	VC																+					
Brachythemis contaminata	Asian Amberwing	黃翅蜻	NP	VC										+											
Ceriagrion auranticum ryukyuanum	Orange-tailed Sprite	琉球橘黃蟌	NP	VC																+	++	+		+	
Copera ciliata	Black-knees Featherleg	白狹扇蟌	NP	VC																+					
Copera marginipes	Yellow Featherlegs	黃狹扇蟌	NP	VC										+						+		+		+	+
Crocothemis servilia servilia	Crimson Darter	紅蜻	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	C																					
Neurobasis chinensis chinensis	Chinese Greenwing	華艷色蟌	NP	VC								+							+						
Neurothemis fulvia	Russet Percher	網脈蜻	NP	VC						+												+	+		
Orthetrum chrysis	Red-faced Skimmer	華麗灰蜻	NP	VC	+	+	+	+		+						+									
Orthetrum glaucum	Common blue skimmer	黑尾灰蜻	NP	VC			+								+						+				
Orthetrum luzonicum	Marsh Skimmer	呂宋灰蜻	NP	VC								+									+	+			
Orthetrum pruinosum neglectum	Common Red Skimmer	赤褐灰蜻	NP	VC								++			+						++	++	+	+	+
Orthetrum Sabina sabina	Green Skimmer	狹腹灰蜻	NP	C	+	+															+				+
Pantala flavescens	Wandering Glider	黃蜻	NP	VC	+	+			+	+	+	+++	+	+	+	+	+								
Prodasineura autumnalis	Black Threadtail	烏幽原蟌	NP	VC								+			+						+	+			
Pseudagrion pruinosum fraseri	Ferruginous-faced Sprit	赤斑蟌	NP	C																					
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	斑翼翅蜻	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,PG	VC																		+	+	+	
No of Species					6	4	3	4	1	6	1	11	1	4	10	4	6	6	8	7	9	13	9	11	9

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

Table 4.4. Odonate species recorded at the She Shan River

					Post construction monitoring								Post construction monitoring								
Species name	Common name	Chinese name	Status	Commo--nness	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16
Agriocnemis pygmnalis	Wandering Midget	黃尾小蟌	NP	VC																	
Brachythemis contaminata	Asian Amberwing	黃翅蜻	NP	VC																	
Ceriagrion auranticum ryukyuanum	Orange-tailed Sprite	琉球橘黃蟌	NP	VC						+	+	+	+	+	+	+					
Copera ciliata	Black-knees Featherleg	白狹扇蟌	NP	VC																	
Copera marginipes	Yellow Featherlegs	黃狹扇蟌	NP	VC	+					+	+	+	+	+	+	+					
Crocothemis servilia servilia	Crimson Darter	紅蜻	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	C																	
Neurobasis chinensis chinensis	Chinese Greenwing	華艷色蟌	NP	VC	+	+				+	+	+			+	+	+	+			
Neurothemis fulvia	Russet Percher	網脈蜻	NP	VC						+	+	+	+	+	+	+					
Orthetrum chrysis	Red-faced Skimmer	華麗灰蜻	NP	VC											+	+	+	+		+	
Orthetrum glaucum	Common blue skimmer	黑尾灰蜻	NP	VC																	
Orthetrum luzonicum	Marsh Skimmer	呂宋灰蜻	NP	VC									+	+							
Orthetrum pruinosum neglectum	Common Red Skimmer	赤褐灰蜻	NP	VC	+						+	+	+	+							
Orthetrum Sabina sabina	Green Skimmer	狹腹灰蜻	NP	C	+												+	+			
Pantala flavescens	Wandering Glider	黃蜻	NP	VC	+	+						+	+	+	+	+	+	+	+	+	+
Prodasineura autumnalis	Black Threadtail	烏幽原蟌	NP	VC							+	+	+	+	+						
Pseudagrion pruinosum fraseri	Ferruginous-faced Sprit	赤斑蟌	NP	C																	
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,PG	VC																	
No of Species					11	7	2	2	1	5	10	12	13	13	13	12	9	7	2	3	1

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

Table 4.5 Aquatic Macro invertebrates recorded at She Shan River.

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

Species	Chinese name	Sampling location		Baseline monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring			
				Jul-08		Aug-08		Jan-09				Jul-09				Jan-10				Jul-10				Jan-11				Jul-11				Jan-12				Jul-12			
		Status	Common-ness	Upper stream	Lower stream	Upper stream	Lower stream	Referen	T1	T2	T3	Referen	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Referenc	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
Mollusks																																							
Anodonta woodiana	背角無齒蚌	NP	VC																			+																	
Biomphalaria sp.	--	NP	VC	+	+	+	+	+		+	+	+			+	+		+		+		+		+		+	+			+	+			+	+	+	
Brotia hainanensis	--	NP	VC	+	+	+	+	+		+		+				+		+		+	+	+		+				+	+			+				+			
Corbicula fluminea	河蜆	NP	VC																			+								+									
Melanoides tuberculata	瘤擬黑螺	NP	VC	+	+	+	++				+				+	+		+		+		+	+	++	++	+	+		+	+	+		+		+	+	+	+	+
Pomacea canaliculata	蘋果螺	NP	VC	+	++	+	+	+		+	+	+			+	+		++		+	+	++	++	+	+++	+++	+++	+	++	++	+++	+	+	+	+	+	+	+	+
Radix plicatulus	--	NP	VC	+	+	+	+	+			+	+			+	+		+		+	+	+		+	+	+	+	+	+	+	++	+	+	+	+	+	+	+	+
Sinotaia quadrata	田螺	NP	VC	+	+	+	++	+			+	+			+	+		++		+	+	++	++	+	+++	++	++	+	+++	++	+	+	+	+	+	+	+	+	+
Insects																																							
Baetis sp.		NP	VC	+	+	+	+	+		+	+	+			+	+		+		+	+	+		+	+	+	+	+	+	+		+				+	+		
Caenis sp.	--	NP	VC	+	+	+	+	+			+	+			+	+		+		+		+		+															
Chironomus sp.	蠓幼虫	NP	VC	+	+	++	++	+		+	+	+			+	+		+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Euphaea sp.		NP	VC																																				
Indobaetis sp.	--	NP	VC	+	+	+	+	+		+	+	+			+	+		+		+	+	+		+	+	+	+	+	+	+		+							
Odonate larvae		NP	VC																																				
Orthetrum spp.	--	NP	VC							+	+				+						+	+			+	+	+	+	+	+	+	+	+			+	+	+	
Pseudagrion spp.	--	NP	UC												+																									
Pseudocloeon sp.	--	NP	VC	+	+	+	+				+				+																									
Serratella sp.		NP	VC	+	+	+	+											+				+																		
Crustaceans																																							
Caridina cantanensis	廣東米蝦	NP	VC																																				
Cryptopotamon anacoluthon	鰓刺溪蟹	NP	VC																																				
No of Species				12	12	12	12	9	0	7	11	9	0	0	12	10	0	11	0	10	8	14	4	10	9	9	8	10	10	9	7	11	7	6	5	9	8	7	5

Note: NP – Not protected in Hong Kong;

Ꝑ - protected species in Hong Kong

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

“+” – Species exists in the study area

“++” – Species common in the study area

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

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

Table 4.5 Aquatic Macro invertebrates recorded at She Shan Rive

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

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

Note: NP – Not protected in Hong Kong;

Ꝑ - protected species in Hong Kong

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

"+" – Species exists in the study area

"++" – Species common in the study area

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

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

Table 4.5 Aquatic Macro invertebrates recorded at She Shan Rive

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

Species	Chinese name	Sampling location		Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
				Aug-14				Sep-14				Oct-14				Nov-14				Dec-14				Jan-15				Feb-15				Mar-15				Apr-15				May-15			
		Status	Common-ness	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
Mollusks																																													
Anodonta woodiana	背角無齒蚌	NP	VC																																										
Biomphalaria sp.	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+				+				+	+				+		+	+	+		+	+	+		+	+	+	
Brotia hainanensis	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+			+	+	+		+		+		+	+	+		+	+	+		+	+	+	
Corbicula fluminea	河蜆	NP	VC			+	+			+	+			+				+				+																						
Melanoides tuberculata	瘤擬黑螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Pomacea canaliculata	蘋果螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Radix plicatulus	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Sinotaia quadrata	田螺	NP	VC	+	+	++	+	+	+	++	+	+	+	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++
Insects																																													
Baetis sp.		NP	VC		+	+		+	+	+		+	+	+		+	+	+				+				+						+						+						+	
Caenis sp.	--	NP	VC																																									
Chironomus sp.	蠓幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Euphaea sp.		NP	VC			+				+								+				+										+						+						+	
Indobaetis sp.	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+		+		+	+	+			+	+		+	+	+						+	+	+	
Odonate larvae		NP	VC																																		+								
Orthetrum spp.	--	NP	VC	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+					+	+	+	+	+	+
Pseudagrion spp.	--	NP	UC	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+		+		+	+	+		+	+	+			+	+			+	+			+	+	
Pseudocloeon sp.	--	NP	VC			+		+	+	+		+	+	+		+		+		+		+		+		+								+	+	+	+							
Serratella sp.		NP	VC		+	+																			+	+		+					+				+	+			+					
Crustaceans																																													
Caridina cantanensis	廣東米蝦	NP	VC																																										
Cryptopotamon anacoluthon	鰓刺溪蟹	NP	VC																																									
No of Species				10	12	15	6	12	12	14	8	12	12	13	7	12	11	13	7	10	8	13	6	10	11	14	6	7	10	12	6	9	12	13	6	9	12	13	6	9	12	13	6

Note: NP – Not protected in Hong Kong;

Ᵽ - protected species in Hong Kong

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

“+” – Species exists in the study area

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

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

Table 4.5 Aquatic Macro invertebrates recorded at She Shan Rive

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

Species	Chinese name	Sampling location		Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
				Jun-15				Jul-15				Aug-15				Sep-15				Oct-15				Nov-15				Dec-15				Jan-16				Feb-16			
		Status	Common-ness	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
Mollusks																																							
Anodonta woodiana	背角無齒蚌	NP	VC																																				
Biomphalaria sp.	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
Brotia hainanensis	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
Corbicula fluminea	河蜆	NP	VC			+				+				+				+				+				+				+				+				+	
Melanoides tuberculata	瘤擬黑螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+
Pomacea canaliculata	蘋果螺	NP	VC	+	++	++	++	++	++	++	++	++	++	++	++	++	++	++	++	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+
Radix plicatulus	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Sinotaia quadrata	田螺	NP	VC	+	+	+	++	+	+	+	++	+	+	+	++	+	+	+	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+	+	++	++	+
Insects																																							
Baetis sp.		NP	VC			+				+				+				+				+				+				+				+				+	
Caenis sp.	--	NP	VC																																				
Chironomus sp.	蠓幼虫	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Euphaea sp.		NP	VC		+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+	
Indobaetis sp.	--	NP	VC	+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+		+	+	+	
Odonate larvae		NP	VC											+			+	+			+	+			+	+			+	+			+	+			+	+	
Orthetrum spp.	--	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Pseudagrion spp.	--	NP	UC		+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+			+	+	
Pseudocloeon sp.	--	NP	VC																																				
Serratella sp.		NP	VC		+				+				+				+				+				+				+				+				+			
Crustaceans																																							
Caridina cantanensis	廣東米蝦	NP	VC							+				+				+				+				+				+				+				+	
Cryptopotamon anacoluthon	鰓刺溪蟹	NP	VC															+				+				+				+				+				+	
No of Species				9	12	13	6	9	12	14	6	9	12	15	6	9	13	15	6	9	13	15	6	9	13	15	6	9	14	15	6	9	14	15	6	9	14	15	6

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

				Baseline monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring			
				Jul-08		Aug-08		Jan-09				Jul-09				Jan-10				Jul-10				Jan-11				Jul-11			
Species		Status	Commonness	Upper stream	Lower stream	Upper stream	Lower stream	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Referenc	T1	T2	T3
Channa maculata	斑鱧	NP	C																												
Clarias gariepinus	革胡子鯰	NP	VC																												
Gambusia affinis	食蚊魚	NP	VC			++	++	+		+	+	+				+		+		+		+	+	+	+	+		+		+	+
Misgurnus anguillicaudatus	泥鰍	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 fish number		80	60	80	60	30		15	45	30	0	0	300	30	0	13		20	5	20	200	22	16	3	0	6	4	2	3
		No of Species		4	4	9	9	6	1	6	9	7	1	0	5	7	1	6	0	7	3	9	8	8	6	1	0	8	0	2	1
Amphibian																															
Paramesotriton hongkongensis	香港瘰螈	P, Cap 170, NT, PGC	R																												

Note: NP – Not protected in Hong Kong

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"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

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

				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
				Jan-12				Jul-12				Jul-13				Dec-13				Jan-14				Feb-14				Mar-14			
Species		Status	Commonness	Reference	T1	T2	T3	Reference	T1	T2	T3	Referenc	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
Channa maculata	斑鱧	NP	C																					+				+	+	+	
Clarias gariepinus	革胡子鯰	NP	VC																					+				+			
Gambusia affinis	食蚊魚	NP	VC	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Misgurnus anguillicaudatus	泥鰍	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 fish number		8	2	4	0	4	2	2	0	5	3	4	2	5	3	4	2	12	16	30	40	30	40	50	60	60	60	70	70
		No of Species		8	6	1	0	9	7	7	3	9	8	8	3	8	8	7	6	8	8	7	7	12	8	7	7	12	11	11	8
Amphibian																															
Paramesotriton hongkongensis	香港瘰螈	P, Cap 170, NT, PGC	R																	+				+		+		+	+	+	

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

				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
				Apr-14				May-14				Jun-14				Jul-14				Aug-14				Sep-14				Oct-14				Nov-14				Dec-14			
Species		Status	Commonness	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
Channa maculata	斑鱧	NP	C	+	+	+		+	+	+		+	+			+	+			+	+	+		+	+	+			+	+			+	+					
Clarias gariepinus	革胡子鯰	NP	VC	+						+				+				+	+					+	+					+						+	
Gambusia affinis	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Misgurnus anguillicaudatus	泥鰍	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 fish number		40	40	50	40	20	10	20	10	12	5	8	6	16	8	10	10	12	10	16	12	20	20	30	16	40	30	40	30	50	50	60	50	60	50	50	40
		No of Species		12	11	12	9	10	10	13	9	10	9	11	9	9	8	11	10	9	9	12	10	9	9	12	10	8	9	11	10	8	9	12	8	7	6	11	9
Amphibian																																							
Paramesotriton hongkongensis	香港瘰螈	P, Cap 170, NT, PGC	R			+				+				+				+				+				+				+				+				+	

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

				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
				Jan-15				Feb-15				Mar-15				Apr-15				May-15				Jun-15				Jul-15				Aug-15			
Species		Status	Commonness	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
Channa maculata	斑鱧	NP	C		+				+				+				+				+	+				+				+			
Clarias gariepinus	革胡子鲶	NP	VC			+				+				+	+				+				+	+				+	+				+	+
Gambusia affinis	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Misgurnus anguillicaudatus	泥鰍	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	越南隱鰭鮠	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 fish number		50	40	40	50	40	30	40	40	40	40	50	50	30	35	55	45	20	10	20	10	20	10	20	10	15	8	15	8	20	10	20	10
		No of Species		7	8	11	8	7	9	12	8	8	10	12	9	8	10	12	9	8	9	13	10	8	8	13	10	8	8	13	10	8	8	13	7
Amphibian																																			
Paramesotriton hongkongensis	香港瘰螈	P, Cap 170, NT, PGC	R			+				+				+				+				+				+									

Note: NP – Not protected in Hong Kong

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

'V" - Vulerable - in Red China Data Book

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

				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
				Sep-15				Oct-15				Nov-15				Dec-15				Jan-16				Feb-16			
Species		Status	Commonness	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3
Channa maculata	斑鱧	NP	C			+				+				+				+				+				+	
Clarias gariepinus	革胡子鯰	NP	VC			+	+			+	+			+	+			+	+			+	+			+	+
Gambusia affinis	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Misgurnus anguillicaudatus	泥鰍	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 fish number		20	12	23	12	35	35	25	20	45	45	35	30	55	50	40	35	55	45	35	25	60	45	40	30
		No of Species		8	8	13	6	8	8	13	6	8	8	13	6	8	8	13	6	8	8	12	7	8	8	12	7
Amphibian																											
Paramesotriton hongkongensis	香港瘰螈	P, Cap 170, NT, PGC	R															+				+				+	

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

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

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

	Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Post construction monitoring			ost construction monitorin			ost construction monitorin			Post construction monitoring			Post construction monitoring		
Parameter / date	Jan-12			Jul-12			Jul-13			Dec-13			Jan-14			Feb-14			Mar-14			Apr-14			May-14		
Replicate	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
DO (mg/L)	8.6	8.2	8.8	7.7	7.7	6.3	7.8	7.8	7.7	8.7	8.6	9.2	8.3	8.2	8.6	7.2	7.6	7.8	7.1	7.2	7.2	7.3	7.5	7.6	7.8	7.6	7.7
pH	6.9	6.6	7.1	6.7	6.6	6.6	6.8	7.2	7.6	6.6	6.9	7.1	6.8	7.3	7.4	7.8	6.7	7.6	7.2	6.8	7.5	6.6	7.3	7.2	7.5	7.5	7.4
Nitrate (mg N/L)	0.2	0.2	0.4	0.84	0.86	1.14	0.6	0.61	0.7	0.78	0.63	0.53	1.2	1.12	1.02	1.5	1.2	1.6	1.2	1.1	0.77	0.6	0.8	1.2	1.1	1.0	1.1
Ammonia (mg N/L)	0.2	0.2	0.3	0.05	0.02	1.08	0.14	0.06	0.05	0.08	<0.01	0.42	1.9	1.8	1.73	0.8	1.2	1.4	0.4	0.6	0.01	0.6	0.5	0.8	< 0.1	< 0.1	< 0.1
Salinity (ppt)	0	0	0	0.03	0.04	0.07	0.03	0.03	0.04	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.04	0.04	0.06
Conductivity (µS/cm)	122	118	126	121	120	160	94	97	97	116	116	134	124	118	132	128	113	132	123	136	140	112	116	120	124	121	123
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
Water flow at pool (m/s)	0.2	0.05	0.1	0.2	0.05	0.1	0.2	0.05	0.1	0.1	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1-0.2	0.1-0.2	0.1-0.2
Water flow at riffle (m/s)	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2-0.4	0.2-0.3	0.2-0.4	0.2-0.5	0.2-0.4	0.2-0.5
Sand (%)	10	25	5	10	25	5	15	25	5	15	10	5	15	10	5	15	10	5	15	10	5	10	10	5	5	5	5
Stone (%)	45	65	5	45	65	5	65	65	15	65	80	20	65	80	20	65	80	20	65	80	20	70	80	30	80	80	30
Mud (%)	5	10	10	5	10	10	10	10	10	10	10	5	10	10	5	10	10	5	10	10	5	10	10	5	5	5	2
Concrete (%)	40	0	80	40	0	80	10	0	70	10	0	70	10	0	70	10	0	70	10	0	70	10	0	60	10	10	63

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

	Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring		
Parameter / date	Jun-14			Jul-14			Aug-14			Sep-14			Oct-14			Nov-14			Dec-14			Jan-15		
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)	7.6	7.8	7.4	7.7	7.7	7.4	7.2	7.2	7.4	7.8	7.0	8.1	7.8	8.0	7.5	7.6	8.1	7.6	8.5	8.6	8.6	8.6	8.6	8.7
pH	7.5	7.5	7.4	7.4	7.5	7.3	7.2	7.3	7.1	8.2	8.2	8.2	8.4	8.3	8.1	7.9	8	7.8	8.2	8.5	8.4	9.0	8.8	8.8
Nitrate (mg N/L)	0.5	0.6	0.6	0.8	0.6	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.3	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4	0.4	0.5	0.4
Ammonia (mg N/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	0.04	0.05	0.05	0.04	0.05	0.05	0	0	0	0.03	0.04	0.03	0.03	0.03	0.04	0.01	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.03
Conductivity (µS/cm)	118	115	119	110	113	111	120	116	108	125	125	123	113	114	116	110	96	106	127	132	121	156	162	147
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.1-0.2	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)	0.2-0.5	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 (%)	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 (%)	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 (%)	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 (%)	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63

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

	Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring		
Parameter / date	Feb-15			Mar-15			Apr-15			May-15			Jun-15			Jul-15			Aug-15		
Replicate	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
DO (mg/L)	8.5	8.6	8.4	8.6	8.5	8.4	8.3	8.4	8.1	8.3	8.1	8.2	8.3	8.1	8.2	8.2	8.0	8.2	8.1	8.0	8.1
pH	9.1	8.9	8.7	8.6	8.5	8.5	8.6	8.5	8.5	8.1	8.2	8.1	7.8	7.7	7.8	7.8	7.7	7.9	7.6	7.7	7.6
Nitrate (mg N/L)	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	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
Salinity (ppt)	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.03	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.02	0.01	0.01	0.02
Conductivity (µS/cm)	152	153	155	142	138	137	142	138	137	36	39	45	36	39	45	39	45	28	32	38	46
BOD (mg/L)	<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)	0.1-0.2	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)	0.2-0.5	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 (%)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Stone (%)	80	80	30	80	80	30	80	80	30	80	80	30	80	80	30	80	80	30	80	80	30
Mud (%)	5	5	2	5	5	2	5	5	2	5	5	2	5	5	2	5	5	2	5	5	2
Concrete (%)	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63

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

	Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring			Post construction monitoring		
Parameter / date	Sep-15			Oct-15			Nov-15			Dec-15			Jan-16			Feb-16		
Replicate	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
DO (mg/L)	8	8.1	8.2	8.1	7.9	8	7.9	7.8	7.9	8	7.8	8	7.8	7.7	7.8	8.0	8.0	8.0
pH	7.7	7.7	7.5	7.5	7.5	7.6	7.6	7.5	7.5	7.6	7.6	7.5	7.9	7.8	7.8	7.7	7.7	7.8
Nitrate (mg N/L)	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
Salinity (ppt)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.02	0.01	0.01
Conductivity (µS/cm)	29	31	32	33	32	39	30	29	36	32	29	42	29	35	32	56	32	33
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2
Water flow at riffle (m/s)	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5
Sand (%)	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5
Stone (%)	80	80	30	80	80	30	80	80	30	80	80	30	80	80	30	80	80	30
Mud (%)	5	5	2	5	5	2	5	5	2	5	5	2	5	5	2	5	5	2
Concrete (%)	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63

Agreement No. CE65/2013(EP) Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River – Investigation
Post-Construction Ecological Monitoring Report (No. 26) Upper Tai Po River

February 2016

Prepared by : Mike Pang		March 10, 2016
Validated by:Mark Shea		March 10, 2016
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Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River – Investigation Agreement No. CE65/2013(EP)

Post-Construction Ecological Monitoring Report (No.26) Upper Tai Po River

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1 Introduction

1.1 The current post-construction ecological monitoring programme is under Agreement No. CE65/2013(EP) Post-Construction Ecological Monitoring of River Improvement Work in Upper Lam Tsuen River, She Shan River and Upper Tai Po River. The collected data are mainly used to assess ecological recovery process and effectiveness of ecological migration proposed and enforced during the construction period.

1.2 The scope of the ecological monitoring was detailed in EM & A Manual of the project. In brief, the survey aimed to collect data on abiotic factors such as water quality, substratum characteristics, water flow as well as flora and fauna.

1.3 China Hong Kong Ecology Consultants Ltd. was committed by Allied Environmental Consultants Ltd (AEC) to undertake the ecological monitoring tasks for the project from December 2014.

1.4 This is the number 26 post-construction ecological monitoring report for the project conducted **on 16th February 2016**. It contains the following subsections:

- Summary of major points
- Monitoring Methods and Results
- Summary and Comments

2 Summary of Major Points

- Fauna and flora along the drainage project sections is in a process of re-establishing or restoration;
- Bird abundance was similar to those recorded during baseline survey;
- The abundance of target river fauna, i.e., fish *Parazacco spilurus* recorded was lower than those recorded during baseline monitoring (before fish capture/relocation took place). The reason for low fish population of *Parazacco spilurus* was due to river bed modification. The rare fish *Pseudobagrus trilineatus* was consistently recorded in the river during recent monitoring. The other target species, Hong Kong Newt *Paramesotriton hongkongensis,* was not found within works area during baseline, impact monitoring and it was recorded in the river during post construction monitoring. Apart from fauna species, 65 flora species was recorded within the survey transects along the river course. Some common herbs were observed generating on the embankment, which indicating that vegetation was recovering. Flora species of *Tibouchina semidecandra* and *Ipomoea pes-caprae* were planted on the gabion along the river for landscape purpose;
- The abundance of fish was similar to last month;
- The abundance of odonata was still low compared with the data of wet season.
- Hong Kong Newt could not be found in this month.

3 Monitoring Methodology

3.1 Riparian Vegetation

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

3.2 Avifauna

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

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

3.3 Adult Odonata Survey

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

3.4 Aquatic Macro-invertebrates

Macro-invertebrates in the river channel were surveyed in three sampling sites with two located at upper (T1) and middle (T2) proportion of the river respectively and one reference site. It aims to collect necessary macro-invertebrate fauna for ecological monitoring programme (**Figure 1**). Five replicates were taken at each sampling point and pool together for further sample sorting and identification. Kick sampling and hand netting were the survey methodologies for river organisms. Dissection microscope and digital camera were used to aid identification and enumeration. Numerical abundance and species identity were recorded. Nomenclature and protection status of the species has followed those documented in the AFCD website (www.hkbiodiversity.net) and other literatures such as Dudgeon (1994).

3.5 Fish and Newt

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

Sampling was conducted at three sampling locations with one located at upper section (T1) and one located at middle section (T2), as well as reference site. The selected sampling site covered major type of river habitats, e.g. river pool and riffle (**Figure 1**). The number of the observed fish and newt was estimated and recorded. Nomenclature and protection status of the species has followed those documented in the AFCD website (www.hkbiodiversity.net) and Lee *et al.* (2004).

3.6 Abiotic Data Collection

3.6.1 Water Quality Monitoring

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

3.6.2 Sediment Characteristics

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

3.6.3 Water Flow

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

4 Monitoring Results

4.1 Vegetation

Major proportion of river bed and bank was concrete and without plant colonizing (Photos 2-3). Vegetation has sparely covered the gabion wall along the upper Tai Po River and the river bed with some common plants including invasive species *Mikania micrantha,* and native species *Commelina diffusa* (Photo 4). In total, 65 flora species was recorded within the survey transects along the river course. Abundant native species *Commelina diffusa* was the dominant species established in the river bed (Photo 5). The flora were generally in good health, and the height of the dominated riparian grass and herb species were in a range from 0.2m to 2m as observed along survey transect. Dominant flora species were shown in the **Table 4.1** marked with relative abundance sign "+++". Results of vegetation survey and belt transect survey were presented in **Table 4.1** and **Table 4.2**. **Figure 1** shows the transect line for the flora surveys.

4.2 Fauna

4.2.1 Avifauna

An avifauna survey was undertaken along survey transects and at two defined point count locations. In total, 16 species of birds were recorded during bird survey. Among them, 4 species were wetland dependant birds observed feeding in the river channel including *Motacilla alba* (Photo 6), *Egretta garzetta*, *Ardeola bacchus* and *Motacilla cinerea* (Photo 7). A common species *Pycnonotus jocosus* was the dominant species of most of the proportion of the river. All the birds in Hong Kong are under protection of Wild Animals Protection Ordinance (Cap. 170). Some of the wetland dependent species recorded are classified as Regional Concern by Fellowes *et al.* (2002) including *Egretta garzetta* and *Ardeola bacchus*, which were usually observed feeding in the river. Only foraging behaviour of some wetland dependent birds were noticed. Transect and Point Count locations were shown on **Figure 1**. Result of bird survey was presented in the **Table 4.3**.

4.2.2 Adult Odonata Survey

Odonata surveys were performed and a list of recorded odonata species at Upper Tai Po River is shown in **Table 4.4**. Number of odonata species recorded was gradually decreased by 1 species compared with the survey conducted in last month and the result was similar to previous surveys conducted in approximate period of last year. In total, 1 species odonata was found, the recorded odonata species was common species in Hong Kong. The species richness of odonata is still low during current dry season. The peak of emergence has ended up in late autumn for most of the species in Hong Kong. The remaining species recorded have no specific emergence period, they could be seen throughout the year (Wilson *et al.*, 2004 & Tam *et al.*, 2011). Sampling location was shown in **Figure 1**.

4.2.3 Aquatic Macro-invertebrates

Aquatic-net and kick sampling were performed at the river. The river benthic fauna collected was mainly comprised of insects, molluscs and crustaceans (Photo 9). Details of recorded of river benthic fauna refers to **Table 4.5.** Sampling location was shown on **Figure 1**.

4.2.4 Hong Kong Newt

Surveys of Hong Kong Newt were conducted at Upper Tai Po River. No newt was captured in this month. Hong Kong Newt is listed in Wild Animals Protection Ordinance (Cap. 170) and classified as "Near Threatened" under IUCN Red List Status and as "Potential Global Concern" by Fellowes *et al.* (2002). Record of Hong Kong Newts can be referred to **Table 4.6.**

4.2.5 River Fish Fauna

Fish surveys were performed at Upper Tai Po River during surveys. In total, 11 species freshwater fish were recorded within project area. Fish abundance was low along the modified river channel. The *Parazacco spilurus* and *Pseudobagrus trilineatus,* which have conservation interest, were restricted in the upper section of the surveyed river outside the works boundary where the habitat was not affected by construction works, while *Parazacco spilurus* is listed in China Red Data Book Status as Vulnerable and *Pseudobagrus trilineatus* is classified as Global Concern by Fellowes *et al*. (2002). The data showed that fish abundance has not changed significantly compared with last month. Details of records of fish fauna refers to **Table 4.6.** Sampling location was shown on **Figure 1**.

4.3 Abiotic Data

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

Generally, the water was clean and nutrient levels were generally low. Results of water test were presented in the **Table 4.7.**

The river substratums of upper and lower sections were comprised of 40% stone and 60% concrete, 20% stone and 80% concrete respectively. Moderate water flow up to 0.3m/second at pool and 0.6m/second at riffle was measured.

5 Summary and Commentary

Post construction ecological monitoring was carried out in current month and relevant biotic and abiotic data was collected according to project specification and EM & A Manual. No newt was recorded within the surveyed area. Fishes abundance was recorded with tiny change in this month. Bird abundance was similar to those recorded during baseline survey. Species richness of odonata was still low during current dry season.

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

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

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FIGURE

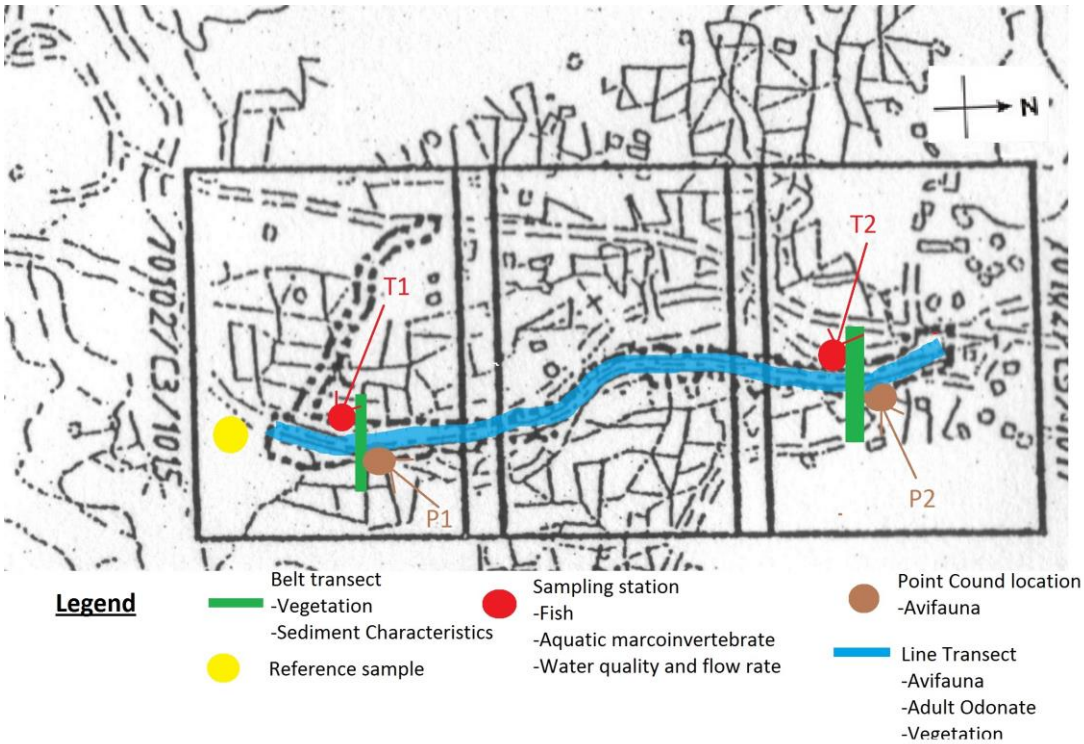

Figure 1. Sampling Location of Ecological Survey and Monitoring at Upper Tai Po River,Tai Po.

PHOTOS

	
Photo 1: General view of the river channel (Reference site)	Photo 2: General view of the river channel (Upper section)
	
Photo 3: General view of the river channel (Middle section)	Photo 4: Vegetation sparsely growing on gabion
	
Photo 5: Abundant species - *Commelina diffusa* (Middle section)	Photo 6: Avifauna – *Motacilla alba*

	
Photo 7: Avifauna – *Motacilla cinerea*	Photo 8: Sample collected from kick sampling

TABLE

Table 4.1. Flora species recorded at the transect along the Upper Tai Po River including riparian habitat.

			Baseline	Impact Monitoring							Impact Monitoring			Post Construction Monitoring					Post Construction Monitoring									Post Construction Monitoring					Post Construction Monitoring			Post Construction Monitoring		
Family	Species name	Species name in Chinese	Oct-07	Jan-09	Jul-09	Jan-10	Jul-10	Jan-11	Jul-11	Jan-12	Jul-12	Mar-13	Jul-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16
Acoraceae	*Acorus gramineus*	金錢蒲															+	+	+	+	+	+	+	+	+				+	+	+	+	+	+	+	+	+	+
Amaranthaceae	*Alternanthera philoxeroides*	空心蓮子草	+	+	+	+	+	+				+	+	+	+	+	++	++	++	++	++	++	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Amaranthaceae	*Amaranthus viridis*	野莧										+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Amaranthaceae	*C elosia argentea*	青葙															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Araceae	*Alocasia macrorrhizos*	海芋	+	+	+	+	+	+						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Araceae	*Colocasia esculenta*	芋	+	+	+	+	+	+							+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Asteraceae	*Bidens alba*	白花鬼針草	+	+	+	+	+	+	++	+	+	+	+	+	+	+	++	++	++	++	+++	+++	+++	+++	+++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
Asteraceae	*Ageratum conyzoides*	勝紅薊	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	++	++	++	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Asteraceae	*Mikania micrantha*	薇甘菊	++	+	+	+	+	+	+	+	+	+	+	++	++	++	++	+++	+++	+++	+++	+++	+++	+++	+++	++	++	++	++	++	++	++	++	++	++	++	++	++	++
Asteraceae	*Synedrella nodiflora*	金腰箭	+	+	+	+	+	+				+	+	+	+	+		+	+	+	+	+	+	+	+				+	+	+	+	+	+	+	+	+	+	+
Asteraceae	*Wedelia chinensis*	蜈蚣菊	+	+	+	+	+	+	+	+				+	+	+	+	+	+	+	+	+	+	+	+				+	+	+	+	+	+	+	+	+	+	+
Asteraceae	*Eclipta prostrata*	鱧腸										+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Asteraceae	*Erechtites hieraciifolius*	革命菜											+	+	+	+	+	+	+	+	+	+	+	+	+				+	+	+	+	+	+	+	+			
Asteraceae	*Youngia japonica*	黃鵌菜															+	+	+	+	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+
Asteraceae	*Conyza canadensis*	小蓬草															+	+	+	+	+	+	+	+	+														
Athyriaceae	*Callipteris esculenta*	菜蕨	+	+	+	+	+	+							+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Bombacaceae	*Bombax ceiba*	木棉	+	+	+	+	+	+																															
Brassicaceae	*Nasturtium officinale*	西洋菜															+	+	+	+	+	+	+	+	+														
Caesalpiniaceae	*Bauhinia championii*	峽葉藤															+	+	+	+	+	+	+	+	+														
Caprifoliaceae	*Viburnum odoratissimum*	珊瑚樹	+	+	+	+	+																																
Caryophyllaceae	*D rymaria cordata*	荷蓮豆															+	+	+	+	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+
Caryophyllaceae	*M yosoton aquaticum*	鵝腸菜															+	+	+	+	+	+	+	+	+														
Commelinaceae	*Commelina diffusa*	節節草	+	+	+	+	+	+	+	+	+	+	+	+	++	++	++	++	++	++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
Commelinaceae	*F loscopa scandens*	聚花草															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Convolvulaceae	*Ipomoea aquatica*	通菜	+	+	+	+	+																																
Convolvulaceae	*Ipomoea cairica*	五爪金龍	+	+	+	+	+	+	+	+				+	+	+	+	+	+	++	++	++	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Convolvulaceae	*Ipomoea pes-caprae*	海灘牽牛										+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Convolvulaceae	*M erremia hederacea*	魚黃草															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Cucurbitaceae	*Benincasa hispida*	冬瓜						+					+	+	+	+																							
Equisetaceae	*Equisetum debile*	筆管草	+	+	+	+	+									+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+			
Euphorbiaceae	*Macaranga tanarius*	血桐	+	+	+	+	+	+								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Euphorbiaceae	*Glochidion zeylanicum*	香港算盤子	+	+	+	+	+																																
Euphorbiaceae	*Phyllanthus reticulatus*	小果葉下珠															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Fabaceae	*Pueraria lobata*	野葛	+	+	+	+	+	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Lauraceae	*Cinnamomum camphora*	樟樹	+	+	+	+	+	+																															
Lauraceae	*Litsea glutinosa*	潺槁樹	+	+	+	+	+																																
Malvaceae	*Hibiscus rosa-sinensis*	大紅花											+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Melastomataceae	*Melastoma sanguineum*	毛稔										+	+	+	+	+	+	+	+	+	+	+	+	+	+													
Melastomataceae	*Tibouchina semidecandra*	巴西野牡丹										+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Mimosaceae	*Calliandra haematocephala*	紅絨球											+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Mimosaceae	*M imosa pudica*	含羞草															+	+	+	+	+	+	+	+	+														
Mimosaceae	*L eucaena leucocephala*	銀合歡															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Moraceae	*Ficus hispida*	對葉榕	+	+	+	+	+	+					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Moraceae	*Ficus variegata*	青果榕															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Musaceae	*Musa paradisiaca*	大蕉	+	+	+	+	+								+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+
Myrtaceae	*Psidium guajava*	番石榴	+	+	+	+	+	+																															
Myrtaceae	*Cleistocalyx operculatus*	水翁	+	+	+	+	+	+	+	+						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Oleaceae	*Ligustrum sinense*	山指甲															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Onagraceae	*Ludwigia erecta*	美洲水丁香																				+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Oxalidaceae	*Oxalis corniculata*	酢漿草															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Plantaginaceae	*P lantago major*	車前草															+	+	+	+	+	+	+	+	+														
Poaceae	*Panicum repens*	枯骨草	+	+	+	+	+	+	+	+					+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Microstegium ciliatum*	刚秀竹	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	++	++	++	+	+	+	+	+	+	+	+	+	+
Poaceae	*Pennisetum purpureum*	象草	+	+	+	+	+	+							+	+	+	+	+	+	+	+	+	++	++	++	++	++	++	+	+	+	+	+	+	+	+	+	+
Poaceae	*Coix lacryma-jobi*	薏苡	+	+	+	+	+	+		+					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Phragmites karka*	卡開蘆	+	+	+	+	+	+		+					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Miscanthus floridulus*	五節芒															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

Table 4.1. Flora species recorded at the transect along the Upper Tai Po River including riparian habitat.

			Baseline	Impact Monitoring							Impact Monitoring			Post Construction Monitoring					Post Construction Monitoring										Post Construction Monitoring					Post Construction Monitoring					Post Construction Monitoring			Post Construction Monitoring		
Family	Species name	Species name in Chinese	Oct-07	Jan-09	Jul-09	Jan-10	Jul-10	Jan-11	Jul-11	Jan-12	Jul-12	Mar-13	Jul-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16
Poaceae	*Brachiaria mutica*	巴拉草															+	+	+	++	++	++	++	++	++	+++	+++	+++	+++	++	++	++	++	++	++	++	++	++	++	++	++
Poaceae	*Digitaria radicosa*	紅尾翎																	+	+	+	+	+	+	+	++	++	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Pennisetum alopecuroides*	狼尾草																					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Polygonaceae	*Polygonum barbatum*	毛蓼	+	+		+	+	+				+	+	+	+	+	+	+	+	+	+	+	+	+	+																	
Polygonaceae	*Polygonum chinense*	火炭母															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Polygonaceae	*Rumex trisetifer*	假菠菜																								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Rutaceae	*Clausena lansium*	黃皮	+	+		+	+	+	+																																	
Sapindaceae	*Dimocarpus longan*	龍眼	+	+		+	+	+	+																																	
Sapindaceae	*Litchi chinensis*	荔枝	+	+		+	+	+	+																																	
Scrophulariaceae	*Scoparia dulcis*	冰糖草															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Solanaceae	*Solanum torvum*	水茄	+	+		+	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+																	
Solanaceae	*Solanum nigrum*	龍葵				+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨	+	+		+	+	+	+						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ulmaceae	*Celtis sinensis*	朴樹	+	+		+	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Urticaceae	*Boehmeria nivea*	苧麻	+	+		+	+	+	+	+					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Urticaceae	*Pouzolzia zeylanica*	露水葛											+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Verbenaceae	*Lantana camara*	馬纓丹	+	+		+	+	+	+					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Eleusine indica*	牛筋草																								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Brassicaceae	*Rorippa indica*	塘葛菜																								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Isachne globosa*	柳葉箬																								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Paspalum distichum*	雙穗雀稗																								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Cyperaceae	*Cyperus involucratus*	風車草																								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Dioscoreaceae	*Dioscorea alata*	參薯																								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Menispermaceae	*Stephania longa*	黃筤篤																								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Polygonaceae	*Polygonum hydropiper*	水蓼																								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Balsaminaceae	*Impatiens walleriana*	非洲鳳仙																								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Rubiaceae	*Paederia scandens*	雞矢藤																								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ulmaceae	*Trema tomentosa*	山黃麻																								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Verbenaceae	*Duranta erecta*	假連翹															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Floating plant																																									
Lemnaceae	*Lemna minor*	浮萍																								+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
No of Species			38	38	38	39	39	34	11	12	4	17	23	27	36	39	59	60	61	61	61	62	63	63	63	61	63	63	66	67	67	67	67	67	67	67	67	67	65	65

Note:

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

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

			Baseline survey				Impact monitoring						Impact monitoring						Impact monitoring						Impact monitoring						Impact monitoring					
		Stream	Oct-07				Jan-09						Jul-09						Jan-10						Jul-10						Jan-11					
		Transect	P1		P2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2	
Family	Species	Chinese name	Height (m)	%	Height (m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height(m)	%	Height (m)	%
Asteraceae	*Mikania micrantha*	薇甘菊	0.4	15	1	40	0.5	5	0.5	5			0.5	5					0.5	3	0.2	5	0.2	2	0.5	20	0.5	60			0.5	10				
Moraceae	*Ficus hispida*	對葉榕	1	2			5	5			2	10	5	5			2	10	5	5					5	5										
Ulmaceae	*Celtis sinensis*	朴樹	5	2							6	15					6	15											4m	5						
Poaceae	*Microstegium ciliatum*	蒭秀竹	1.2	45	1.2	30			0.8	10	0.5	12					0.7	30							1	35	1	5	0.5	10	1	15	1	5	0.5	2
Euphorbiaceae	*Macaranga tanarius*	血桐	2	2			5	5	3	5	1.5	4	5	5	3	5	1.5	5	5	5					5	5							4m	5		
Araceae	*Alocasia odora*	海芋	1.5	23							1.5	25					2	30											2	10					0.4	3
Araceae	*Colocasia esculenta*	芋	0.3	<1	0.4	<1	0.3	2					0.3	2	0.8	5			0.3	1																
Myrtaceae	*Cleistocalyx operculatus*	水翁					0.4	10	7	5			0.4	10	7	5			0.4	10	7	5			0.4	10					0.4	5	5m	5		
Athyriaceae	*Callipteris esculenta*	菜蕨			0.6	1	0.8	10			0.4	10	0.8	10			0.4	2	0.8	6					0.8	6										
Poaceae	*Phragmites karka*	卡開蘆					1.5	51					1.5	51					1.5	53					1.5	10					1.5	2				
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨	0.4	10							0.4	10					0.4	2																		
Equisetaceae	*Equisetum debile*	笔管草			0.6	<1	0.3	2					0.3	2					0.3	2																
Asteraceae	*Ageratum conyzoides*	勝紅薊							0.4	2					0.4	2					0.2	2													0.3	2
Commelinaceae	*Commelina diffusa*	節節草																	0.2	5	0.2	5	0.2	5			0.5	20							0.2	4
Solanaceae	*Solanum nigrum*	龍葵																					0.4	5												
Euphorbiaceae	*Mallotus paniculatus*	白楸																			0.3	5														
Poaceae	*Eleusine indica*	牛筋草													0.5	5						5														
Poaceae	*Pennisetum purpureum*	象草									3	4																								
Asteraceae	*Wedelia chinensis*	蜈蚣菊																																		
Asteraceae	*Bidens alba*	白花鬼針草																															0.5	5		3
Poaceae	*Panicum repens*	枯骨草																																		
Poaceae	*Coix lacryma-jobi*	薏苡																																		
Convolvulaceae	*Ipomoea cairica*	五爪金龍																																		
Cucurbitaceae	*Benincasa hispida*	冬瓜																																	0.2	5
Fabaceae	*Pueraria lobata*	野葛																																		
Convolvulaceae	*Merremia hederacea*	魚黃草																																		
Poaceae	*Pennisetum alopecuroides*	狼尾草																																		
Poaceae	*Brachiaria mutica*	巴拉草																																		
Onagraceae	*Ludwigia erecta*	美洲水丁香																																		
Malvaceae	*Hibiscus rosa-sinensis*	大紅花																																		
Cyperaceae	*Cyperus sp.*	莎草																																		
Balsaminaceae	*Impatiens walleriana*	非洲鳳仙																																		
Amaranthaceae	*Celosia argentea*	青葙																																		
Bare Gound								10		73		10		10		78		6		10		73		88		9		15		65		68		80		89

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

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

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

			Impact monitoring						Impact monitoring						Impact monitoring						Impact monitoring						Impact monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring					
		Stream	Jul-11						Jan-12						Jul-12						Mar-13						Jul-13						Jan-14						Feb-14						Mar-14					
		Transect	Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2	
Family	Species	Chinese name	Height(m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height (m)	%	Height(m)	%	Height (m)	%
Asteraceae	*Mikania micrantha*	薇甘菊	0.5	10					0.4	20					0.4	10					0.4	60					0.4	40	0.4	3			0.4	40	0.4	5			0.4	40	0.4	8			0.4	40	0.4	8		
Moraceae	*Ficus hispida*	對葉榕																																															
Ulmaceae	*Celtis sinensis*	朴樹																																														
Poaceae	*Microstegium ciliatum*	蒯秀竹	1	2											1	55													0.6	3					0.6	3					0.6	5					0.6	5		
Euphorbiaceae	*Macaranga tanarius*	血桐																																														
Araceae	*Alocasia odora*	海芋																																														
Araceae	*Colocasia esculenta*	芋																			0.3	2					0.3	5					0.3	3					0.3	3					0.3	3				
Myrtaceae	*Cleistocalyx operculatus*	水翁																																														
Athyriaceae	*Callipteris esculenta*	菜蕨																																														
Poaceae	*Phragmites karka*	卡開蘆	1.5	2																							1.2	5					1.2	2					1.2	2					1.2	2				
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨																																														
Equisetaceae	*Equisetum debile*	笔管草																																														
Asteraceae	*Ageratum conyzoides*	勝紅薊	1.2	10					0.4	20																																							
Commelinaceae	*Commelina diffusa*	節節草							0.4	10					0.4	5					0.4	5	(concret section)		(concret section)		0.4	5			(concret section)		0.4	6			(concret section)		0.4	6			(concret section)		0.4	6			(concret section)	
Solanaceae	*Solanum nigrum*	龍葵					0.5	4																																							
Euphorbiaceae	*Mallotus paniculatus*	白楸																																													
Poaceae	*Eleusine indica*	牛筋草					0.3	5																					0.3	3					0.3	3					0.3	3					0.3	3		
Poaceae	*Pennisetum purpureum*	象草																																													
Asteraceae	*Wedelia chinensis*	蜈蚣菊																																													
Asteraceae	*Bidens alba*	白花鬼針草					0.2	2													0.3	10					0.3	10	0.3	10			0.3	15	0.3	10			0.3	15	0.3	10			0.3	15	0.3	10		
Poaceae	*Panicum repens*	枯骨草	1.5	5					1.5	5																	0.6	5					0.6	5					0.6	5					0.6	5	0.6	2		
Poaceae	*Coix lacryma-jobi*	薏苡							1.5	5					1.5	5					1.5	3																												
Convolvulaceae	*Ipomoea cairica*	五爪金龍							0.2	5					0.2	5																																	
Cucurbitaceae	*Benincasa hispida*	冬瓜																																													
Fabaceae	*Pueraria lobata*	野葛																			0.2	5					0.2	10					0.2	10					0.2	10					0.2	10				
Convolvulaceae	*Merremia hederacea*	魚黃草																			0.2	5																												
Poaceae	*Pennisetum alopecuroides*	狼尾草																																														
Poaceae	*Brachiaria mutica*	巴拉草																																														
Onagraceae	*Ludwigia erecta*	美洲水丁香																																														
Malvaceae	*Hibiscus rosa-sinensis*	大紅花																											0.6	5					0.6	5					0.6	5					0.6	5		
Cyperaceae	*Cyperus sp.*	莎草																																														
Balsaminaceae	*Impatiens walleriana*	非洲鳳仙																																														
Amaranthaceae	*Celosia argentea*	青葙																																														
Bare Gound				71		100		89		35		100		100		20		100		100		10						20		76				19		74				19		69				19		67		

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

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

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

			Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring					
		Stream	Apr-14						May-14						Jun-14						Jul-14						Aug-14						Sep-14						Oct-14						Nov-14					
		Transect	Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2	
Family	Species	Chinese name	Height (m)	%	Height(m)	%	Height (m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height (m)	%	Height(m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%
Asteraceae	*Mikania micrantha*	薇甘菊	0.3	5	0.3	20			0.3	5	0.3	25			0.3	5	0.3	25			0.4	8	0.4	25			0.4	10	0.4	28			0.4	10	0.4	28			0.4	10	0.4	30			0.4	12	0.4	30		
Moraceae	*Ficus hispida*	對葉榕																																														
Ulmaceae	*Celtis sinensis*	朴樹																																														
Poaceae	*Microstegium ciliatum*	蒯秀竹	0.4	5					0.4	5					0.4	5					0.6	5					0.6	5					0.6	5					0.6	10					0.6	15				
Euphorbiaceae	*Macaranga tanarius*	血桐			0.5	1					0.5	1					0.5	1					0.6	1					0.6	1					0.6	1					0.6	1				
Araceae	*Alocasia odora*	海芋																																													
Araceae	*Colocasia esculenta*	芋																																													
Myrtaceae	*Cleistocalyx operculatus*	水翁																																												
Athyriaceae	*Callipteris esculenta*	菜蕨																																												
Poaceae	*Phragmites karka*	卡開蘆	1.5	5					1.5	5					1.5	5					1.5	5					1.8	5					1.8	5					2	5					2	5				
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨																																													
Equisetaceae	*Equisetum debile*	笔管草																																													
Asteraceae	*Ageratum conyzoides*	勝紅薊					(concrete section)						(concrete section)						(concrete section)						(concrete section)						(concrete section)						(concrete section)						(concrete section)					
Commelinaceae	*Commelina diffusa*	節節草			0.1	5					0.1	3					0.1	3					0.2	4					0.3	5					0.3	5					0.3	10					0.3	10		
Solanaceae	*Solanum nigrum*	龍葵																																													
Euphorbiaceae	*Mallotus paniculatus*	白楸																																												
Poaceae	*Eleusine indica*	牛筋草																																												
Poaceae	*Pennisetum purpureum*	象草																																												
Asteraceae	*Wedelia chinensis*	蜈蚣菊																																												
Asteraceae	*Bidens alba*	白花鬼針草																																									1	10		1	10	
Poaceae	*Panicum repens*	枯骨草	0.3	5					0.3	3					0.3	3					0.4	3					0.6	3					0.6	4					0.6	4					0.6	4				
Poaceae	*Coix lacryma-jobi*	薏苡																																													
Convolvulaceae	*Ipomoea cairica*	五爪金龍																																												
Cucurbitaceae	*Benincasa hispida*	冬瓜																																												
Fabaceae	*Pueraria lobata*	野葛	0.4	10					0.4	15					0.4	15					0.4	15					0.4	15					0.4	18					0.4	18					0.4	20				
Convolvulaceae	*Merremia hederacea*	魚黃草																																													
Poaceae	*Pennisetum alopecuroides*	狼尾草			1.5	5					1.5	5					1.5	5					1.5	5					1.5	5					2	20					2	20				
Poaceae	*Brachiaria mutica*	巴拉草																																							1.5	25					1.5	25		
Onagraceae	*Ludwigia erecta*	美洲水丁香																																												
Malvaceae	*Hibiscus rosa-sinensis*	大紅花																																												
Cyperaceae	*Cyperus sp.*	莎草																																												
Balsaminaceae	*Impatiens walleriana*	非洲鳳仙																																												
Amaranthaceae	*Celosia argentea*	青葙																																												
Bare Gound				70		69				67		66				67		66				64		65				62		61				58		61				43		4				34		4		

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

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

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

			Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring					
		Stream	Dec-14						Jan-15						Feb-14						Mar-14						Apr-14						May-15						Jun-15						Jul-15					
		Transect	Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2	
Family	Species	Chinese name	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%
Asteraceae	*Mikania micrantha*	薇甘菊	0.4	12	0.4	30			0.8	15			0.3	10	0.8	15			0.3	10	0.8	15			0.3	10	0.8	15			0.3	10	0.5	10			0.3	3	0.5	10			0.3	3	0.5	10				
Moraceae	*Ficus hispida*	對葉榕																																															
Ulmaceae	*Celtis sinensis*	朴樹																																															
Poaceae	*Microstegium ciliatum*	蒭秀竹	0.6	15					1.3	5			1	5	1.3	5			1	5	1.3	5			1	5	1.3	5			1	5	1	5			1	3	1	5			1	3	1	5	1	1		
Euphorbiaceae	*Macaranga tanarius*	血桐			0.6	1							0.6	1					0.6	1					0.6	1					0.5	1					0.5	1									1.5	5
Araceae	*Alocasia odora*	海芋																																														
Araceae	*Colocasia esculenta*	芋	0.5	5					0.8	5					0.8	5					0.8	5					0.8	5					0.5	5					0.5	5					0.5	5	1.2	10		
Myrtaceae	*Cleistocalyx operculatus*	水翁																																														
Athyriaceae	*Callipteris esculenta*	菜蕨																																														
Poaceae	*Phragmites karka*	卡開蘆	2	5					1.7	10					1.7	10					1.7	10					1.7	10					1.5	10					1.5	10					1.5	10				
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨																																														
Equisetaceae	*Equisetum debile*	笔管草	0.3	5					0.3	5					0.3	5					0.3	5					0.3	5					0.3	5					0.3	5					0.3	5				
Asteraceae	*Ageratum conyzoides*	勝紅薊									0.3	2					0.3	2					0.3	2					0.3	2					0.3	2					0.3	5								
Commelinaceae	*Commelina diffusa*	節節草			0.3	10			0.2	10			0.4	60	0.3	10			0.5	60	0.3	10			0.5	60	0.3	10			0.5	60	0.3	10			0.5	35	0.3	10			0.5	35	0.3	10			0.4	40
Solanaceae	*Solanum nigrum*	龍葵																																														
Euphorbiaceae	*Mallotus paniculatus*	白楸																																														
Poaceae	*Eleusine indica*	牛筋草																																														
Poaceae	*Pennisetum purpureum*	象草																																														
Asteraceae	*Wedelia chinensis*	蜈蚣菊																																														
Asteraceae	*Bidens alba*	白花鬼針草			1	10			1	5			0.8	2	1	5			0.8	2	1	5			0.8	2	1	5			0.8	2	0.7	5			0.6	2	0.7	5			0.6	2	0.7	5			0.5	5
Poaceae	*Panicum repens*	枯骨草	0.6	4					0.6	5					0.6	5					0.6	5					0.6	5					0.4	5					0.4	5					0.4	5				
Poaceae	*Coix lacryma-jobi*	薏苡																																														
Convolvulaceae	*Ipomoea cairica*	五爪金龍																																														
Cucurbitaceae	*Benincasa hispida*	冬瓜																																														
Fabaceae	*Pueraria lobata*	野葛	0.4	20																																												
Convolvulaceae	*Merremia hederacea*	魚黃草																																														
Poaceae	*Pennisetum alopecuroides*	狼尾草			2	20							4	10					4	10					4	10					4	10					2	7					2	7			2.5	20	2	30
Poaceae	*Brachiaria mutica*	巴拉草			1.5	25																																								1.2	50	0.5	15
Onagraceae	*Ludwigia erecta*	美洲水丁香									0.2	4					0.3	4					0.3	4					0.3	4					0.3	2					0.3	5								
Malvaceae	*Hibiscus rosa-sinensis*	大紅花																																														
Cyperaceae	*Cyperus sp.*	莎草									0.2	6					0.2	6					0.2	6					0.2	6					0.2	3					0.2	5					0.2	5				
Balsaminaceae	*Impatiens walleriana*	非洲鳳仙											1	5					1	5					1	5					1	3									1	3								
Amaranthaceae	*Celosia argentea*	青葙							1.7	5					1.7	5					1.7	5					1.7	5					1.7	5					1.7	5					1.7	5				
Bare Gound				34		4				35		88		7		35		88		7		35		88		7		35		88		7		40		93		46		40		85		46		40		14		5

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

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

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

			Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring					
		Stream	Aug-15						Sep-15						Oct-15						Nov-15						Dec-15						Jan-16						Feb-16					
		Transect	Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2		Reference		T1		T2	
Family	Species	Chinese name	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%
Asteraceae	*Mikania micrantha*	薇甘菊	0.5	10					0.5	10					0.5	10					0.5	10					0.5	5					0.5	5					0.5	5				
Moraceae	*Ficus hispida*	對葉榕																																										
Ulmaceae	*Celtis sinensis*	朴樹																																										
Poaceae	*Microstegium ciliatum*	蒯秀竹	1	5	1	1			1	5	1	1			1	5	1	3			1	5	1	3			1	5	1	3			1	5	1	3			1	5	1	3		
Euphorbiaceae	*Macaranga tanarius*	血桐					1.5	5					1.5	5					1.5	5					1.5	5					1.5	5					1.5	5					1.5	5
Araceae	*Alocasia odora*	海芋																																										
Araceae	*Colocasia esculenta*	芋	0.5	5	1.2	5			0.5	5	1.2	2			0.5	5	1.2	5			0.5	5	1.2	5			0.5	5	1.2	5			0.5	5	1.2	5			0.5	5	1.2	5		
Myrtaceae	*Cleistocalyx operculatus*	水翁																																										
Athyriaceae	*Callipteris esculenta*	菜蕨																																										
Poaceae	*Phragmites karka*	卡開蘆	1.5	10					1.5	10					1.5	10					1.5	10					1.5	7					1.5	7					1.5	7				
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨																																										
Equisetaceae	*Equisetum debile*	筆管草	0.3	5					0.3	5					0.3	5					0.3	5					0.3	5					0.3	5					0.3	5				
Asteraceae	*Ageratum conyzoides*	勝紅薊																																										
Commelinaceae	*Commelina diffusa*	節節草	0.4	10	0.2	20	0.4	30	0.4	10	0.2	5	0.4	30	0.4	10	0.2	15	0.4	30	0.4	10	0.2	20	0.4	30	0.4	7	0.2	20	0.4	30	0.4	10	0.2	25	0.4	35	0.4	10	0.2	25	0.4	35
Solanaceae	*Solanum nigrum*	龍葵																																										
Euphorbiaceae	*Mallotus paniculatus*	白楸																																										
Poaceae	*Eleusine indica*	牛筋草																																										
Poaceae	*Pennisetum purpureum*	象草																																										
Asteraceae	*Wedelia chinensis*	蟛蜞菊																																										
Asteraceae	*Bidens alba*	白花鬼針草	0.7	5			0.5	5	0.7	5			0.5	5	0.7	5			0.5	5	0.7	5			0.5	5	0.7	5			0.5	5	0.7	5			0.5	5	0.7	5			0.5	5
Poaceae	*Panicum repens*	枯骨草	0.4	5					0.4	5					0.4	5					0.4	5					0.4	5					0.4	5					0.4	5				
Poaceae	*Coix lacryma-jobi*	薏苡																																										
Convolvulaceae	*Ipomoea cairica*	五爪金龍																																										
Cucurbitaceae	*Benincasa hispida*	冬瓜																																										
Fabaceae	*Pueraria lobata*	野葛																																										
Convolvulaceae	*Merremia hederacea*	魚黃草																																										
Poaceae	*Pennisetum alopecuroides*	狼尾草			2.5	5	2	20			2.5	5	2	20			2	7	2	20			2	10	2	20			2	10	2	20			2	10	2	20			2	10	2	20
Poaceae	*Brachiaria mutica*	巴拉草			1.2	30	0.5	15			1.2	2	0.5	15			1.2	2	0.5	15			1.2	2	0.5	15			1.2	2	0.5	15			1.2	2	0.5	15			1.2	2	0.5	15
Onagraceae	*Ludwigia erecta*	美洲水丁香																																										
Malvaceae	*Hibiscus rosa-sinensis*	大紅花																																										
Cyperaceae	*Cyperus sp.*	莎草			0.2	5					0.2	2					0.2	2					0.2	2					0.2	2					0.2	2					0.2	2		
Balsaminaceae	*Impatiens walleriana*	非洲鳳仙																																										
Amaranthaceae	*Celosia argentea*	青葙	1.7	5					1.7	5					1.7	5					1.7	5					1.7	5					1.7	5					1.7	5				
Bare Gound				40		34		25		40		83		25		40		66		25		40		58		25		51		58		25		48		53		20		48		53		20

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

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

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

					Baseline survey			Impact monitoring						Impact monitoring												Impact monitoring												Post construction monitoring									Post construction monitoring									Post construction monitoring								
					Oct-07			Jan-09			Jul-09			Jan-10			Jul-10			Jan-11			Jul-11			Jan-12			Jul-12			Mar-13			Jul-13			Jan-14			Feb-14			Mar-14			Apr-14			May-14			Jun-14			Jul-14			Aug-14			Sep-14		
					Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance		
Common Name	**Species name**	**Chinese name**	**Status**	**Rarity**	C	P1	P2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2
Barn Swallow	*Hirundo rustica*	家燕	SV, SpM	C																			+						+++	3	2	+++	4	1	+			+			+	1		+	1	2	++	2	3	++	3	2	+	2	1									
Black -crown Night Heron	*Nycticorax nyxticorax*	夜鷺	R,WV, P	C													+			+																																												
Black Kite	*Milvus lineatus*	麻鷹	R, RC, Cap.586	C	+									+						+						+									+						+																							
Black-collared Starling	*Sturnus nigricollis*	黑領椋鳥	R	C	+	1	1							+			+		1	+			+		1	+		1	+			+			+			+			+	1		+	1	2	+		1	+			+			+			+		2	+	2	2
Chinese Bulbul	*Pycnonotus sinensis*	白頭鵯	R	C	+	3	2	++	5	6	++	4	7	+++	7	6	+++	6	3	+	4	2	+	1		+	1		++	2	1	++	2	3	++	2	1	+	2	2	+	5	2	+		3	+	2	1	+	2	2	+		1	+	1		+			+		
Chinese Hwamei	*Garrulax canorus*	畫眉	R	C																																																												
Chinese Pond Heron	*Ardeola bacchus*	池鷺	R,RC	C	+			++	6	3	+	2	3	++	3	3	++	2	2	+	1	1	+	1					+			+		1	+			+		1	+	1	2	+		3	+		1	+		2	+		1	+		1	+		1	+	2	2
Common Blackbird	*Turdus merula*	烏鶇	WV, PM	C																+																																												
Common Kingfisher	*Alcedo atthis*	普通翠鳥	PM, WV	C	+												+			+																		+			+			+																				
Common Koel	*Eudynamys scolopacea*	噪鵑	R	C	+											2				+			+						+			+			+			+			+			+			+			+			+			+			+					
Common Sandpiper	*Actitis hypoleucos*	磯鷸	WV&PM	C	+															+			+												+			+						+		+	+		+	+														
Common Snipe	*Gallinago gallinago*	扇尾沙錐	WV&PM	C																																																												
Common Tailorbird	*Orthotomus sutorius*	長尾縫葉鶯	R	C	+		1	+	1	1	+		1	++		10	+	1		+		1	+			+			+			+			+	1		+	1		+	1		+	1		+	1	1	+	1		+			+	1	1	+	1	1	+	1	1
Crested bulbul	*Pycnonotus jocosus*	紅耳鵯	R	C	+	2		+++	6	7	++	2	6	+++	4	5	++	3	2	+	2	1	+	1	2	+	2		+++	5	3	+++	2	1	++	3	2	++	5	4	++	4	6	++	2	5	++	1	4	++	2	6	++	3	2	++	2	4	++	3	2	++	3	5
Crested Myna	*Acridotheres cristatellus*	八哥	R	C		1											+			+	2		+		2	+			+			+			+			+			+			+			+			+			+	2		+	2	2	+		3	+		2
Daurian redstart	*Phoenicurus auroreus*	北紅尾鴝	WV	U																																																												
Domestic pigeon	*Columba sp.*	鴿	R	C		3											+						+												+		2	+																										
Eurasian Tree Sparrow	*Passer montanus*	麻雀	R	C	+	3	2							+			+	4	3	+			+		1	+			+			+			+			+			+			+		2	+			+			+			+			+			+		2
Great Coucal	*Centropus sinensis*	褐翅鴉鵑	R,VU	C	+	1											+	1		+			+												+			+			+			+			+			+			+			+			+					
Great Tit	*Parus major (commixtus)*	大山雀	R	C										+	2	1	+	1								+												+			+			+			+			+														
Green Sandpiper	*Tringa ochropus*	白腰草鷸	WV	U																+																								+			+																	
Grey Wagtail	*Motacilla cinerea*	灰鶺鴒	WV	C																+	2	1				+	1	2										+	1	2	+	1	1	+	1	2	+		1							+			+		1	++	1	3
Japanese White Eye	*Zosterops japonica*	暗綠繡眼鳥	R	C		2		++	2	3	+	1	4	+++	4	6	++	3	2	+	5	2	+			+			+	2		+	3		+	2		+	3		+	5		+	3		+	4		+	2	4	+		3	+		5	+	3	6	+		3
Large-billed Crow	*Corvus macrorhynchos*	大嘴烏鴉	R	C																																																												
Little Egret	*Egretta garzetta*	小白鷺	R, RC	C	+			+	1		+		1	+		1	+	1	1		1	1	+												+			+		1	+		2	+		1	+			+									+			+		1
Little Swift	*Apus affinis*	小白腰雨燕	R, SpM	C																												+						++			++	3	5	+	2	1																		
Magpie	*Pica pica*	喜鵲	R	C		1																				+															+			+																		+		
Magpie Robin	*Copsychus saularis*	鵲鴝	R	C	+	1	1				+	1	3	+	2	1	+	2	2	+	1	1	+	1		+		2	+	1	1	+	1		+		1	+	1	1	+	1	1	+	1	1	+	1		+	1	1	+	1	2	+	1	1	+	1	1	+	1	1
Olive Backed pipit	*Anthus hodgsoni*	樹鷚	WV	C	+			+	1	3										+																								+																				
Red-billed blud magpie	*Urocissa erythrorhyncha*	紅咀藍鵲	R	C										+		2																																																
Rufous-backed Shrike	*Lanius schach*	棕背伯勞	R	C										+	1		+	1					+												+						+			+												+			+			+		
Scaly-breasted Munia	*Lonchura punctulata*	斑文鳥	R	C																																																												
Scarlet Minivet	*Pericrocotus flammeus*	赤紅山椒鳥	R	C										+																																																		
Scarlet-backed Flowerpecke	*Dicaeum cruentatum*	朱背啄花鳥	R	C										+																																																		
Siberian Stonechat	*Saxicola maurus*	黑喉石䳭	WV	U																																																												
Silver-eared Mesia	*Leiothrix argentauris*	銀耳相思鳥	R	C																+																																												
Sooty-headed Bulbul	*Pycnonotus aurigaster*	白喉紅臀鵯	R	C																			+		1																																							
Spotted Dove	*Streptopelia chinensis*	珠頸斑鳩	R	C	+		2	+	1		+	1	3	+	1	2	+	1	1	+	1	1	+	1		++	4	3	++	1	2	++		1	++	1	1	++	2	1	++	2	3	++	1	4	++	2	3	++	3	5	++	2	3	++	1	2	++	2	4	++	1	3
Violet Whistling Thrush	*Myiophoneus caeruleus*	紫嘯鶇	R	C	+																																									1				+			+											
White Wagtail	*Motacilla alba*	白鶺鴒	WV, R	C	+		1							++	2	3	+	1	1	+	2	2	+			++	2	1	+	1	1	+		1	+			+			+	1	2	+	2	1	+		1				+		1	+	1	2	+	1	1	+	3	4
White-breasted Waterhen	*Amaurornis phoenicurus*	白胸苦惡鳥	R	C	+									+		1	+		1							+												1		1	+			+			+			+			+			+			+			+		
White-rumped Munia	*Lonchura striata*	白腰文鳥	R	C																																																												
Yellow Bellid Prinia	*Prinia flaviventris*	灰頭鷦鶯	R	C	+															+			+			+			+			+			+			+			+			+			+			+			+			+			+			+		
Yellow Wagtail	*Motacilla flava*	黃鶺鴒	WV&PM	C		1																																																										
Number of birds						19	10		22	23		10	25		24	39		26	17		21	13		5	7		10	9		15	10		12	8	0	9	7		15	12		26	24		15	28		13	16		14	22		10	14		9	18		11	22		14	29
No. of species					19	11	7	8	8	6	8	6	8	18	9	13	19	13	11	23	10	10	20	5	5	16	5	5	14	7	6	15	5	6	21	5	5	25	7	8	26	12	9	27	10	13	24	7	9	24	7	7	17	5	8	17	7	8	18	6	10	19	8	12

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

Abundance indication: +, No. of indiv. 1 ~ 3; ++, No. of indiv. 4 ~ 10; +++, No. of indiv. >10; Commonness and status were decided 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 4.3 Avifauna recorded along survey transects and at two selected point count locations for Upper Tai Po River. (T1- Upper stream section and T2- Lower stream section)

					Post construction monitoring									Post construction monitoring									Post construction monitoring									Post construction monitoring									Post construction monitoring									Post construction monitoring						Post construction monitoring					
					Oct-14			Oct-14			Dec-14			Jan-15			Feb-15			Mar-15			Apr-15			May-15			Jun-15			Jul-15			Aug-15			Sep-15			Oct-15			Nov-15			Dec-15			Jan-16			Feb-16		
					Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance			Abundance		
Common Name	**Species name**	**Chinese name**	**Status**	**Rarity**	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2	C	T1	T2
Barn Swallow	*Hirundo rustica*	家燕	SV, SpM	C																++	2	3	+	2	3	+		3	+	2	2	+	2	3	++	2	4	++	3	3	++	5																	
Black -crown Night Heron	*Nycticorax nyxticorax*	夜鷺	R,WV, P(	C																																																									
Black Kite	*Milvus lineatus*	麻鷹	R, RC, Cap.586	C	+			+						+			+			+																																									
Black-collared Starling	*Sturnus nigricollis*	黑領椋鳥	R	C	+		3	+		2	+		2	+		3	++		2	++		2	+	1	2	++	2	2	++	3	3	++	1	2	++	2	2	++	3	3	++	4	2	++	2	1	++	2	2	++	3	3	++	2	1
Chinese Bulbul	*Pycnonotus sinensis*	白頭鵯	R	C	+		1	+	1	2	+	2	2	+	1	2	+	1		++	2	4	+	2	2	++	2	3	++	1	2	++	3	3	++	2	2	++		2	++	3	2	++	3	2	++	1	3	++	4	2	++	3	5
Chinese Hwamei	*Garrulax canorus*	畫眉	R	C																			+																																			
Chinese Pond Heron	*Ardeola bacchus*	池鷺	R,RC	C	+	1		+	1	1	+		1	+		2	+	1	1	+		1			1	+		1	+	1		+		1	+		1	+		1	+	1		+		1	+		1	+		1	+		1	+		1
Common Blackbird	*Turdus merula*	烏鶇	WV, PM	C																																																								
Common Kingfisher	*Alcedo atthis*	普通翠鳥	PM, WV	C													+																						+	1						+											
Common Koel	*Eudynamys scolopacea*	噪鵑	R	C																+			+						+																												
Common Sandpiper	*Actitis hypoleucos*	磯鷸	WV&PM	C																																		+																				
Common Snipe	*Gallinago gallinago*	扇尾沙錐	WV&PM	C																															+			1																				
Common Tailorbird	*Orthotomus sutorius*	長尾縫葉鶯	R	C	+	1	1	+		1	+		1	+	1	1	+		1	+		1	+	1	1	+	1	1	+	1	1	+	1	1	+	1	1	+		1	+	1	1	+	1	1	+		1	+		1	+		1	+		1
Crested bulbul	*Pycnonotus jocosus*	紅耳鵯	R	C	++	3	2	++	2	4	+	2	4	+++	3	4	+++	2	3	+++	3	4	+++	3	4	+++	4	4	+++	5	5	+++	7	6	+++	5	5	+++	7	3	+++	7	5	+++	5	7	+++	3	6	+++	6	4	+++	8	5
Crested Myna	*Acridotheres cristatellus*	八哥	R	C	+		2	+		3	+			+	2		++	2	2	++		3	++	2	3	++	2	3	++	4	2	++	3	2	++		2	++	2	2	++	2	1	+	2								+		
Daurian redstart	*Phoenicurus auroreus*	北紅尾鴝	WV	U							+		1	+																																												
Domestic pigeon	*Columba sp.*	鴿	R	C	+			+			+			+			+																																									
Eurasian Tree Sparrow	*Passer montanus*	麻�雀	R	C	+		3	+	2	1	0			++		3	++	3		++		2	++		2	++	3	2	++	3	3	++	5	7	++	5	2	++	4	3	++	4	4	++	3	6	++	6	2	++	4	4	++	2	3
Great Coucal	*Centropus sinensis*	褐翅鴉鵑	R,VU	C	+	1		+			+			+			+		1				+			+														+																	
Great Tit	*Parus major (commixtus)*	大山雀	R	C										+		1							+		2	+		2	+		2	+	2		+	2																					
Green Sandpiper	*Tringa ochropus*	白腰草鷸	WV	U																															+		1	+																				
Grey Wagtail	*Motacilla cinerea*	灰鶺鴒	WV	C	+	2	2	+	1	1	++	2	2	++	1	2	+	1	1	++	2	2	++	2	1	++	2	2	+		1	+	1	1	+		3	+	1	1	+	1	1	+	2	1	+	1	1	+	2	1	+	1	1
Japanese White Eye	*Zosterops japonica*	暗綠繡眼鳥	R	C	+			+	3		+			+		4	+		3	+		5	++		4	++	2	4	++	4	4	++	5	3	++	5	2	++	4	3	++	3	3	++	3	4	++	4	4	++	3	4	+	2	2
Large-billed Crow	*Corvus macrorhynchos*	大嘴烏鴉	R	C																																+																				
Little Egret	*Egretta garzetta*	小白鷺	R, RC	C	+	1	2	+	1	1	+			+	1	1	+	1	2	+		1	+	1		+	1		+	1		+		1	+	1		+		1	+	1		+			+			+			+			+		
Little Swift	*Apus affinis*	小白腰雨燕	R, SpM	C													++						+														2	+		5	+		6	+		5	++		6	++		7	++		7
Magpie	*Pica pica*	喜鵲	R	C	+			+												+																																					
Magpie Robin	*Copsychus saularis*	鵲鴝	R	C	+	1	1	+	1	1	+		1	+	2	1	++	1	1	+	1	1	+	1	1	++	2	2	++	2	2	++	2	2	++		2	++		2	+	1	1	+	1		+	1	1	+	1		+	1	1
Olive Backed pipit	*Anthus hodgsoni*	樹鷚	WV	C																																																						
Red-billed blud magpie	*Urocissa erythrorhyncha*	紅咀藍鵲	R	C																																																					
Rufous-backed Shrike	*Lanius schach*	棕背伯勞	R	C	+		1	+																																																	
Scaly-breasted Munia	*Lonchura punctulata*	斑文鳥	R	C				+			++			++			++												++	3		+++		7	+++		5	++		3	++		3	++		3									
Scarlet Minivet	*Pericrocotus flammeus*	赤紅山椒鳥	R	C																																																				
Scarlet-backed Flowerpecker	*Dicaeum cruentatum*	朱背啄花鳥	R	C																																																			
Siberian Stonechat	*Saxicola maurus*	黑喉石鴴	WV	U							+			+			+																																							
Silver-eared Mesia	*Leiothrix argentauris*	銀耳相思鳥	R	C																																																			
Sooty-headed Bulbul	*Pycnonotus aurigaster*	白喉紅臀鵯	R	C																																																			
Spotted Dove	*Streptopelia chinensis*	珠頸斑鳩	R	C	++	2	3	++	3	4	+	2	3	++	2	3	+++	2	2	++	2	3	++	2	3	++	2	3	++	2	3	++	3	3	++	3	1	++	1	3	++	3	3	++	4	2	++	1	3	++	2	3	++	1	3
Violet Whistling Thrush	*Myiophoneus caeruleus*	紫嘯鶇	R	C				+																																																	
White Wagtail	*Motacilla alba*	白鶺鴒	WV, R	C	+	2	2	+	2	1	+			+	1	1	+		1	+		1	++		3	++		2	++		3	++		3	++	1	2	++		2	+	1	1	+	1	1	+		2	+	1	2	+	1	1
White-breasted Waterhen	*Amaurornis phoenicurus*	白胸苦惡鳥	R	C	+			+		1				+		1							+	1		+	1		+	1					+	1																				
White-rumped Munia	*Lonchura striata*	白腰文鳥	R	C																															+	1																				
Yellow Bellid Prinia	*Prinia flaviventris*	灰頭鷦鶯	R	C	+		1	+			+			+																																										
Yellow Wagtail	*Motacilla flava*	黃鶺鴒	WV&PM	C																																																					
Number of birds						14	23		17	22		8	17		8	17		14	20		12	31		18	32		24	34		31	33		42	38		31	38		29	36		37	33		27	34		19	32		26	33		21	30
No. of species					21	9	13	23	10	13	19	4	9	22	4	9	20	9	12	17	6	14	19	11	14	18	15	14	18	14	13	17	14	13	21	13	17	22	11	14	17	14	13	16	11	12	15	8	12	15	9	12	16	9	11

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

Abundance indication: +, No. of indiv. 1 ~ 3; ++, No. of indiv. 4 ~ 10; +++, No. of indiv. >10;

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

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Table 4.4. Odonate species recorded at the UpperTai Po River

					Baseline survey	Impact monitoring				Impact monitoring						Post construction monitoring									
Species	Common name	Chinese name	Status	Commonness	Oct-07	Jan-09	Jul-09	Jan-10	Jul-10	Jan-11	Jul-11	Jan-12	Jul-12	Mar-13	Jul-13	Jan-14	Feb-14	Mar-14	Apr-14	May-14	Jun-14	Jul-14	Aug-14	Sep-14	Oct-14
Macrodiplax cora	Coastal Glider	高翔澣蜻	NP	C																					
Ceriagrion auranticum ryukyuanum	Orange-tailed Sprite	琉球橘黃蟌	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							+											+	+		
Neurobasis chinensis	Chinese Greenwing	華艷色蟌	NP	C					+									+	+	+		+	+	+	+
Neurothemis fulvia	Russet Percher	網脈蜻	NP	VC																					
Orthetrum chrysis	Red-faced Skimmer	華麗灰蜻	NP	VC		+	+		+				+		+	+									
Orthetrum glaucum	Common blue skimmer	黑尾灰蜻	NP	VC	+	+	+								+									+	+
Orthetrum luzonicum	Marsh Skimmer	呂宋灰蜻	NP	VC									+									+	+	+	+
Orthetrum pruinosum neglectum	Common Red Skimmer	赤褐灰蜻	NP	VC																					
Palpopleura sexmaculata sexmaculata	Asian Widow	六斑曲緣蜻	NP	C									+												
Pantala flavescens	Wandering Glider	黃蜻	NP	VC	+		+	+	+	+	++	+	+	+	+										+
Paracercion calamorum dyeri	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	C							+										+				
Rhinocypha perforata	Common Blue Jewel	三斑鼻蟌	NP	VC					+															+	+
Trithemis Aurora	Crimson dropwing	曉褐蜻	NP	VC	+				+									+				+	+	+	+
Trithemis festiva	Indigo Dropwing	慶褐蜻	NP	VC							+		+		+	+	+	+	+	+	+		+	+	+
Urothemis signata signata	Scarlet Basket	赤斑曲鈎脈蜻	NP	C							+														
Zygonyx iris insignis	Emerald Cascader	彩虹蜻	P	P,PGC																			+	+	+
No of Species					4	2	4	1	6	1	5	1	5	1	4	2	1	3	4	4	2	5	7	8	9

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

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

"+" – Species exists in the study area

"++" – Species common in the study area

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

Commonness and status were decided accroding to AFCD biodiversity website (www.hkbiodiversity.net)
LC- Local Concern - Fellowes *et al* (2002)
PGC - Potential Global Concern - Fellowes *et al* (2002)

Table 4.4. Odonate species recorded at the UpperTai Po River

					Post construction monitoring							Post construction monitoring							
Species	Common name	Chinese name	Status	Commonness	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16
Macrodiplax cora	Coastal Glider	高翔蜻蜻	NP	C								+	+							
Ceriagrion auranticum ryukyuanum	Orange-tailed Sprite	琉球橘黃蟌	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																
Neurobasis chinensis	Chinese Greenwing	華艷色蟌	NP	C	+				+	+				+	+	+				
Neurothemis fulvia	Russet Percher	網脈蜻	NP	VC									+	+	+					
Orthetrum chrysis	Red-faced Skimmer	華麗灰蜻	NP	VC										+	+	+	+			
Orthetrum glaucum	Common blue skimmer	黑尾灰蜻	NP	VC												+	+			
Orthetrum luzonicum	Marsh Skimmer	呂宋灰蜻	NP	VC					+	+	+	+	+	+						
Orthetrum pruinosum neglectum	Common Red Skimmer	赤褐灰蜻	NP	VC							+	+	+							
Palpopleura sexmaculata sexmaculata	Asian Widow	六斑曲緣蜻	NP	C								+	+							
Pantala flavescens	Wandering Glider	黃蜻	NP	VC	+											+	+	+	+	+
Paracercion calamorum dyeri	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	C							+	+	+							
Rhinocypha perforata	Common Blue Jewel	三斑鼻蟌	NP	VC						+	+	+	+	+	+	+				
Trithemis Aurora	Crimson dropwing	曉褐蜻	NP	VC	+	+	+									+	+			
Trithemis festiva	Indigo Dropwing	慶褐蜻	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+			+	
Urothemis signata signata	Scarlet Basket	赤斑曲鈎脈蜻	NP	C																
Zygonyx iris insignis	Emerald Cascader	彩虹蜻	P	P,PGC	+															
No of Species					6	2	2	1	3	6	7	9	11	10	8	8	5	1	2	1

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

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

"+" – Species exists in the study area

"++" – Species common in the study area

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

Commonness and status were decided accroding to AFCD biodiversity website (www.hkbiodiversity.net)
LC- Local Concern - Fellowes *et al* (2002)
PGC - Potential Global Concern - Fellowes *et al* (2002)

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

				Baseline survey		Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring		
Species	Chinese name			Oct-07		Jan-09			Jul-09			Jan-10			Jul-10			Jan-11			Jul-11			Jan-12			Jul-12			Mar-13			Jul-13		
Mollusca		Sampling point		T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2
Biomphalaria sp.	--	NP	VC		+			+			+		+	+		+	+				+			+										
Brotia hainanensis	--	NP	VC	++	+	++			++			++	+		++	+		+			+	+		+			+			+			+		
Melanoides tuberculata	瘤擬黑螺	NP	VC					+	+	+	+	+		+	+		++	+			+		+		+	+	+	+		+	+		+	+	
Physella acuta	尖膀胱螺	NP	VC															+	+	++				+			+			+					
Pomacea canaliculata	蘋果螺	NP	VC					+	+		++	+		+	+		++			+	+		+	+	+	+	+			+			+	+	+
Radix plicatulus	羅白螺	NP	VC		++			+			+		+	+		+	+				+		+	+	+	+	+			+			+		
Sinotaia quadrata	田螺	NP	VC					++		+	++			++			+++				+			+			+	+		+			+		
Insects																																			
Anisocentropus sp.	--	NP	VC													+																			
Arctopora sp.	--	NP	VC													+																			
Aulocodes sp.	--	NP	VC										+			+																			
Baetis sp.	--	NP	VC	+		+			+			+	+		+	+		+									+			+			+		
Chironomus sp.	蠕幼虫	NP	VC	+	+	+			+			+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Ephemera sp.		NP	VC																																
Indobaetis sp.	--	NP	VC	+		+			+			+	+		+	+		+															+		
Mnais sp.	--	NP	VC		+	+			+			+	+		+	+		+	+	+	+	+		+	+		+	+		+			+		
Odonate Larvae	--	NP	VC																																
Orthetrum sp.	--	NP	VC	+	+	+			+			+	+		+	+		+	+		+			+	+		+	+		+			+		
Perla sp	--	NP	VC										+			+																			
Rhaphium sp.	--	NP	VC																								+	+		+					
Tipulidae spp.	--	NP	VC										+			+																			
Crustacea																																			
Caridina cantonensis	廣東米蝦	NP	VC			+			+			+	++		+	++	+	+	+	+	+	+		+			+	+		+			+	+	
Cryptopotamon anacoluthon	鰓刺溪蟹	NP	C			+			+			+			+	+					+						+			+			+		
Macrobrachium hainanense	海南沼蝦	NP	VC			+			+			+	+		+	+	+	+	+		+							+			+			+		
No of Species				5	6	9	0	5	11	2	5	11	12	6	11	16	8	10	6	5	12	4	4	10	6	4	14	7	1	14	2	0	13	4	1

Note:

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

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

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

				Post construction monitoring						Post construction monitoring																		Post construction monitoring														
Species	Chinese name			Jan-14			Feb-14			Mar-14			Apr-14			May-14			Jun-14			Jul-14			Aug-14			Sep-14			Oct-14			Nov-14			Dec-14			Jan-15			Feb-15		
Mollusca		Sampling point		Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2
Biomphalaria sp.	--	NP	VC				+			+			+			+			+			+			+			+			+									+			+		
Brotia hainanensis	--	NP	VC	+	+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+		+	+		+	+	
Melanoides tuberculata	瘤擬黑螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+		+	+		+			+			+			+			+			+			+		
Physella acuta	尖膀胱螺	NP	VC																			+						+			+			+			+			+			+		
Pomacea canaliculata	蘋果螺	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Radix plicatulus	羅白螺	NP	VC	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Sinotaia quadrata	田螺	NP	VC	+			+		+	+	+	+	+	+	+	+		+	+			+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Insects																																														
Anisocentropus sp.	--	NP	VC							+			+			+			+			+			+			+			+	+		+			+			+			+		
Arctopora sp.	--	NP	VC							+			+			+									+			+			+									+					
Aulocodes sp.	--	NP	VC																												+			+											
Baetis sp.	--	NP	VC	+			+			+			+	+					+			+			+			+	+		+	+		+			+			+			+		
Chironomus sp.	蠕幼虫	NP	VC	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ephemera sp.		NP	VC																+			+			+			+	+		+	+		+			+			+			+		
Indobaetis sp.	--	NP	VC	+			+	+		+	+		+	+		+			+			+			+			+	+		+	+		+			+			+			+		
Mnais sp.	--	NP	VC	+	+		+	+	+	+	+	+	+	+	+	+	+		+	+		+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Odonate Larvae	--	NP	VC																																										
Orthetrum sp.	--	NP	VC	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Perla sp	--	NP	VC										+	+		+						+												+						+					
Rhaphium sp.	--	NP	VC							+			+									+			+			+																	
Tipulidae spp.	--	NP	VC																																										
Crustacea																																													
Caridina cantonensis	廣東米蝦	NP	VC	+	+	+	+	+	+	+	+	+	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	+	+	++	+	+	++	+	+	++	+	+	++	+	+
Cryptopotamon anacoluthon	鰓刺溪蟹	NP	C	+			+			+			+						+			+			+			+			+			+			+			+			+		
Macrobrachium hainanense	海南沼蝦	NP	VC	+			+	+		+	+		+	+		+			+			+	+		+			+	+		+			+			+			+	+		+	+	
No of Species				13	7	4	14	10	8	17	11	9	18	13	9	15	9	7	15	9	5	18	10	6	18	9	8	19	12	8	19	13	7	19	11	6	16	10	5	19	10	5	18	7	4

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

				Post construction monitoring																				Post construction monitoring									Post construction monitoring								
Species	Chinese name			Mar-15			Apr-15			May-15			Jun-15			Jul-15			Aug-15			Sep-15			Oct-15			Nov-15			Dec-15			Jan-16			Feb-16		
Mollusca		Sampling point		Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2
Biomphalaria sp.	--	NP	VC	+	+	+	+			+			+			+			+			+			+			+			+			+			+			+		
Brotia hainanensis	--	NP	VC	+			+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+	
Melanoides tuberculata	瘤擬黑螺	NP	VC	+			+			+		+	+		+	+		+	+		+	+		+	+		+	+		+			+			+			+		+
Physella acuta	尖膀胱螺	NP	VC	+			+																																				
Pomacea canaliculata	蘋果螺	NP	VC	+			+	+	+	+	+	+	+	++	+	++	++	+	++	+	+	++	+	+	++	+	+	++	+	+	++	+	+	++	+	+	++	+	+	++	+	+
Radix plicatulus	羅白螺	NP	VC	+	+		+			+			+			+			+			+			+			+			+			+			+			+		
Sinotaia quadrata	田螺	NP	VC	+	+	+	+	+	+	+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+	
Insects																																											
Anisocentropus sp.	--	NP	VC	+			+			+			+			+			+			+			+			+			+			+			+			+		
Arctopora sp.	--	NP	VC	+			+			+			+			+			+			+			+			+			+			+			+			+		
Aulocodes sp.	--	NP	VC	+																																						
Baetis sp.	--	NP	VC	+	+	+	+																																			
Chironomus sp.	蠕幼虫	NP	VC	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Ephemera sp.		NP	VC	+	+		+																																			
Indobaetis sp.	--	NP	VC	+			+			+			+			+			+			+			+			+			+			+			+			+		
Mnais sp.	--	NP	VC				+			+			+			+			+			+			+			+			+			+			+			+		
Odonate Larvae	--	NP	VC																+			+			+			+			+			+			+			+		
Orthetrum sp.	--	NP	VC				+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+	
Perla sp	--	NP	VC	+			+			+			+			+			+			+			+			+			+			+			+			+		
Rhaphium sp.	--	NP	VC	+																																						
Tipulidae spp.	--	NP	VC																																							
Crustacea																																										
Caridina cantonensis	廣東米蝦	NP	VC	+	+		++	++		++	++	+	++	++	+	++	++	+	++	+	+	++	+		++	+		++	+		++	+		++	+		++	+		++	+	
Cryptopotamon anacoluthon	鰓刺溪蟹	NP	C	++	++	+	+		+		+			+			+																									
Macrobrachium hainanense	海南沼蝦	NP	VC	+			+	+		+			+			+			+			+			+			+			+			+			+			+		
No of Species				19	7	5	20	7	4	15	7	4	15	7	4	15	7	4	16	6	4	16	6	3	16	6	3	16	6	3	16	6	3	16	6	3	16	6	3	16	6	3

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

				Baseline survey		Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring		
				Oct-07		Jan-09			Jul-09			Jan-10			Jul-10			Jan-11			Jul-11			Jan-12			Jul-12			Mar-13			Jul-13		
Species		Status	Commonness	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2
Cyprinus carpio var. viridiviolaceus	錦鯉	NP	C													+																		
Gambusia affinis	食蚊魚	NP	VC	+	++			+		+	+		+	++		+	+++	+	+	+	+	+	+	+		++	+	+	+	+	+	+	+	+	+
Glyptothorax pallozonum	白線紋胸鮡	NP	R																																
Liniparhomaloptera disparis	擬平鰍	NP	C																																
Misgurnus anguillicaudatus	泥鰍	NP	C			+			+			+			+			+			+						+			+			+		
Oreochromis niloticus	尼羅口孵非鯽	NP	C	+													+			+			+	+					+						
Parazacco spilurus	異鱲	V and	C	++		+	+		+			+			+	+		+	+		+			+	+					+			+	+	
Poecilia reticulata	孔雀花魚將	NP	C	++	+			++			+		+	+++		+	++			+	+		+	+		+									
Pseudobagrus trilineatus	三線擬鯰	NP,GC	R																											+			+		
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	C	+		+			+			+			+	+		++	++		+	+		+			+			+			+		
Pterocryptis cochinchinensis	越南隱鰭鮠	NP	C																																
Puntius semifasciolatus	七星魚	NP	C	+		+	+		+	+	+	+	+	++	+	+	++	+			+		+	+	+	+	+			+			+		
Rhinogobius spp.	鰕虎魚	NP	C	+		+	+		+			+	++	+	+	++	+	+			+			+	+		+	+		+			+	+	
Schistura fasciolata	橫紋南鰍	NP	C	+		+			+	+		+			+	+		+	+		+		+	+			+			+	+		+	+	
Xiphophorus hellerii	劍尾魚	NP	C	++		+			+	+	++	+	+	++	+	+	+++	+	+		+		+	+		++	+			+			+		
Xiphophorus variatus	雜色劍尾魚	NP	C	+													++				+		+	+		++									
		2x2m fish		70	60	15	8	25	10	20	100	10	2	8	10	7	100	10	5	20	6	2	4	6	2	5	5	2	2	5	2	1	5	2	1
		No of Speices		10	2	7	3	2	7	4	4	7	5	5	7	9	7	8	5	3	11	2	7	10	3	5	8	2	2	9	2	1	9	4	1
Amphibian																																			
Paramesotriton hongkongensis	香港瘰螈	P	UC																																

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

V – Listed as vulnerable in China Fish Red Data Book

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

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

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

				Post construction monitoring						Post construction monitoring																					Post construction monitoring														
				Jan-14			Feb-14			Mar-14			Apr-14			May-14			Jun-14			Jul-14			Aug-14			Sep-14			Oct-14			Nov-14			Dec-14			Jan-15			Feb-15			Mar-15		
Species		Status	Commonness	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2
Cyprinus carpio var. viridiviolaceus	錦鯉	NP	C																																											
Gambusia affinis	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+			+			+			+		+	+		+	+		+	+		+	+		+	+		+	+		+	+	+
Glyptothorax pallozonum	白線紋胸鮡	NP	R										+			+			+			+			+			+			+			+			+			+			+			+	
Liniparhomaloptera disparis	擬平鰍	NP	C							+			+			+			+			+			+			+			+			+			+			+			+			+	
Misgurnus anguillicaudatus	泥鰍	NP	C										+			+			+			+			+			+			+			+			+			+			+			+	
Oreochromis niloticus	尼羅口孵非鯽	NP	C	+			+			+			+								+			+					+				+				+				+				+				+
Parazacco spilurus	異鱲	V and	C	+	+		+	+	+	+	+	+	+	+	+	+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+	
Poecilia reticulata	孔雀花魚將	NP	C	+							+			+			+																																
Pseudobagrus trilineatus	三線擬鯰	NP,GC	R										+			+			+			+			+			+			+			+			+			+			+			+	
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	C	+			+	+		+	+		+	+		+			+			+			+			+			+			+			+			+			+			+	
Pterocryptis cochinchinensis	越南隱鰭鮠	NP	C													+			+			+			+			+			+			+			+			+			+			+	
Puntius semifasciolatus	七星魚	NP	C	+		+	+		+	+		+	+		+	+			+			+			+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Rhinogobius spp.	鰕虎魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Schistura fasciolata	橫紋南鰍	NP	C	+	+		+	+		+	+		+	+		+			+			+			+			+			+			+			+			+			+			+	
Xiphophorus hellerii	劍尾魚	NP	C	+			+			+			+			+			+			+			+			+			+			+			+			+			+			+	
Xiphophorus variatus	雜色劍尾魚	NP	C							+			+			+																																
		2x2m fish		12	8	6	10	12	10	16	10	8	16	10	8	12	4	2	12	4	2	15	5	4	20	8	5	30	10	10	40	15	20	50	20	30	60	30	30	50	20	20	40	20	20	50	20	20
		No of Speices		9	4	3	8	5	4	10	6	4	13	6	4	13	3	1	12	2	2	12	2	2	12	3	4	12	3	4	12	3	4	12	3	4	12	3	4	12	4	4	12	4	4	12	4	4
Amphibian																																															
Paramesotriton hongkongensis	香港瘰螈	P	UC				+			+			+			+			+			+			+			+			+			+			+			+			+			+	

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

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				Post construction monitoring																																
				Apr-15			May-15			Jun-15			Jul-15			Aug-15			Sep-15			Oct-15			Nov-15			Dec-15			Jan-16			Feb-16		
Species		Status	Commonness	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2	Reference	T1	T2
Cyprinus carpio var. viridiviolaceus	錦鯉	NP	C																																	
Gambusia affinis	食蚊魚	NP	VC	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+		+	+		+	+		+	+	
Glyptothorax pallozonum	白線紋胸鮡	NP	R	+			+			+			+			+																				
Liniparhomaloptera disparis	擬平鰍	NP	C	+			+			+			+			+			+			+			+			+			+			+		
Misgurnus anguillicaudatus	泥鰍	NP	C	+																																
Oreochromis niloticus	尼羅口孵非鯽	NP	C			+			+			+			+			+			+	+			+			+			+			+		
Parazacco spilurus	異鱲	V and	C	+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+		+	+	
Poecilia reticulata	孔雀花魚將	NP	C																																	
Pseudobagrus trilineatus	三線擬鯰	NP,GC	R	+			+			+			+			+			+			+			+			+								
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	C	+			+			+			+			+			+			+			+			+			+			+		
Pterocryptis cochinchinensis	越南隱鰭鮠	NP	C	+			+			+			+			+			+			+			+			+			+			+		
Puntius semifasciolatus	七星魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+	+		+	+		+	+		+	+		+	+		+	+	
Rhinogobius spp.	鰕虎魚	NP	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Schistura fasciolata	橫紋南鰍	NP	C	+			+			+			+			+			+			+			+			+			+			+		
Xiphophorus hellerii	劍尾魚	NP	C	+			+			+			+			+			+			+			+			+			+			+		
Xiphophorus variatus	雜色劍尾魚	NP	C																																	
		2x2m fish		40	15	20	12	4	2	10	4	2	8	4	2	10	5	2	15	7	6	20	10	5	35	15	10	45	20	5	50	15	5	45	20	5
		No of Speices		12	4	4	11	4	4	11	4	4	11	4	4	11	4	3	11	4	3	12	4	1	12	4	1	12	4	1	11	4	1	11	4	1
Amphibian																																				
Paramesotriton hongkongensis	香港瘰螈	P	UC	+			+			+			+			+			+			+			+			+			+			+		

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

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

“+” – Species exists in the study area

“++” – Species common in the study area

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

V – Listed as vulnerable in China Fish Red Data Book

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

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

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

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

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

	Post construction monitoring								Post construction monitoring											
Parameters/ Date	Jan-14		Feb-14		Mar-14		Apr-14		May-14		Jun-14		Jul-14		Aug-14		Sep-14		Oct-14	
Replicate	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
DO (mg/L)	8.3	8.1	7.8	8.2	7.6	8	7.4	7.6	7.8	7.5	7.3	7.2	7.6	7.4	7.4	7.5	8.3	8.4	8.2	8.0
pH	7.1	7.4	6.7	7.6	7.7	7.3	7.5	7.4	7.8	8.2	8	7.7	7.9	7.8	7.1	7.2	8.2	8.4	8.2	8.1
Nitrate (mg N/L)	0.62	0.73	0.3	0.5	0.3	0.5	0.3	0.4	0.1	0.1	0.3	0.4	0.5	0.5	0.3	0.4	0.4	0.5	0.5	0.5
Ammonia (mg/L)	0.04	0.06	0.05	0.06	0.06	0.07	0.04	0.05	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	0.01	0.01	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	< 0.1	< 0.1	0.02	0.01	0.02	0.01	0	0	0	0	0	0.01
Conductivity (mS/cm)	52	56	113	112	48	43	42	40	35	55	53	32	51	30	54	40	34	49	26	43
BOD (mg/L)	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Water flow at pool (m/s)	0.01-0.2		0.01-0.2		0.01-0.2		0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3	
Water flow at riffle (m/s)	0.2-0.5		0.2-0.5		0.2-0.5		0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6	
Sand (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stone (%)	40	20	40	20	40	20	40	20	40	20	40	20	40	20	40	20	40	20	40	20
Mud (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Concrete(%)	60	80	60	80	60	80	60	80	60	80	60	80	60	80	60	80	60	80	60	80

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

	Post construction monitoring														Post construction monitoring							
Parameters/ Date	Nov-14		Dec-14		Jan-15		Feb-15		Mar-15		Apr-15		May-15		Jun-15		Jun-15		Aug-15		Sep-15	
Replicate	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
DO (mg/L)	8.4	8.2	8.4	8.3	8.9	9.0	8.5	8.4	8.3	8.2	8.1	8.3	8.8	9.0	8.7	8.8	8.6	8.6	8.5	8.5	8.4	8.3
pH	7.8	8	8.5	8.2	8.6	8.4	8.6	8.3	8.5	8.5	8.4	8.4	8.1	8	7.9	8	7.8	7.9	7.8	7.6	7.7	7.8
Nitrate (mg N/L)	0.4	0.5	0.5	0.5	0.4	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Ammonia (mg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	0.01	0.01	0	0	0	0.02	0.02	0.01	0.02	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
Conductivity (mS/cm)	36	48	38	42	23	84	82	50	79	46	79	46	39	46	39	46	36	42	28	36	33	42
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
Water flow at pool (m/s)	0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3	
Water flow at riffle (m/s)	0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6	
Sand (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Stone (%)	40	20	40	20	40	20	40	20	40	20	40	20	40	20	40	20	40	20	40	20	40	20
Mud (%)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Concrete(%)	60	80	60	80	60	80	60	80	60	80	60	80	60	80	60	80	60	80	60	80	60	80

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

					Post construction monitoring					
Parameters/ Date	Oct-15		Nov-15		Dec-15		Jan-16		Feb-16	
Replicate	T1	T2	T1	T2	T1	T2	T1	T2	T1	T2
DO (mg/L)	8.2	8.0	8.1	8.1	7.8	7.8	7.9	7.8	7.7	7.9
pH	7.9	7.7	7.8	7.9	7.9	7.8	7.8	7.6	7.6	7.5
Nitrate (mg N/L)	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
Ammonia (mg/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01
Conductivity (mS/cm)	28	33	34	36	33	32	42	45	33	35
BOD (mg/L)	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2	< 2
Water flow at pool (m/s)	0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3		0.01-0.3	
Water flow at riffle (m/s)	0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6		0.3-0.6	
Sand (%)	0	0	0	0	0	0	0	0	0	0
Stone (%)	40	20	40	20	40	20	40	20	40	20
Mud (%)	0	0	0	0	0	0	0	0	0	0
Concrete(%)	60	80	60	80	60	80	60	80	60	80