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

POST-CONSTRUCTION ECOLOGICAL MONITORING REPORT (NO. 22)

Prepared By:

ALLIED ENVIRONMENTAL CONSULTANTS LTD.

For:

Drainage Services Department

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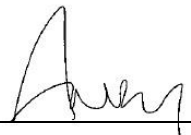
Checked: 

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

Post-Construction Ecological Monitoring Report (No. 22)
Upper Lam Tsuen River

October 2015

Prepared by: Mike pang		November 2, 2015
Validated by: Mark Shea		November 2 2015
	Ecology Team: China-Hong Kong Ecology Consultants	

Post-Construction Ecological Monitoring Report (No. 22)

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 22 post-construction ecological monitoring report for the project conducted **on 23rd of October 2015**. 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 23rd of October 2015**.
- Fauna and flora along the drainage project sections is in a process of re-establishing or restoration; Plants on river bed was experiencing seasonal changes in abundance and phonological appearance ;
- The species richness of odonata was lower than last month due to seasonality;
- 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);
- Higher fish abundance and vegetation coverage was recorded.

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 and partially covered the riverbed along Lam Tsuen River. Compared with dry season, lower density of vegetation was observed during current wet season since heavy rain events occurred which could wash away plants (Photos 1-3). In total, 64 flora species were recorded within the survey transects along the river course. Among those recorded flora, exotic species *Brachiaria mutica* was the dominated species recorded along the river (Photo 4). 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, 23 species of birds were recorded during the bird survey and 7 of the total were wetland dependent species including *Ardeola bacchus, Alcedo atthis* (Photo 5), *Motacilla cinerea, Egretta garzetta* (Photo 6), *Amaurornis phoenicurus* (Photo 7), *Nycticorax nycticorax* 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) and *Nycticorax nycticorax* is classified as Local Concern by Fellowes *et al.* (2002). *Saxicola maurus* (Photo 8) is a winter visitor, was recorded in this month. It is expected that more winter visitors will be noticed in following months due to seasonality. 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, 9 odonata species were recorded during the survey and all of recorded species were common species (Photos 9-11). The result obtained this month is similar to previous surveys conducted in approximate period of last year. Species richness sharply decreased by 6 species in this month compared with last month. The sharp decrease in abundance was mainly related to the seasonal change. The period of conducting survey was still within the emergence period of most odonata species in Hong Kong so that comparative high abundance could be still recorded compared to dry season. However, it is predicted that their abundance will start to decrease following the end up of emergence peak in late autumn (Wilson *et al.*, 2004 & Tam *et al.*, 2011). Only mating behavior of odonata was observed during the survey period. 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 (Photo 12), 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 13) 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 14). As the time of conducting survey was within the breeding period

of Hong Kong Newt, their individuals were easier being caught within a short transect distance compared to their non-breeding season. They were captured in all sampling points. It is assumed that the abundance of Hong Kong Newt was getting higher than previous surveys counducted in wet season. 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. It is expected that more newts could be found in the following months due to seasonality. 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, 18 species of freshwater fish, including species recorded from reference site, were recorded. *Oreochromis niloticus* 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. It is assumed that less flooding or heavy rain happened in October, which could possibly wash proportion fish out of the river. Details of recorded of fish fauna refers to **Table 4.6.** Sampling location was shown on **Figure 1**.

4.3 Abiotic Data

Data on water quality and major 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 October 2015 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 low 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 odonate 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 partially 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

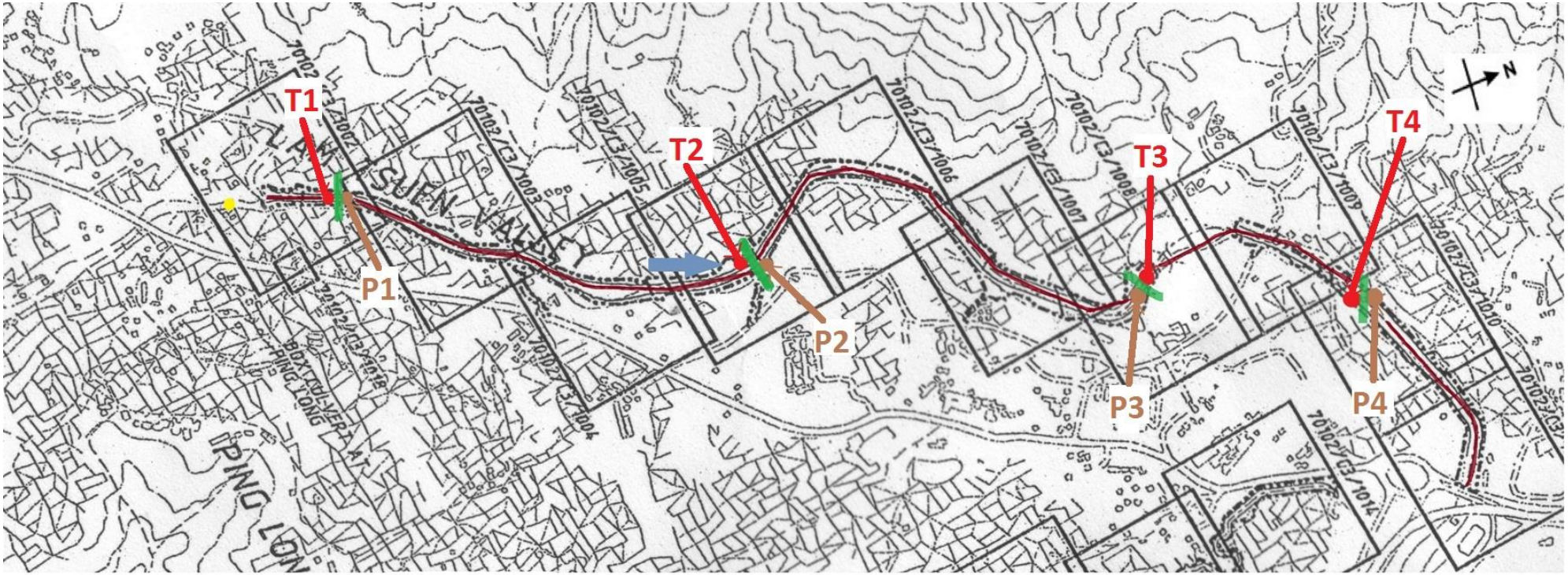

Figure1. Sampling Location of Ecological Survey and Monitoring at Upper Lam Tsuen River, Tai Po.

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: *Brachiaria mutica* dominated at river bed (Lower section)
	
Photo 5: Avifauna - *Alcedo atthis*	Photo 6: Avifauna - *Egretta garzetta*

	
Photo 7: Avifauna - *Amaurornis phoenicurus*	Photo 8: Avifauna - *Saxicola maurus*
	
Photo 9 : Odonata - *Rhinocypha perforata perforata*	Photo 10: Odonata - *Neurobasis chinensis*
	
Photo 11 : Odonata - *Trithemis aurora*	Photo 12: Odonata Larvae

	
Photo 13: Kick sampling	Photo 14: Amphibian - *Paramesotriton hongkongensis*

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	
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
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*	黃鵪菜															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
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*	齊菜															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
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-sinensis*	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	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	++	++	++	+	+	+	+	+	+

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	
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
Poaceae	*Pennisetum alopecuroides*	狼尾草																														+	+	+	+
Poaceae	*Rhynchelytrum repens*	紅毛草	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+										
Poaceae	*Microstegium ciliatum*	剛秀竹	++	++	++	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Brachiaria mutica*	巴拉草	++	+	++	++	++	++	+	++	++	++	++	++	++	++	++	++	++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
Poaceae	*Miscanthus floridulus*	五節芒		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Arundinella nepalensis*	石珍芒		+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Panicum maximum*	大黍		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+										
Poaceae	*Coix lacryma-jobi*	薏苡				+	+	+						+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Arundo donax*	蘆竹															+	+	+	+	+	+	+	+	+											
Poaceae	*Chloris virgata*	虎尾草															+	+	+	+	+	+	+	+	+											
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

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			
		Stream	Jul-08				Aug-08				Jan-09				Jan-09			
		Transect	P1		P4		P1		P4		T1		T2		T3		T4	
Family	Species	Chinese name	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Poaceae	*Microstegium ciliatum*	剛秀竹	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		
Poaceae	*Pennisetum purpureum*	象草	3	20			3	20										
Araceae	*Alocasia odora*	海芋	1	10			1	10			0.5	2					0.3	<1
Caesalpiniaceae	*Cassia alata*	翅莢決明			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						
Moraceae	*Ficus hispida*	對葉榕									1.5	5						
Asteraceae	*Mikania micrantha*	薇甘菊									0.4	20					0.5	1
Musaceae	*Musa paradisiaca*	大蕉													3	5		
Ulmaceae	*Celtis sinensis*	朴樹			6	10			6	10							4	10
Araceae	*Pistia stratiotes L.*	大漂																
Urticaceae	*Boehmeria nivea*	苧麻																
Asteraceae	*Bidens alba*	白花鬼針草											0.5	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											3	5				
Asteraceae	*Wedelia chinensis*	蟛蜞菊															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

			Impact monitoring															
		Stream	Jul-09								Jan-10							
		Transect	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)	%
Poaceae	*Microstegium ciliatum*	剛秀竹																
Fabaceae	*Pueraria lobata*	野葛	0.5	50			0.5	20					0.5	5			0.5	2
Poaceae	*Pennisetum purpureum*	象草															2	5
Araceae	*Alocasia odora*	海芋															1	5
Caesalpiniaceae	*Cassia alata*	翅莢決明																
Magnoliaceae	*Michelia alba*	白蘭																
Poaceae	*Brachiaria mutica*	巴拉草	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	4	5									4	5	0.5	30
Asteraceae	*Mikania micrantha*	薇甘菊	0.5	5	0.3	15	0.5	30					0.5	30	0.3	25		
Musaceae	*Musa paradisiaca*	大蕉					1.5	5									0.5	2
Ulmaceae	*Celtis sinensis*	朴樹							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									0.4	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																
Asteraceae	*Wedelia chinensis*	蟛蜞菊																
Commelinaceae	*Commelina diffusa*	節節草																
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																
Amaranthaceae	*Celosia argentea*	青葙																
Bare Gound				20		80		38		10		50		10		43		24

			Impact monitoring				Impact monitoring				Impact monitoring							
		Stream	Jul-10				Jul-10				Jan-11							
		Transect	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)	%
Poaceae	*Microstegium ciliatum*	剛秀竹															0.8	5
Fabaceae	*Pueraria lobata*	野葛			0.5	5												
Poaceae	*Pennisetum purpureum*	象草											1.2	10				
Araceae	*Alocasia odora*	海芋					1	10									0.5	3
Caesalpiniaceae	*Cassia alata*	翅莢決明																
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
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
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	20					0.5	10	0.4	10	0.4	20	0.5	5		
Poaceae	*Coix lacryma-jobi*	薏苡																
Solanaceae	*Solanum nigrum*	龍葵																
Cyperaceae	*Cyperus flabelliformis*	風車草															1	5
Poaceae	*Miscanthus floridulus*	五節芒																
Euphorbiaceae	*Macaranga tanarius*	血桐																
Asteraceae	*Wedelia chinensis*	蟛蜞菊															0.5	5
Commelinaceae	*Commelina diffusa*	節節草							0.5	20					0.4	10		
Asteraceae	*Erechtites hieracifolia*	革命菜																
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨															0.5	5
Convolvulaceae	*Pharbitis nil*	牽牛							0.5	10								
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				60		45		20		30		75		65		45		54

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								Post construction monitoring							
		Stream	Jul-11								Jan-12								Jul-12								Aug-13								Dec-13								Jan-14							
		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																											0.5	5																					
Fabaceae	*Pueraria lobata*	野葛	0.3	10							0.3	10							0.3	5							0.3	15	0.3	5			0.3	10											0.3	10				
Poaceae	*Pennisetum purpureum*	象草			1.2	2	2.5	10					2.5	5	2.5	5					2	5															1.5	5							1.5	5		
Araceae	*Alocasia odora*	海芋																																															
Caesalpiniaceae	*Cassia alata*	翅英決明																																														
Magnoliaceae	*Michelia alba*	白蘭																																														
Poaceae	*Brachiaria mutica*	巴拉草	0.8	10	1	5					0.8	10	1	2	1.5	60			0.8	10	1	5	1.5	20			0.8	5	0.8	5	1	10	1	15	0.8	10	0.8	10					0.8	10	0.8	10		
Moraceae	*Ficus hispida*	對葉榕																																														
Asteraceae	*Mikania micrantha*	薇甘菊	0.4	5	0.5	3			0.4	2	0.4	5	0.5	3			0.4	2	0.4	5	0.5	3	0.5	15	0.4	1	0.5	25	0.5	10	0.5	10	0.4	3	0.5	10	0.5	5	0.5	10	0.4	10	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					1.5	10																							0.8	2																		
Asteraceae	*Bidens alba*	白花鬼針草	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	0.4	5	0.4	20	0.5	10	0.5	2	0.4	5			0.5	10			0.4	5			0.5	10		
Poaceae	*Coix lacryma-jobi*	薏苡																																														
Solanaceae	*Solanum nigrum*	龍葵					2	3																																								
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					0.4	10					0.3	3	0.4	5							0.4	2	0.3	5													0.3	5										
Asteraceae	*Erechtites hieraciifolia*	革命菜																																														
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨																																														
Convolvulaceae	*Pharbitis nil*	牽牛																																														
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				73		85		65		88		73		82		28		88		75		82		58		92		50		55		68		70		75		85		73		75		75		85		73		75

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

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

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

			Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring								Post construction monitoring								
		Stream	Feb-14								Mar-14								Apr-14								May-14								Jun-14								Jul-14								
		Transect	T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1		T2		T3		T4		T1
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*	蔪秀竹																	0.3	2							0.3	2							0.3	2							0.5	4							0.7
Fabaceae	*Pueraria lobata*	野葛							0.3	10							0.3	10					0.3	5	0.3	5					0.3	5	0.3	5									0.3	5	0.3	5		
Poaceae	*Pennisetum purpureum*	象草							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	10	0.8	10					1	13	1	13					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
Moraceae	*Ficus hispida*	對葉榕																																														
Asteraceae	*Mikania micrantha*	薇甘菊	0.5	10	0.5	5	0.5	10	0.4	10	0.5	10	0.5	5	0.5	10	0.4	10			0.3	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	
Musaceae	*Musa paradisiaca*	大蕉																																														
Ulmaceae	*Celtis sinensis*	朴樹																																														
Araceae	*Pistia stratiotes L.*	大漂																																														
Urticaceae	*Boehmeria nivea*	苧麻																																														
Asteraceae	*Bidens alba*	白花鬼針草	0.4	5			0.5	10			0.4	5			0.5	10			0.5	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
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					0.3	5							0.3	5			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
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	
Onagraceae	*Ludwigia erecta*	美洲水丁香																																														
Poaceae	*Pennisetum alopecuroides*	狼尾草																																														
Amaranthaceae	*Celosia argentea*	青葙					1	2							1	2																																	
Bare Gound				75		85		73		75		72		82		73		75		63		70		12		65		65		77		60		73		65		74		60		70		58		71		58		70	

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							
		Stream	Aug-14							Sep-14							
		Transect		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)	%
Poaceae	*Microstegium ciliatum*	剛秀竹	5							0.7	5						
Fabaceae	*Pueraria lobata*	野葛				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*	翅莢決明															
Magnoliaceae	*Michelia alba*	白蘭															
Poaceae	*Brachiaria mutica*	巴拉草	10	0.8	12			0.8	8	0.6	10	0.8	12			0.8	8
Moraceae	*Ficus hispida*	對葉榕															
Asteraceae	*Mikania micrantha*	薇甘菊		0.3	6	0.3	15	0.3	8			0.3	8	0.3	15	0.3	10
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	20	0.6	12	0.7	15	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*	蟛蜞菊															
Commelinaceae	*Commelina diffusa*	節節草	10			0.3	5			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		0.3	1	0.3	1	0.3	1			0.3	1	0.3	2	0.3	1
Onagraceae	*Ludwigia erecta*	美洲水丁香															
Poaceae	*Pennisetum alopecuroides*	狼尾草															
Amaranthaceae	*Celosia argentea*	青葙															
Bare Gound			55		69		59		68		55		67		58		66

	Post construction monitoring								Post construction monitoring							
Stream	Oct-14								Nov-14							
Transect	T1		T2		T3		T4		T1		T2		T3		T4	
Species	Height(m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height(m)	%	Height(m)	%	Height (m)	%	Height (m)	%
Microstegium ciliatum																
Pueraria lobata							0.6	10							0.6	10
Pennisetum purpureum																
Alocasia odora							1.8	1							1.8	1
Cassia alata																
Michelia alba																
Brachiaria mutica	1	10	1.5	15	1.3	30	1	5	1	10	1.5	15	1.3	30	1	5
Ficus hispida																
Mikania micrantha	0.3	15	0.3	15	0.3	15	0.3	15	0.3	18	0.3	18	0.3	18	0.3	18
Musa paradisiaca																
Celtis sinensis																
Pistia stratiotes L.																
Boehmeria nivea																
Bidens alba	0.5	5	0.8	12	0.7	10			0.5	5	0.8	12	0.7	10		
Coix lacryma-jobi	2	5							2	5						
Solanum nigrum																
Cyperus flabelliformis																
Miscanthus floridulus																
Macaranga tanarius																
Wedelia chinensis																
Commelina diffusa	0.3	10	0.8	20			0.3	20	0.3	12	0.8	22			0.3	20
Erechtites hieracifolia																
Cyclosorus parasiticus																
Pharbitis nil																
Lantana camara																
Leucaena leucocephala																
Nasturtium officinale					0.3	2	0.1	1					0.3	2	0.1	1
Ludwigia erecta	2	30	2	15	2	10	1.8	5	2	25	2	13	2	10	1.8	5
Pennisetum alopecuroides																
Celosia argentea					1.5	15							1.5	15		
Bare Gound		25		23		18		43		25		20		15		40

	Post construction monitoring								Post construction monitoring							
Stream	Dec-14								Jan-15							
Transect	T1		T2		T3		T4		T1		T2		T3		T4	
Species	Height (m)	%	Height(m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%	Height (m)	%
Microstegium ciliatum																
Pueraria lobata							0.6	10							0.6	10
Pennisetum purpureum													3	15		
Alocasia odora							1.8	1							1.8	1
Cassia alata																
Michelia alba																
Brachiaria mutica	1	10	1.5	15	1.3	30	1	5	1	20	1	20	1.3	20	1	10
Ficus hispida																
Mikania micrantha	0.3	18	0.3	18	0.3	18	0.3	18	0.4	10	0.4	15	0.3	5	0.3	20
Musa paradisiaca																
Celtis sinensis																
Pistia stratiotes L.																
Boehmeria nivea																
Bidens alba	0.5	5	0.8	12	0.7	10			1	10	0.4	15	1	15		
Coix lacryma-jobi	2	5														
Solanum nigrum																
Cyperus flabelliformis																
Miscanthus floridulus																
Macaranga tanarius																
Wedelia chinensis																
Commelina diffusa	0.3	12	0.8	22			0.3	20	0.4	10	0.4	20			0.3	20
Erechtites hieracifolia																
Cyclosorus parasiticus																
Pharbitis nil																
Lantana camara																
Leucaena leucocephala																
Nasturtium officinale					0.3	2	0.1	1					0.3	10	0.1	15
Ludwigia erecta	2	25	2	13	2	10	1.8	5	2	30	2	10	2	5	1.8	5
Pennisetum alopecuroides																
Celosia argentea					1.5	15										
Bare Gound		25		20		15		40		20		20		30		19

	Post construction monitoring								Post construction monitoring							
Stream	Feb-15								Mar-15							
Transect	T1		T2		T3		T4		T1		T2		T3		T4	
Species	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%	Height(m)	%
Microstegium ciliatum																
Pueraria lobata							0.6	10							0.6	10
Pennisetum purpureum					3	15							3	15		
Alocasia odora							1.8	1							1.8	1
Cassia alata																
Michelia alba																
Brachiaria mutica	1	20	1	20	1.3	20	1	10	1	20	1.2	20	1.4	20	1	10
Ficus hispida																
Mikania micrantha	0.4	10	0.4	15	0.3	5	0.3	20	0.4	10	0.4	15	0.3	5	0.3	20
Musa paradisiaca																
Celtis sinensis																
Pistia stratiotes L.																
Boehmeria nivea																
Bidens alba	1	10	0.7	15	1	15			1	10	0.7	15	1	15		
Coix lacryma-jobi																
Solanum nigrum																
Cyperus flabelliformis																
Miscanthus floridulus																
Macaranga tanarius																
Wedelia chinensis																
Commelina diffusa	0.5	10	0.5	20			0.3	20	0.5	10	0.4	20			0.3	20
Erechtites hieracifolia																
Cyclosorus parasiticus																
Pharbitis nil																
Lantana camara																
Leucaena leucocephala																
Nasturtium officinale					0.3	10	0.2	15					0.3	10	0.2	15
Ludwigia erecta	2	30	2	10	2	5	2	5	2	30	2	10	2	5	2	5
Pennisetum alopecuroides																
Celosia argentea																
Bare Gound		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*	刚秀竹																																									
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																													0.6	2							0.6	2		
Poaceae	*Miscanthus floridulus*	五節芒																																								
Euphorbiaceae	*Macaranga tanarius*	血桐																																								
Asteraceae	*Wedelia chinensis*	蟛蜞菊																									0.3	20	0.2	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 hieraciifolia*	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							
		Stream	Sep-15								Oct-15							
		Transect	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)	%
Poaceae	*Microstegium ciliatum*	剛秀竹																
Fabaceae	*Pueraria lobata*	野葛	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*	翅荚決明																
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
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
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		
Poaceae	*Coix lacryma-jobi*	薏苡									1	5						
Solanaceae	*Solanum nigrum*	龍葵																
Cyperaceae	*Cyperus flabelliformis*	風車草					0.6	2										
Poaceae	*Miscanthus floridulus*	五節芒									1	10						
Euphorbiaceae	*Macaranga tanarius*	血桐																
Asteraceae	*Wedelia chinensis*	蟛蜞菊	0.4	20	0.2	10					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
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
Amaranthaceae	*Celosia argentea*	青葙													0.4	5		
Acanthaceae	*Dicliptera chinensis*	狗肝菜									0.3	20						
Bare Gound				15		30		13		55		30		45		20		55

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)

					Baseline monitoring						Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring				
Common Name	**Species name**	**Chinese name**	**Status**	**Commonness**	Jul-08			Aug-08			Jan-09					Jul-09					Jan-10					Jul-10					Jan-11				
					Abundance			Abundance			Abundance					Abundance					Abundance					Abundance					Abundance				
					C	P1	P4	C	P1	P4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4
Barn Swallow	*Hirundo rustica*	家燕	PM	C	+	**1**	**1**									+			2	3														
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**	**1**	++	**2**		+		1			+			2	1	+			2		+			2	1	+	2		1		
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	++	**2**	**3**	+++	**4**	**5**	++	2		2	2	++	1	2	1	3	+++	20	2			+++	4	3	5	2	+	5	2	2	3
Chinese Pond Heron	*Ardeola bacchus*	池鷺	R,RC	C	+			++	**3**	**1**	+			1		+			1	1	+	1	2	1	1	+	2	1	1	2	+	1			
Common Kingfisher	*Alcedo atthis*	普通翠鳥	R	C												+				1	+				1	+		1	1	2	+	1			
Common Koel	*Eudynamys scolopacea*	噪鵑	R	C	++	**1**		+													+			2		+					+				
Common Sandpiper	*Actitis hypoleucos*	磯鷸	WV&PM	C							+										+			3		+					+	2		1	
Common Tailorbird	*Orthotomus sutorius*	長尾縫葉鶯	R	C	+	**1**	**1**	+	**1**		+		1	1		+				1	+	1		1		+			1	1	+	2		1	1
Crested bulbul	*Pycnonotus jocosus*	紅耳鵯	R	C	+++	**2**	**3**	++	**3**	**4**	++	3		3	4	+++	3	2	2	1	+++					+++	2	2	3	2	+	3	2	1	2
Crested Goshawk	*Accipiter trivirgatus*	鳳頭鷹	R, CR, Cap.586	U																										+				4
Crested Myna	*Acridotheres cristatellus*	八哥	R	C	++	**2**		++	**2**		+		2			++		2	3	2	++	2	3	5	1	++	3	4	2	3	+	3	2	1	
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	+			+	**3**	**2**	++					++		4			+	2		4		+	3	2							
Dusky Warbler	*Phylloscopus fuscatus*	褐柳鶯	WV	C																														
Eurasian tree sparrow	*Passer montanus*	麻鵐	R	C	++	**2**		+			+					++	3		1	2	+	4			3	++	6	4	3	5	+				
Great Coucal	*Centropus sinensis*	褐翅鴉鵑	R,VU	C							+					+			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																										+	2		1	1
Japanese White Eye	*Zosterops japonica(simplex)*	暗綠繡眼鳥	R	C	+			+			++	1			4	++		2		3	++	15				++	6			4	+	4	2	1	
Jungle Crow	*Corvus macrorhynchus*	大嘴烏鴉	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				+			+			2		+			1	1	+	1	1	2		+	2	1	2	1	+	1		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	++	**3**																												
Magpie	*Pica pica*	喜鵲	R	C				+			+					+			1							+					+				
Magpie Robin	*Copsychus saularis*	鵲鴝	R	C	++	**1**	**1**	+	**1**	**1**	+		1	1	1	+	1			1	+	1	1	2	2	+	2	1	1	2	+	1	1		1
Mandarin Duck	*Aix galericulata*	鴛鴦	WV	U																														
Masked Laughing Thrush	*Garrulax perspicillatus*	黑臉噪鶥	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	+	**1**					++										+			2		+					+				
Plaintive Cuckoo	*Cacomantis merulinus*	八聲杜鵑	SV	C																														
Red-billed Blue Magpie	*Urocissa erythrorhyncha*	紅嘴藍鵲	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												+		1																
Rufous-backed Shrike	*Lanius schach*	棕背伯勞	R	C				+			+			1		+	1	1			+		1			+			1		+				
Rufous-capped Babbler	*Stachyridopsis ruficeps*	紅頭穗鶥	R	C																														
Scarlet Minivet	*Pericrocotus flammeus*	赤紅山椒鳥	R	C																														
Siberian Stonechat	*Saxicola maurus*	黑喉石鵲	WV	C							+																							
Sooty-headed Bulbul	*Pycnonotus aurigaster*	白喉紅臀鵯	R	U																														
Spotted Dove	*Streptopelia chinensis*	珠頸斑鳩	R	C	+	**1**	**1**	+	**1**		+++			3	1	++	2		1	3	++	3	4	4	2	++	1	2	2	1	+	3	2		1
Spotted Munia	*Lonchura punctulata*	斑文鳥	R	C												+		2			+			3						+				
Velvet-fronted Nuthatch	*Sitta frontalis*	絨額鳭	R	C																														
White Wagtail	*Motacilla alba*	白鶺鴒	WV	C				+			+	1		1	1	+	1		1		+	1	2	2	1	+	1		1	1	+	1		1	2
White-breasted Waterhen	*Amaurornis phoenicurus*	白胸苦惡鳥	R	C	+			+			+				1	+				1	+				1	+			1	2	+	1			
White-throated Kingfisher	*Halcyon smyrnensis*	白胸翡翠	R, LC	C												+			1		+			1		+								
White-rumped Munia	*Lonchura striata*	白腰文鳥	R	C																														
Yellow Bellid Prinia	*Prinia flaviventris*	黃腹鵐鶯	R	C	+		**1**	+			+				1	+				1	+	1		3	1	+			1	1	+	1		1	2
Yellow Wagtail	*Motacilla flava*	黃鶺鴒	WV&PM	U							+			1	1						+	1		2							+				
Zitting cisticola	*Cisticola juncidis*	棕扇尾鶯	WV&PM	C																														
Number of birds						19	12		20	13		6	5	14	12		9	14	13	17		50	14	28	10		31	21	24	27		30	14	8	13
No. of species					18	12	8	19	9	5	24	3	4	8	5	23	5	7	9	11	23	9	6	10	5	25	10	10	12	13	28	13	9	7	7

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

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

Common Name	Species name	Chinese name	Status	Commonness	Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Post construction monitoring					Post construction monitoring				
					Jul-11					Jan-12					Jul-12					Aug-13					Dec-13					Jan-14					Feb-14				
					Abundance					Abundance					Abundance					Abundance					Abundance					Abundance					Abundance				
					C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4
Barn Swallow	*Hirundo rustica*	家燕	PM	C											+++	3	4	3	2	+														+				
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	+			1		+	1			2	++			3		++	1			2	++		2	3	2	++		2	2	1	++		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	+		1	3	1	+	2		2	1	++	2	1	4	2	++	2	1		1	++	3	3	2	1	+	1		2	3	+	3	1	2	2
Chinese Pond Heron	*Ardeola bacchus*	池鷺	R,RC	C	+			1	1	+			1		+		1	1		+			1	1	++	2	3	2	1	++	1	2	4	3	++		1	2	2
Common Kingfisher	*Alcedo atthis*	普通翠鳥	R	C						+					+					+					+					+			1		+				1
Common Koel	*Eudynamys scolopacea*	噪鵑	R	C						+				4	+					+					+					+					+	1			
Common Sandpiper	*Actitis hypoleucos*	磯鷸	WV&PM	C						+					+					+					+		2	2		+		1	2		+		2	2	
Common Tailorbird	*Orthotomus sutorius*	長尾縫葉鶯	R	C	+	1		2	1	+				1	+	1	1	1		+	1			1	+	1	1		1	++	2	1	3	2	++	1	1	2	1
Crested bulbul	*Pycnonotus jocosus*	紅耳鵯	R	C	+	3	1	3	1	+	1		1	2	+++	5	2	4	2	+++	4	2	2	3	+++	5	4	5	3	+++	6	5	4	5	+++	4	3	3	4
Crested Goshawk	*Accipiter trivirgatus*	鳳頭鷹	R, CR, Cap.586	U																+																		
Crested Myna	*Acridotheres cristatellus*	八哥	R	C	+		1	2		+		2			++			5	2	++	1	3	3		++	1	2	3	2	++		3	2	3	++		2	4	2
Crested Serpent Eagle	*Spilornis cheela*	蛇鵬	R, VU, LC	U																					+													
Daurian redstart	*Phoenicurus auroreus*	北紅尾鴝	WV	C																					+					+		1	1		+		1		1
Domestic pigeon	*Columba sp.*	鴿	R	C																+					+					+					+				
Dusky Warbler	*Phylloscopus fuscatus*	褐柳鶯	WV	C																					+					+	1				+	1		1	
Eurasian tree sparrow	*Passer montanus*	麻鵐	R	C	+			3	2	+					+++	4	5	3	2	++			2		++					+					+				
Great Coucal	*Centropus sinensis*	褐翅鴉鵑	R,VU	C	+					++	6			3	+					+					+					+			1	1	+		1	1	
Great Tit	*Parus major(commixtus)*	大山雀	R	C																					+					+					+	1			2
Green Sandpiper	*Tringa ochropus*	白腰草鷸	PM&WV	C																					+					+		2			+			2	
Grey Heron	*Ardea cinerea*	蒼鷺	WV,PRC	C																+					+					+					+				
Grey Wagtail	*Motacilla cinerea*	灰鶺鴒	WV	C						+		1	2	1											++	1	3	3	2	++	2	2	4	1	++	2	1	2	2
Japanese White Eye	*Zosterops japonica(simplex)*	暗綠繡眼鳥	R	C	+	5	2	3		+	1	1	2	1	+++	4		3		+++	4		3	2	+++	6	4	6	3	+++	4	3	3	5	+++	5		4	
Jungle Crow	*Corvus macrorhynchus*	大嘴烏鴉	R	C																					+										+.				
Large Hawk Cuckoo	*Cuculus sparverioides*	鷹鵑	SV	U																																		
Lesser Coucal	*Centropus bengalensis*	小鴉鵑	R, VU	C	+	1									+																								
Little Egret	*Egretta garzetta*	小白鷺	R, RC	C	+			2	1						+			1	1	+	1	1			+	1	2	1	2	+	1	2	3	2	+	2	2	3	3
Great Egret	*Ardea alba*	大白鷺	R,WV, RC	C																																		
Little Swift	*Apus affinis*	小白腰雨燕	R,SpM	C																										+					+		2	1
Magpie	*Pica pica*	喜鵲	R	C	+					+		1								+					+					+					+				
Magpie Robin	*Copsychus saularis*	鵲鴝	R	C	+	2	1	2	1	+	2	3	1	2	++	3	2	3	2	++	1	1	1		++	1	1	1	2	++	2	1	3	1	++	1	2	1	2
Mandarin Duck	*Aix galericulata*	鴛鴦	WV	U																					+														
Masked Laughing Thrush	*Garrulax perspicillatus*	黑臉噪鶥	R	C																					+					+					+			3	2
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						+	1	1			+										++		3	2	3	++	2	1		2	+			1	
Plaintive Cuckoo	*Cacomantis merulinus*	八聲杜鵑	SV	C																																		
Red-billed Blue Magpie	*Urocissa erythrorhyncha*	紅嘴藍鵲	R	C																															+			
Red-flanked Bluetail	*Tarsiger cyanurus*	紅脇藍尾鴝	PM&WV	C																					+					+		1		1	+				1
Rufous Turtle Dove	*Streptopelia orientalis*	山斑鳩	R	C																																		
Rufous-backed Shrike	*Lanius schach*	棕背伯勞	R	C	+					+					+	1				+					+					+					+				
Rufous-capped Babbler	*Stachyridopsis ruficeps*	紅頭穗鶥	R	C																					+					+					+				
Scarlet Minivet	*Pericrocotus flammeus*	赤紅山椒鳥	R	C																					+					+					+				
Siberian Stonechat	*Saxicola maurus*	黑喉石鵖	WV	C						+															+					+		1			+				
Sooty-headed Bulbul	*Pycnonotus aurigaster*	白喉紅臀鵯	R	U	+	1		1		+					+			1																					
Spotted Dove	*Streptopelia chinensis*	珠頸斑鳩	R	C	+	1	2	1	1	+			12		++	2	1	3		++	1	2	2		++	1	3	1	2	++	3	2	3	4	++	3	4	3	2
Spotted Munia	*Lonchura punctulata*	斑文鳥	R	C	+					++					+					+					+					++					++				
Velvet-fronted Nuthatch	*Sitta frontalis*	絨額鳾	R	C																					+														
White Wagtail	*Motacilla alba*	白鶺鴒	WV	C	+					+	1				++	1	2			+					++	1	2	2	3	++		2	1	2	++	1	2	3	2
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*	黃腹鵐鶯	R	C	+			1		+					+	1		1		+					+		1	1		+		1	2	1	+			1	2
Yellow Wagtail	*Motacilla flava*	黃鶺鴒	WV&PM	U																																		
Zitting cisticola	*Cisticola juncidis*	棕扇尾鶯	WV&PM	C																																		
Number of birds						14	8	24	9		15	9	21	17		27	19	36	13		16	10	14	10		23	36	34	27		25	33	41	37		25	25	42	35
No. of species					19	7	6	12	8	26	8	6	7	9	23	10	9	13	7	37	9	6	7	6	48	11	15	14	13	35	11	18	17	16	40	12	14	19	18

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

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

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

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CR: Rare in China Red Data Book Status

VU: Vulnerable in China Red Data Book Status

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

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

Common Name	Species name	Chinese name	Status	Commonness	Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring				
					Mar-14					Apr-14					May-14					Jun-14					Jul-14					Aug-14					Sep-14					Oct-14					Nov-14					Dec-14				
					Abundance					Abundance					Abundance					Abundance					Abundance					Abundance					Abundance					Abundance					Abundance					Abundance				
					C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4
Barn Swallow	*Hirundo rustica*	家燕	PM	C	+					+				1	++	2	1	4	2	+		1	2	1	+			2															+									
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	++	1		4	2	++		2	1		++	1	2	2	1	++	2		3	2	++	2	3	2	1	++	1		3		++		2	2	1	++	2		3		++		2	2		++	2		3	2
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*	白頭鵐	R	C	+	2	2	4	3	+	2		3	1	+		1	2		+	2		2		+	1				+	2		1		+	2	2	1		+	3		2	1	+	2			1	++	2	2	3	
Chinese Pond Heron	*Ardeola bacchus*	池鷺	R,RC	C	++	2	3	3	1	++	3	2	2		++	1		2	1	++	2	1	1		++	4	2	3	2	++	2	1	2	2	++	3	2	3	1	++	4	1	1	2	++	3		2	1	+	2	1	3	
Common Kingfisher	*Alcedo atthis*	普通翠鳥	R	C	+			1		+					+										+										+					+					+			1				
Common Koel	*Eudynamys scolopacea*	噪鵑	R	C	+	1		1		+	2		1		+	1		1	1	+			1		+	1				+		1			+					+					+					+				
Common Sandpiper	*Actitis hypoleucos*	磯鷸	WV&PM	C	+		2	2	1	+		2	1		+			1		+					+					+					+					+					+					+				
Common Tailorbird	*Orthotomus sutorius*	長尾縫葉鶯	R	C	++	1	2	1	2	++	1	1		1	++	1		1	1	++	1	1	1	1	++	2		1		++	1	2	1	1	++	1	1	2	2	++	1	1		1	+		1			++		1		1
Crested bulbul	*Pycnonotus jocosus*	紅耳鵐	R	C	+++	3	2	6	5	+++	2	3	4	2	+++	3	2	3	3	+++	2	3	4	2	+++	4	3	6	3	+++	3		4	2	+++	2	2	3	2	+++	3	3	4	2	+++		2	2	3	+++		4	3	2
Crested Goshawk	*Accipiter trivirgatus*	鳳頭鷹	R, CR, Cap.586	U																																														
Crested Myna	*Acridotheres cristatellus*	八哥	R	C	++			6	3	++		1	3	2	+		2	1		++		3	5	2	++	1	2	5		++		2	3		++		4	3	2	++	1		2	3	++	3		4		++	2	3	5	
Crested Serpent Eagle	*Spilornis cheela*	蛇鵬	R, VU, LC	U	+																																													
Daurian redstart	*Phoenicurus auroreus*	北紅尾鴝	WV	C	+		1	1																											+		1			+		1	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		
Eurasian tree sparrow	*Passer montanus*	麻鵐	R	C	+					+	2				+					+			2	+	2		3	1	+		1	2	2	+		1			+		3		1	+	2	2			++	3		2	
Great Coucal	*Centropus sinensis*	褐翅鴉鵑	R,VU	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
Great Tit	*Parus major(commixtus)*	大山雀	R	C	+	1				+					+			2																																	
Green Sandpiper	*Tringa ochropus*	白腰草鷸	PM&WV	C	+		2	2		+		1	2		+					+																																
Grey Heron	*Ardea cinerea*	蒼鷺	WV,PRC	C	+					+																																									
Grey Wagtail	*Motacilla cinerea*	灰鶺鴒	WV	C	++	2	1	2	1	+		1			+										+			1	1	+	2	1	3	1	+	1	2	2	1	+	1	1	1	2	+	1		2	1
Japanese White Eye	*Zosterops japonica(simplex)*	暗綠繡眼鳥	R	C	++	4		5	3	++	2		3		++	4	3	5	2	++	2	2	3		++	5	2		2	++	3		4	3	++	2				++	3				++	2		3		++	3	4	5	
Jungle Crow	*Corvus macrorhynchus*	大嘴烏鴉	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	3	4	2	++	3	2	2	1	++	1	2	3	2	++	1	1	2	1	++	1	2	3	1	++	2	3	4	2	++	1	2	4	2	++	2	1	3	1	++	3	2	4	2	++	2	1	3	1
Great Egret	*Ardea alba*	大白鷺	R,WV, RC	C																																													
Little Swift	*Apus affinis*	小白腰雨燕	R,SpM	C	+		2	2																																									
Magpie	*Pica pica*	喜鵲	R	C	+			1		+																				+					+					+					+				
Magpie Robin	*Copsychus saularis*	鵲鴝	R	C	++	1	1	2	2	++	1		2	1	++	1	1	1		++	1	2		1	++		1	3	1	++	1	2	2	1	++	2	1	2	1	++	1	2	2		++	1	1	2	1	++	1	1	2	2
Mandarin Duck	*Aix galericulata*	鴛鴦	WV	U																																													
Masked Laughing Thrush	*Garrulax perspicillatus*	黑臉噪鶥	R	C	+		2	4	2	+		2			+		2	4	2	+	2		3		+			2	1	+		3	2	3	+		2	4	2	+		2			+	3		3		++			2	2
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	+		1	2		+			2		+																																+			
Plaintive Cuckoo	*Cacomantis merulinus*	八聲杜鵑	SV	C											+					+																														
Red-billed Blue Magpie	*Urocissa erythrorhyncha*	紅嘴藍鵲	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	1	+			1		+	1		1		+				1	+	1		1					
Rufous-capped Babbler	*Stachyridopsis ruficeps*	紅頭穗鶥	R	C	+					+					+																				+					+					+				
Scarlet Minivet	*Pericrocotus flammeus*	赤紅山椒鳥	R	C																																													
Siberian Stonechat	*Saxicola maurus*	黑喉石鵖	WV	C	+			1																																										
Sooty-headed Bulbul	*Pycnonotus aurigaster*	白喉紅臀鵐	R	U																																													
Spotted Dove	*Streptopelia chinensis*	珠頸斑鳩	R	C	++	2	3	4	3	++	3	2	2	1	++	2	3	5	2	++	3	1	3	2	++	2	3	5	1	++	2	4	3	++	4	2	3	2	++	3	3	5	3	+++	2	3	3	2
Spotted Munia	*Lonchura punctulata*	斑文鳥	R	C	++					++			4		++					++					+					+					+					++	5		8		++		4	5		+++	5		7	
Velvet-fronted Nuthatch	*Sitta frontalis*	絨額鳭	R	C																																													
White Wagtail	*Motacilla alba*	白鶺鴒	WV	C	++	1	2	2	1	++	1	2	1	2	+					+					++	1	2	3	1	++	2	1	2	2	++	3	2	3	4	++	2	1	2	1	++	1	2	1	2	++	1	1	2	1
White-breasted Waterhen	*Amaurornis phoenicurus*	白胸苦惡鳥	R	C	+			2		+				1	+			1	1	+		1			+			1		+		1	2	1	+			1	1	+			1	1	+				1			
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*	黃腹鵐鶯	R	C	+		1	2	1	+	1	1	1		+			1	1	+	1			1	+	1	2	1	1	+	1	2	2	1	+	1	1	2	2	+	1		1		+		1	1	1	+	1		1	
Yellow Wagtail	*Motacilla flava*	黃鶺鴒	WV&PM	U																																													
Zitting cisticola	*Cisticola juncidis*	棕扇尾鶯	WV&PM	C																																												+			
Number of birds						22	32	66	33		23	23	36	14		18	19	41	21		19	16	32	16		28	24	44	18		19	21	43	24		22	28	46	25		34	21	39	17		25	23	39	19		29	26	49	17
No. of species					41	13	18	26	16		12	14	18	11		11	10	19	14		11	10	14	11		14	12	18	14		11	12	20	14		11	17	18	14		15	13	18	12		12	13	17	12		15	15	18	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

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

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

Common Name	Species name	Chinese name	Status	Commonness	Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					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					Sep-15					Oct-15				
					Abundance					Abundance					Abundance					Abundance					Abundance					Abundance					Abundance					Abundance					Abundance					Abundance				
					C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4	C	T1	T2	T3	T4
Barn Swallow	*Hirundo rustica*	家燕	PM	C											++	3	2	4	2	++	4	3	3	2	++	4	4	5	3	++	3	3	2	3	++			3	3	++	3	2	4		++		3	2		++			5	
Black Drongo	*Dicrurus macrocercus*	黑卷尾	Sv	C																					+									+			1															
Black Kite	*Milvus lineatus*	麻鷹	R, RC, Cap.586	C	+					+					+					+			1																													
Black-faced bunting	*Emberiza spodocephala*	灰頭鵐	WV&PM	C																+			1																													
Black-necked Starling	*Sturnus nigricollis*	黑領椋鳥	R	C	++	2		2		++			3	2	++	2		2		+		2		2	++			3	2	++	2		1	2	++	2	2		2	++	4	3	3		++		3	3		++		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																					+			1																									
Chinese Bulbul	*Pycnonotus sinensis*	白頭鵐	R	C	++	2		3	1	+	1		1		++	2		2		++	2		2		++	2	2	2		++		1	3	2	++		2	1	2	++	3		2	2	++	2	2	4	3	++			3	3
Chinese Pond Heron	*Ardeola bacchus*	池鷺	R,RC	C	+	2	2		1	+	2	1	2		+	2	1	2	1	+				1	+				1	+	1				+	1				+				1	+				1	+				2
Common Kingfisher	*Alcedo atthis*	普通翠鳥	R	C	+		1			+					+		1			+	1				+	1				+	1				+			1		+					+					+				2
Common Koel	*Eudynamys scolopacea*	噪鵑	R	C						+	1				+			1	1	+			1	1	+			1	1	+			1	1																	
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		2	1	+	2		1		+	2		2		+	1		2		++	2		2		++	1	2	2		++		1		1	++	2			2
Crested bulbul	*Pycnonotus jocosus*	紅耳鵐	R	C	+++	3	2	3		+++	2	2	4		+++	2	4			+++	4	3	5	2	+++	5	2	5	2	+++	5	3	5	4	+++	8	3	3	5	+++	7	5	5	5	+++	3	6	5	20	+++	3	5	5	10
Crested Goshawk	*Accipiter trivirgatus*	鳳頭鷹	R, CR, Cap.586	U																																															
Crested Myna	*Acridotheres cristatellus*	八哥	R	C	++		3	4	2	++		4	3		++		2	3	2	+++	3	4	2	3	+++	3	4	2	3	++	2	3	2	2	++	3	2	3	3	++		2	4		++		2		3	++				
Crested Serpent Eagle	*Spilornis cheela*	蛇鵬	R, VU, LC	U																																															
Daurian redstart	*Phoenicurus auroreus*	北紅尾鴝	WV	C	+	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		+							
Eurasian tree sparrow	*Passer montanus*	麻鵐	R	C	+++		3	2	1	++		2		1	++	2			1	++	2	2	1	3	++	2	2	1	3	++	3	2	2	2	++	3		2	3	++	3	2	2	3	++	4	4	2	2	++				7
Great Coucal	*Centropus sinensis*	褐翅鴉鵑	R,VU	C	+					+			1	1	+		1	1		+			1		+	1																									
Great Tit	*Parus major(commixtus)*	大山雀	R	C	+															+	2				+	2				+																					
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		++	1	2	2	2	++	1		1	2	+		1	1	2	++		1	1	2	++		1	1	1	+			1		+	1	1			+	1				+		1		
Japanese White Eye	*Zosterops japonica(simplex)*	暗綠繡眼鳥	R	C	++	3		3		++	3		4		++			4	3	++			3	3	++		3	1	3	++	3	3	2	3	++	3	3	2	5	++	4	2	3	2	++	3	3	2	4	++				4
Jungle Crow	*Corvus macrorhynchus*	大嘴烏鴉	R	C																																															
Large Hawk Cuckoo	*Cuculus sparverioides*	鷹鵑	SV	U											+					+			1	1	+			1	1	+																					
Lesser Coucal	*Centropus bengalensis*	小鴉鵑	R, VU	C																																															
Little Egret	*Egretta garzetta*	小白鷺	R, RC	C	++	1	2	3	2	+	1	1	3	2	+	1	2	3	2	+		2	1		+		2	1		+	1	1	1		+	1	1	1		+		1		1	+		1		1	+	1			1
Great Egret	*Ardea alba*	大白鷺	R,WV, RC	C											+		1			+		1							+	1				+	1				+												
Little Swift	*Apus affinis*	小白腰雨燕	R,SpM	C						+	1		2		+			2																	+			4		+		3			++	5					
Magpie	*Pica pica*	喜鵲	R	C																																														
Magpie Robin	*Copsychus saularis*	鵲鴝	R	C	++	1	1	2	2	++	1	1	2	1	++	1	1	2		++	2		1	2	++	1	1	1	2	++	2			2	++	2	1	1	2	++		2	2		++		2	2		++		2	2	
Mandarin Duck	*Aix galericulata*	鴛鴦	WV	U																																															
Masked Laughing Thrush	*Garrulax perspicillatus*	黑臉噪鶥	R	C	++	2				+			3		++					++		2			++		2			++	2				++				3	++			4	++		3							
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	+			1																																										
Plaintive Cuckoo	*Cacomantis merulinus*	八聲杜鵑	SV	C											+																																				
Red-billed Blue Magpie	*Urocissa erythrorhyncha*	紅嘴藍鵲	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	+					+					+		1																													
Rufous-capped Babbler	*Stachyridopsis ruficeps*	紅頭穗鶥	R	C	++					++					+					+					+																									
Scarlet Minivet	*Pericrocotus flammeus*	赤紅山椒鳥	R	C											+										+					++			12																
Siberian Stonechat	*Saxicola maurus*	黑喉石鴭	WV	C	++		1	1		+		1			++		1	1																															+		1		
Sooty-headed Bulbul	*Pycnonotus aurigaster*	白喉紅臀鵐	R	U																																													+		1				
Spotted Dove	*Streptopelia chinensis*	珠頸斑鳩	R	C	+++	2	3	5	2	++	3	2	4	3	++	2	3	2	2	++	4	2	3	2	++	3	3	3	2	++	1	2	2	2	++	2	2	2	4	++	1	2	2	4	++	3	2	2		++	2	4	4	3
Spotted Munia	*Lonchura punctulata*	斑文鳥	R	C	++	5		8		+													2		+																								++				
Velvet-fronted Nuthatch	*Sitta frontalis*	絨額鳭	R	C											+					+		1			+					1																					
White Wagtail	*Motacilla alba*	白鶺鴒	WV	C	++	1	2	3	2	+	1	1	2		++	2	1	2	2	+	1	2	1	2	++	1	1	1	2	++			2	2	++			2		+++			8	+				2	+				2
White-breasted Waterhen	*Amaurornis phoenicurus*	白胸苦惡鳥	R	C	+					+			1	1	+			1		+		1			+	1				+			1			+														1
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*	黃腹鵐鶯	R	C											+		1	1	1	+		1	1	1	+		1	1	1	+			1	1		+			1		+				1		+						
Yellow Wagtail	*Motacilla flava*	黃鶺鴒	WV&PM	U																																														
Zitting cisticola	*Cisticola juncidis*	棕扇尾鶯	WV&PM	C																																														
Number of birds						27	23	42	14		18	18	39	15		21	21	36	20		28	29	32	27		28	30	35	28		32	21	25	27		27	19	38	34		14	27	36	26		16	36	25	38		13	13	25	41
No. of species					29	14	13	15	9	29	12	11	17	10	31	12	13	18	12	31	12	16	18	14	30	12	15	20	15	25	17	11	15	13	21	10	11	16	11	23	10	14	14	11	21	6	13	11	10	23	5	5	7	13

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							Post construction monitoring							Post construction 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	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
Acisoma panorpoides panorpoides	Asian Pintail	雛腹蜻	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	方帶翡蟌	NP	VC																+		+														+		
Ictinogomphus pertinax	Common Flangetail	霸王華春蜓	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	華麗色蟌	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	蜻蜓	NP	VC	+	+		+				++					+				+					+	+	+				+	+	+	+	+	+	+
Paracercion calamorum duyeri	Dusky Lilysquatter	葦尾蟌	P, LC	C																+																		
Prodasineura autumnalis	Black Threadtail	烏narrow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,PGC	VC																		+																
No. of species					4	5	3	4	0	6	0	7	1	7	5	3	2	1	3	12	9	14	13	15	11	13	9	4	3	2	4	9	11	13	14	15	13	9

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)

				Baseline monitoring				Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Impact monitoring					Post construction monitoring					Post construction monitoring				
				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				
		Sampling point		Upper stream	Lower stream	Upper stream	Lower stream	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	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	鯉刺溪蟹	NP	VC	+		+																											+					+					+	+	+	+		+	+	+	+		+	+				+	+				+	+			
Macrobrachium hainanense	海南沼蝦	NP	VC	+	+	+	+	+	+				+					+	+				+	+				+	+			+	+	+			+	+					+					+	+				+					+					+	+	+		
Somanniathelphusa zanklon	束腰蟹	NP	VC	+		+																																+																													
No. of species				9	12	10	11	10	11	3	2	9	10	3	3	2	9	12	5	3	2	7	12	5	4	2	7	15	13	11	13	15	16	4	1	1	2	17	9	6	5	0	15	10	8	5	1	16	12	11	7	3	15	11	9	8	7	15	11	9	10	8	16	13	13	11	8

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

Reference point was the sampling location outside the works area.

Table 4.5 Aquatic Macro invertebrates recorded at Lam Tsuen River

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

				Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring				
				Mar-14					Apr-14					May-14					Jun-14				
		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
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				16	14	14	12	11	17	15	16	13	12	13	15	10	10	10	11	12	11	10	9

	Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring				
	Jul-14					Aug-14					Sep-14					Oct-14				
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
Species name																				
Molluscs																				
Biomphalaria sp.	+	+		+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+
Brotia hainanensis	++	+	+	+	+	++	+	+	+		++	+	+	+		++	+	+	+	
Melanoides tuberculata				+	+			+	+	+			+					+	+	+
Pomacea canaliculata	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Radix plicatulus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Sinotaia quadrata	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Insects																				
Baetis sp.	+		+			+	+	+	+		+	+	+	+	+	+	+	+	+	+
Caenis sp.												+								
Chironomus sp.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Electrogenas sp.	+	+				+	+	+			+	+	+			+	+	+		
Hydropsyche sp.	+		+	+		+		+	+		+		+	+	+	+		+	+	
Indobaetis sp.	+	+	+	+		+	+	+	+		+	+	+	+	+	+	+	+	+	+
Mnais sp.			+	+			+	+	+			+	+	+	+		+	+	+	+
Orthetrum sp.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Crustaceans																				
Caridina cantanensis	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++
Cryptopotamon anacoluthon			+	+				+	+				+	+			+	+	+	
Macrobrachium hainanense	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	
Somanniathelphusa zanklon																				
No. of species	13	11	13	13	10	13	13	15	15	9	13	14	16	14	12	13	14	16	15	11

	Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring				
	Nov-14					Dec-14					Jan-15					Feb-15				
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
Species name																				
Molluscs																				
Biomphalaria sp.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+		+		+	
Brotia hainanensis	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+
Melanoides tuberculata			+	+	+				+					+	+				+	+
Pomacea canaliculata	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+	+	+	+
Radix plicatulus	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Sinotaia quadrata	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Insects																				
Baetis sp.	+	+	+	+	+	+	+			+	+	+		+	+	+	+		+	+
Caenis sp.																				
Chironomus sp.	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Electrogenas sp.	+	+	+	+		+	+	+	+		+	+				+	+	+		
Hydropsyche sp.	+		+			+		+			+		+			+		+		
Indobaetis sp.	+	+	+	+	+	+	+	+	+	+	+	+		+	+	+	+			+
Mnais sp.		+	+	+				+	+				+	+				+		
Orthetrum sp.	+	+	+		+	+	+	+		+	+		+		+					+
Crustaceans																				
Caridina cantanensis	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++	+	++	++	++	++
Cryptopotamon anacoluthon		+		+					+					+				+	+	
Macrobrachium hainanense	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Somanniathelphusa zanklon																				
No. of species	13	14	15	14	12	13	12	12	13	11	13	11	11	13	12	11	12	12	11	11

	Post construction monitoring									
	Mar-15					Apr-15				
Sampling point	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4
Species name										
Molluscs										
Biomphalaria sp.		+		+	+				+	+
Brotia hainanensis	++	++	+	+	+	++	++	+	+	+
Melanoides tuberculata				+	+				+	+
Pomacea canaliculata	+	+	+	+	+	+	+	+	+	+
Radix plicatulus	+	+	+	+	+	+	+	+	+	+
Sinotaia quadrata	+	+	+	+	+	+	+	+	+	+
Insects										
Baetis sp.	+	+	+	+	+	+		+	+	+
Caenis sp.										
Chironomus sp.	+	+	+	+	+	+	+	+	+	+
Electrogenas sp.	+	+	+			+	+	+	+	
Hydropsyche sp.	+	+	+			+	+	+		
Indobaetis sp.	+	+	+		+	+	+	+	+	+
Mnais sp.				+					+	
Orthetrum sp.			+	+	+			+	+	+
Crustaceans										
Caridina cantanensis	+	++	++	++	++	+	++	++	++	++
Cryptopotamon anacoluthon			+						+	
Macrobrachium hainanense	+	+	+	+	+	+		+	+	+
Somanniathelphusa zanklon										
No. of species	11	13	13	12	12	11	9	12	15	12

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

Reference point was the sampling location outside the works area.

Table 4.5 Aquatic Macro invertebrates recorded at Lam Tsuen River

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

				Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring				
				May-15					Jun-15					Jul-15					Aug-15					Sep-15					Oct-15				
		Sampling point		Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4	Reference point	T1	T2	T3	T4
Species name	Chinese name	Status	Commonness																													
Molluscs																																
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	瓣白螺	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	12	11	9	11	13	12	11	9	11	13	12	12	9	11	13	12	11	9	11	13	12	11	9	11	13	13

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					Impact monitoring					Impact monitoring					Impact monitoring					Post construction monitoring				
				Jul-08		Aug-08		Jan-09					Jul-09					Jan-10					Jul-10					Jan-11					Jul-11					Jan-12					Jul-12					Aug-13					Dec-13					Jan-14				
			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	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	C	+		+																	+	+				+	+				+					+	+				+	+	+			+	+	+	+		+	+	+	+		+	+	+	+	
Poecilia reticulate	孔雀花魚將	NP	VC			+	+								+											+	+					+			+	+	+	+					+					+	+	+										+	+	
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	C		+	+	+	++	++	++	+		++	++	+	+	+	++	++				++	+++	+	+		++	+				++	+				+					+					+					+					+				
Pterocryptis cochinchinensis	黃鯰	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	5	2	3	2	3	5	2	3	2	3	6	20	60	20	10
No. of species				5	8	11	12	7	7	4	8	2	5	3	3	5	6	5	3	2	2	2	9	8	10	13	9	9	7	4	4	8	10	8	9	5	3	12	8	6	4	3	14	10	10	4	3	14	11	11	6	4	14	9	12	8	6	14	10	13	11	6
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	1	0	0	0	0	0	1	0	1	1	0	0	0	0	1	0	1	0	1	1	0	1	1	1	1	1	1	1	1	1	1

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				
				Feb-14					Mar-14					Apr-14				
			Sampling point	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	C	+	+	+	+		+	+	+	+	+	+	+	+	+	+
Poecilia reticulate	孔雀花魚將	NP	VC			+	+				+	+	+			+	+	+
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	C	+	+	+			+	+	+				+	+		
Pterocryptis cochinchinensis	黃鯰	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		16	40	70	40	30	60	70	80	90	80	40	50	60	60	50
No. of species				14	10	15	11	7	15	11	16	14	11	11	12	16	14	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

				Post construction monitoring					Post construction monitoring					Post construction monitoring				
				May-14					Jun-14					Jul-14				
			Sampling point	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	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poecilia reticulate	孔雀花魚將	NP	VC			+	+	+			+		+			+		+
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	C	+	+				+	+				+	+			
Pterocryptis cochinchinensis	黃鯰	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		20	30	30	20	20	6	12	10	6	8	8	16	15	5	10
No. of species				13	13	13	12	11	10	12	13	11	11	11	12	13	12	11
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

				Post construction monitoring					Post construction monitoring					Post construction monitoring				
				Aug-14					Sep-14					Oct-14				
			Sampling point	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	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poecilia reticulate	孔雀花魚將	NP	VC			+	+	+			+	+	+			+	+	+
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	C	+	+	+			+	+	+	+		+	+	+	+	
Pterocryptis cochinchinensis	黃鯰	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		10	12	18	10	12	20	30	30	20	20	30	40	40	30	30
No. of species				10	12	13	13	11	11	13	14	15	13	11	13	14	15	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

				Post construction monitoring					Post construction monitoring					Post construction monitoring					Post construction monitoring				
				Nov-14					Dec-14					Jan-15					Feb-15				
			Sampling point	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	C	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poecilia reticulate	孔雀花魚將	NP	VC			+	+				+	+					+					+	
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	C	+	+	+	+		+	+	+	+		+	+	+	+		+	+	+	+	
Pterocryptis cochinchinensis	黃鯰	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		50	70	70	60	60	60	60	60	50	50	50	50	60	60	60	50	60	60	60	40
No. of species				11	13	14	13	11	11	13	14	14	11	10	11	12	13	10	10	11	12	14	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

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 are

-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				
				Mar-15					Apr-15					May-15					Jun-15					Jul-15					Aug-15					Sep-15					Oct-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
Species	Chinese name	Status	Commonness																																								
Fish																																											
Acrossocheilus parallens	條紋光唇魚	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	鏡鯉	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	C	+	+	++	+	+	+	+	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poecilia reticulate	孔雀花魚腽	NP	VC			+	+			+	+				+	+	+			+	+	+			+	+	+			+	+	+			+	+	+			+	+	+
Pseudogastromyzon myersi	麥氏擬腹吸鰍	NP	C	+	+	+	+		+	+	+	+		+	+				+	+				+	+				+	+				+					+	+			
Pterocryptis cochinchinensis	斑鮠	NP	C	+	+	+	+		+	+	+	+		+					+					+					+					+					+				
Puntius semifasciolatus	十星魚	NP	C	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	++	+	+	+	++	++	++	+	+	+	++	++	++	+	+	+	++	++	++	++	+
Rhinogobius spp.	虾虎魚	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	寬鱗鱲	NP	C	+	++	++	++	+	+	++	++	++	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+	+	++	++	+	+
2x2m fish counting		No. of fish		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	15	12	16	10	10	18	15	20	15	15	25	20	22	18	20
No. of species				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	12	12	13	13	12	12	10	13	13	12	12	10	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

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 are

-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				Impact monitoring			
Parameter / date	8-Aug	Jan-09				Jul-09				Jan-10				Jul-10				Jan-11				Jul-11				Jan-12				Jul-12			
Replicate		T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
DO (mg/L)	9.2	9.8	9.9	9.4	9.1	6.4	6.4	6.5	6.8	9.7	9.5	9.5	9.3	8.3	8.5	8.5	8.7	9.6	9.5	9.5	9.1	9.5	9.6	9.4	9.3	9.4	9.2	9.4	9.2	8.2	8	7.8	7.3
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	7.2	6.9	6.8	6.7	6.8	7.1	7.3	7.6
Nitrate (mg N/L)	0.36	0.79	1.1	1.2	1.2	0.31	0.48	0.48	0.59	0.56	1.11	1.13	1.33	0.1	0.2	0.2	0.3	0.1	0.2	0.4	0.5	0.1	0.2	0.3	0.45	0.2	0.3	0.5	0.6	0.13	0.67	0.62	0.82
Ammonia (mg/L)	<0.01	PO4-P (µg P/L): <100				0.02	0.02	0.02	0.03	0.01	0.16	0.17	0.07	0.2	0.4	0.2	0.2	0.05	0.07	0.07	0.1	0.06	0.05	0.08	0.1	0.04	0.05	0.06	0.2	0.01	0.02	0.04	0.03
Salinity (ppt)	<0.1	<0.1	0.1	0.1	0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Conductivity (µS/cm)	60	80	100	120	120	45	51	52	63	62	96	98	114	84	100	460	54	90	87	93	120	93	90	90	100	92	84	96	110	41	38	73	86
BOD (mg/L)	<2	<2	<2	<2	3	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.1-0.3	0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2			
Water flow at riffle (m/s)	0.4-0.7	0.2-0.5				0.2-0.5				0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.6			
Sand (%)	15	15	10	10	10	10	10	10	15	8	8	8	15	8	8	8	15	8	8	8	15	8	8	8	15	10	15	10	10	10	10	10	10
Stone (%)	80	80	88	88	88	88	88	88	70	90	90	90	70	90	90	90	70	90	90	90	70	90	90	90	70	80	70	80	70	60	60	60	60
Mud (%)	5	5	2	2	2	2	2	2	5	2	2	2	5	2	2	2	5	2	2	2	5	2	2	2	5	10	15	10	20	30	30	30	30

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				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	8-Aug	Aug-13				Dec-13				Jan-14				Feb-14				Mar-14				Apr-14				May-14				Jun-14				Jul-14				Aug-14			
Replicate		T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
DO (mg/L)	9.2	8.9	8.5	8.7	8.8	9.3	8.6	8.8	8.7	9.1	9.0	8.6	8.5	7.8	8.7	9.8	9.8	7.5	7.8	8.2	8.1	7.7	7.6	7.8	8.0	8.2	7.8	8.1	8.2	7.6	7.8	7.4	7.2	7.6	7.2	7.6	7.5	7.6	7.4	7.3	7.6
pH	7.49	6.5	6.8	6.8	7.1	6.2	6.9	7.1	7.1	6.2	6.9	7.1	7.1	8.2	8.5	8	7.8	8.3	8.2	7.6	7.2	7.6	7.8	8.2	7.8	7.7	7.8	7.9	8.2	7.6	7.8	7.8	8.1	7.6	7.7	7.8	8	7.8	7.5	7.6	7.8
Nitrate (mg N/L)	0.36	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	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
Ammonia (mg/L)	<0.01	0.02	0.03	0.03	0.04	<0.01	<0.01	<0.01	<0.01	0.04	0.1	0.12	0.15	0.05	0.04	0.1	0.12	0.06	0.04	0.04	0.1	0.1	0.1	0.1	0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	<0.1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.02	0.02	0.03	0.03	0.01	0.02	0.03	0.03	0	0	0	0	0	0	0	0
Conductivity (µS/cm)	60	67	77	74	75	62	64	90	110	72	78	88	108	78	87	118	119	120	123	125	123	96	114	120	122	82	80	72	66	39	58	69	70	43	85	72	75	75	78	82	86
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.1-0.3	0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2				0.01-0.2				0.03-0.2				0.03-0.2				0.03-0.2			
Water flow at riffle (m/s)	0.4-0.7	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				0.2-0.6				0.2-0.6			
Sand (%)	15	10	10	10	10	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	5	10	5	5	5	10	5	5	5	10	5	5	5	10	5	5	8	10
Stone (%)	80	75	75	75	75	90	85	85	85	90	85	85	85	90	85	85	85	90	85	85	80	90	85	85	75	90	85	85	75	93	90	90	75	93	90	90	75	93	90	90	75
Mud (%)	5	15	15	15	15	5	10	10	10	5	10	10	10	5	10	10	10	5	10	10	15	5	10	10	15	5	10	10	15	2	5	5	15	2	5	5	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)

	Baseline monitoring	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
Parameter / date	8-Aug	Sep-14				Oct-14				Nov-14				Dec-14			
Replicate		T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
DO (mg/L)	9.2	8.7	8.7	8.4	8.6	7.2	7.3	8.1	7.6	7.3	7.3	8.2	7.8	7.2	8.1	8.2	8.2
pH	7.49	8.4	8.1	8.4	8.0	8.4	8.2	8.1	8.0	8.1	8.3	8.1	8.3	8.5	8.4	8.2	8.2
Nitrate (mg N/L)	0.36	1.2	1.3	1.2	1.2	0.9	1	0.9	1	1	1	0.9	0.9	0.9	1	0.9	0.9
Ammonia (mg/L)	<0.01	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	<0.1	0	0	0	0	0.01	0.01	0.02	0.02	0.01	0.01	0.01	0.01	0.02	0.02	0.02	0.02
Conductivity (µS/cm)	60	73	77	74	72	47	50	80	88	52	56	82	84	112	92	86	67
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.1-0.3	0.03-0.2				0.03-0.2				0.03-0.2				0.03-0.2			
Water flow at riffle (m/s)	0.4-0.7	0.2-0.6				0.2-0.6				0.2-0.6				0.2-0.5			
Sand (%)	15	5	5	8	10	5	5	8	10	5	5	8	10	5	5	8	10
Stone (%)	80	93	90	90	75	93	90	90	75	93	90	90	75	93	90	90	75
Mud (%)	5	2	5	2	15	2	5	2	15	2	5	2	15	2	5	2	15

	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
Parameter / date	Jan-15				Mar-15				Apr-15				May-15			
Replicate	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
DO (mg/L)	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
pH	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
Nitrate (mg N/L)	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
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
Salinity (ppt)	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
Conductivity (µS/cm)	156	153	152	163	45	89	92	94	45	89	92	94	35	45	50	43
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.03-0.2				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			
Sand (%)	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
Mud (%)	2	5	2	15	2	5	2	15	2	5	2	15	2	5	2	15

	Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
Parameter / date	Jun-15				Jul-15				Aug-15				Sep-15				Oct-15			
Replicate	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4	T1	T2	T3	T4
DO (mg/L)	8.0	8.2	8.3	8.2	8.3	8.2	8.0	8.3	8.4	8.3	8.3	8.3	8.3	8.2	8.2	8.2	8.1.	8.2	8.2	8.2
pH	7.8	7.9	7.9	8.1	7.7	7.8	7.8	7.8	7.7	7.7	7.6	7.7	7.5	7.7	7.6	7.6	7.5	7.6	7.7	7.6
Nitrate (mg N/L)	0.9	0.9	0.9	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
Salinity (ppt)	0.01	0	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.01	0.0	0.0	0.0	0.0	0.01	0.01	0.01	0.01
Conductivity (µS/cm)	35	45	50	43	42	32	35	55	36	42	46	38	33.0	39.0	42.0	43.0	36.0	38.0	44.0	46.0
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)	0.03-0.2				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			
Sand (%)	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
Mud (%)	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.22)
She Shan River

September 2015

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Ecology Team: China Hong Kong Ecology Consultants

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

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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 22 post-construction ecological monitoring report for the project conducted **on 26th of October 2015**. 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 26th of October 2015**;
- Fauna and flora along the drainage project sections is in a process of re-establishing or restoration;
- Fish abundance increased due to less flooding event in October.
- Bird diversity and abundance was in natural fluctuation; and
- Odonata abundance was gradually decreased compared to last month. *Paramesotriton hongkongensis* could not be 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, 61 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 and partially covered the riverbed in middle to lower section. Lower vegetation coverage at lower section was observed when comparing with dry season (Photos 1-3) as heavy rain was regularly happened during wet season leading to lost plants through flooding. As river bed in She Shan River was mainly made up in concrete, most of the plants were easily washed out to lower river section. However, dense vegetation on the river bed and gabion was recorded in the upper section of the river as usual. Aquatic plants *Brachiaria mutica* was the most abundant plants found along the river channel (Photo 5). Results of vegetation survey and belt transect survey were presented in **Table 4.1** and **Table 4.2**. **Figure 1** shows the transect line for the flora surveys.

4.2 Fauna

4.2.1 Avifauna

An avifauna survey was undertaken along survey transects and at three selected point count locations. In total, 21 species of birds were recorded during the bird surveys within project area. 7 recorded species were wetland dependant birds and observed foraging in the river channel including *Ardeola bacchus*, *Tringa ochropus*, *Motacilla cinerea* (Photo 5), *Egretta garzetta* (Photo 6), *Motacilla alba* and *Amaurornis phoenicurus* (Photo 7). 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 including *Ardeola bacchus* and *Egretta garzetta* are considered as Regional Concern by Fellowes *et al.* (2002), they were always found foraging in the river. *Spilornis cheela* (Photo 8) and *Accipiter trivirgatus* (Photo 9) were recorded hovering above middle section of the river. Both of them are listed under Endangered Species of Animals and Plants Ordinance (Cap. 586), while *Spilornis cheela* is also considered as Vulnerable and Local Concern in China Red Data Book Status and by Fellowes *et al.* (2002) respectively; *Accipiter trivirgatus* is considered as rare in China Red Data Book. Except foraging behaviour of some wetland dependent 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 3 species compared to last month. The decrease was mainly related to the seasonal changes. Their emerging peak usually ends up with late autumn. It is expected that their abundance will keep ceasing following the coming dry season (Wilson *et al.,* 2003 & Tam *et al.,* 2011). In total of 9 species were recorded, those recorded species were common species in Hong Kong (Photos 10-11) and the result was similar to approximate period of last year. Except mating behavior was observed, no other remarkable behavior was noticed. 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. 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 Fish Fauna

Fish surveys were performed at She Shan River and total 13 species of freshwater fish were recorded. Native fish *Zacco platypus* and *Oreochromis niloticus* were abundant species dominating in the river channel. Among the recorded fish, *Parazacco spilurus* is classified as "Vulnerable" in Red China Data Book, it was commonly observed along the river with low abundance. The number of fish increased compared to last month assuming that less flooding events which could disperse fish of the river. Details of recorded of fish fauna refers to **Table 4.6.** Sampling location was shown on **Figure 1**.

4.3 Abiotic Data

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

Generally, the water was clean and nutrient levels were moderate as a result of effluent from nearby cultivation lands, but the impact from the effluent is anticipated. Results of water test are presented in the **Table 4.7.**

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 not recorded. The rest of fauna was in a natural fluctuation except increase in fish abundance was observed.

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. Low vegetation coverage of the river bed in lower section was observed due to seasonal flooding in previous months.

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

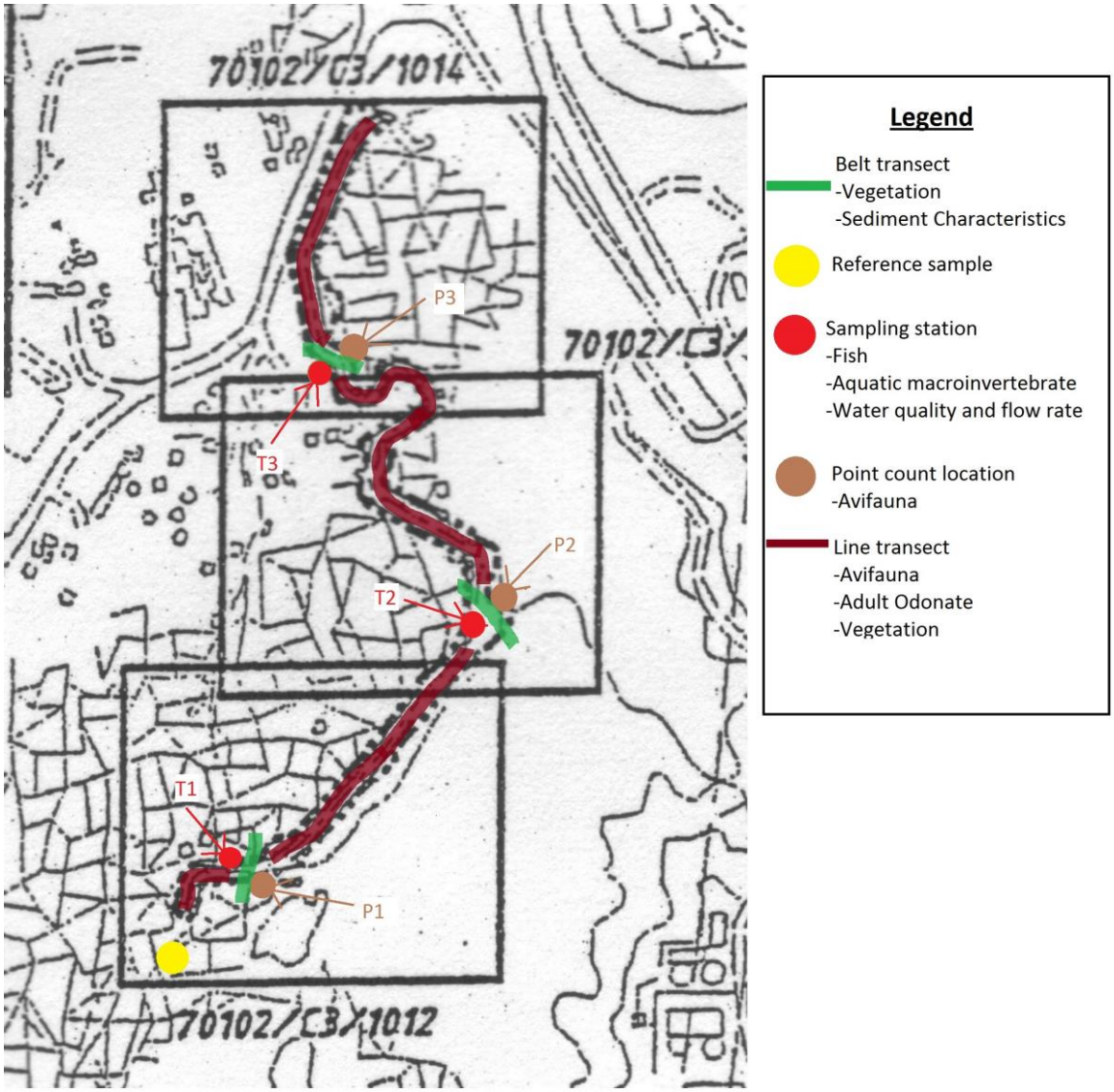

Figure 1. Sampling Location of Ecological Survey and Monitoring at She Shan River, Tai Po.

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: Abundant species: *Brachiaria mutica* (Middle section)
	
Photo 5: Avifauna - *Motacilla cinerea*	Photo 6 : Avifauna - *Egretta garzetta*

	
Photo 7 : Avifauna - *Amaurornis phoenicurus*	Photo 8: Avifauna - *Spilornis cheela*
	
Photo 9: Avifauna - *Accipiter trivirgatus*	Photo 10: Odonata - *Trithemis aurora*
	
Photo 11: Odonata - *Orthetrum chrysis*	Photo 12: Kick sampling

	
Photo 13: Fish - *Zacco platypus*	Photo 14: Fish - *Channa maculata*

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		
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	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
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	*E rechtites 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	*R orippa indica*	塘葛菜															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Brassicaceae	*C apsella 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*	茅瓜		+	+	+	+	+																											
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	*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	*C alliandra 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*	青果榕																								+	+	+	+	+	+	+	+	+	+
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*	枯爺草	+	++	++	++	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+

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		
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	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
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*	紅尾翎																								+	+	+	+	+	+	+	+	+	+
Polygonaceae	*Polygonum hydropiper*	水蓼	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Polygonaceae	*Polygonum glabrum*	光蓼																														+	+	+	+
Polygonaceae	*Polygonum chinense*	火炭母	+	+	+	+	+			+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+				+	+	+	+	+	+	+
Polygonaceae	*Rumex trisetifer*	假蕨菜															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
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*	樟葉朴	+	+	+	+	+	+																											
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*	霧水葛	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+										
Verbenaceae	*Vitex quinata*	山牡荊	+	+	+	+	+																												
Polygonaceae	*Polygonum perfoliatum*	杠板歸															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Verbenaceae	*Lantana camara*	馬纓丹	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Floating Plant																																			
Araceae	*Pistia stratiotes*	大薸																																	+
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

Note:

"+" – Species exists in the study area

"++" – Species common in the study area

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

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

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

			Baseline 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					
		Transect	P1		P3		P1		P3		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)	%
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		
Poaceae	*Panicum repens*	枯骨草	0.3	5											0.2	5			0.6	5					0.6	25									0.3	30				
Asteraceae	*Mikania micrantha*	薇甘菊							0.2	7															0.2	5					1	20	0.3	5				
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*	剛秀竹	0.5	5			0.5	3																							1.5	30					1.5	30		
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	2		
Poaceae	*Pennisetum purpureum*	象草	3	50	1	60	3	80	2	60					4	40					2	50																		
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	2
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																																						
Blechnaceae	*Blechnum orientale*	烏毛蕨																																						
Poaceae	*Pennisetum alopecuroides*	狼尾草																																						
Araceae	*Alocasia macrorrhizos*	海芋																																						
Lemnaceae	*L emna minor*	浮萍																																						
Polygonaceae	*Polygonum hydropiper*	水蓼																																						
Cyperaceae	*Cyperus involucratus*	風車草																																						
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

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						Impact monitoring						Post construction monitoring					
		Stream	Jul-11						Jan-12						Jul-12						Jul-13						Dec-13						Jan-14					
		Transect	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)	%
Commelinaceae	*Commelina diffusa*	節節草	0.2	5	0.8	40			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
Poaceae	*Panicum repens*	枯骨草	0.5	20																											0.2	1				0.2	1
Asteraceae	*Mikania micrantha*	薇甘菊	0.3	30					0.2	15					0.2	2											0.1	10			0.2	1	0.1	10		0.2	1
Brassicaceae	*Nasturtium officinale*	西洋菜																																			
Moraceae	*Ficus microcarpa*	細葉榕																																			
Moraceae	*Ficus hispida*	對葉榕																																			
Poaceae	*Microstegium ciliatum*	蒯秀竹			1.5	15			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					Channelised		1	5			Channelised						0.3	10											0.3	1				0.3	1
Poaceae	*Pennisetum purpureum*	象草			1.5	15			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		
Poaceae	*Coix lacryma-jobi*	薏苡							2.5	2																											
Amaranthaceae	*Alternanthera philoxeroides*	空心蓮子草																	0.1	5																	
Poaceae	*Panicum maximum*	大黍	1	15																																	
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
Cyperaceae	*Cyperus sp.*	莎草																	1	5																	
Poaceae	*Miscanthus floridulus*	五節芒																																			
Poaceae	*Brachiaria mutica*	巴拉草			1.5	20					1	15					1	15	1	10	1	20	1	50			1.5	60	0.8	20			1.5	60	0.8	20		
Blechnaceae	*Blechnum orientale*	烏毛蕨																							0.3	1											
Poaceae	*Pennisetum alopecuroides*	狼尾草																																			
Araceae	*Alocasia macrorrhizos*	海芋																																			
Lemnaceae	*L emna minor*	浮萍																																			
Polygonaceae	*Polygonum hydropiper*	水蓼																																			
Cyperaceae	*Cyperus involucratus*	風車草																																			
Onagraceae	*Ludwigia erecta*	美洲水丁香																			0.8	3			0.5	5			0.8	30					0.8	30		
Convolvulaceae	*Ipomoea cairica*	五爪金龍																																			
Bare Gound				30		10		##		3		15		100		93		20		50		65		5		94		10		10		94		5		10		94

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	Feb-14						Mar-14						Apr-14						May-14						Jun-14						Jul-14						Aug-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)	%
Commelinaceae	*Commelina diffusa*	節節草	0.2	20	0.5	30	0.2	5	0.3	20	0.5	35	0.3	6			0.5	30					0.5	20					0.5	25											0.5	25				
Poaceae	*Panicum repens*	枯骨草					0.2	1					0.4	1																														
Asteraceae	*Mikania micrantha*	薇甘菊	0.1	10			0.2	1	0.1	10			0.2	1	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	1	0.3	10	0.3	10	0.3	2	0.3	12	0.3	12	0.3	5
Brassicaceae	*Nasturtium officinale*	西洋菜													0.3	20			0.3	5	0.3	5			0.3	5	0.3	5			0.3	5	0.3	2			0.3	2	0.3	1			0.3	1
Moraceae	*Ficus microcarpa*	細葉榕																																										
Moraceae	*Ficus hispida*	對葉榕																																										
Poaceae	*Microstegium ciliatum*	蒯秀竹																																										
Fabaceae	*Pueraria lobata*	野葛																																										
Araceae	*Colocasia esculenta*	芋																																										
Urticaceae	*Boehmeria nivea*	苧麻																																										
Asteraceae	*Bidens alba*	白花鬼針草					0.4	1					0.4	1			0.3	5	0.8	1			0.3	5	0.8	1			0.3	5	0.8	1			0.3	5	0.8	2			0.3	5	0.8	5
Poaceae	*Pennisetum purpureum*	象草	1.5	10	1.5	10			1.5	5	1.5	5																																
Poaceae	*Coix lacryma-jobi*	薏苡																	0.8	1					0.8	1					0.8	1					0.8	1					1.2	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					0.4	1					0.4	1																														
Cyperaceae	*Cyperus sp.*	莎草																																										
Poaceae	*Miscanthus floridulus*	五節芒																																										
Poaceae	*Brachiaria mutica*	巴拉草	1.5	55	0.8	25			1.5	60	0.8	30			1.5	50	1	50			1.5	40	1	40			1.5	45	1	45			1.5	45	1	45			1.5	50	1	50		
Blechnaceae	*Blechnum orientale*	烏毛蕨																																										
Poaceae	*Pennisetum alopecuroides*	狼尾草													2	20					2	15					2	15					2	12					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	5					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			0.8	30					0.8	25							1	2					1	2					1	2					1	4					1	6
Convolvulaceae	*Ipomoea cairica*	五爪金龍																																										
Bare Gound				5		5		91		5		5		90		0		5		84		30		25		84		25		15		84		31		15		87		27		8		80

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	Sep-14						Oct-14						Nov-14						Dec-14						Jan-15						Feb-15						Mar-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			0.5	25			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	0.6	10	1	70	0.5	40
Poaceae	*Panicum repens*	枯骨草																																											
Asteraceae	*Mikania micrantha*	薇甘菊	0.3	12	0.3	12	0.3	5	0.3	5	1	15	0.3	2	0.3	5	1	15	0.3	2	0.3	5	1	15	0.3	2	0.4	10	0.5	15			0.4	10	0.5	15			0.4	10	0.5	15		
Brassicaceae	*Nasturtium officinale*	西洋菜	0.3	1			0.3	1																																				
Moraceae	*Ficus microcarpa*	細葉榕																																										
Moraceae	*Ficus hispida*	對葉榕																																										
Poaceae	*Microstegium ciliatum*	蒭秀竹																																										
Fabaceae	*Pueraria lobata*	野葛																																										
Araceae	*Colocasia esculenta*	芋																																										
Urticaceae	*Boehmeria nivea*	苧麻																																										
Asteraceae	*Bidens alba*	白花鬼針草			0.5	5	0.8	5	1	2	0.5	5	0.8	10	1	2	0.5	5	0.8	10	1	2	0.5	5	0.8	10																		
Poaceae	*Pennisetum purpureum*	象草																																										
Poaceae	*Coix lacryma-jobi*	薏苡					1.5	1					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	1.5	50	1	50			1.8	65	1.8	20	1.5	5	1.8	70	1.8	25	1.5	8	1.8	70	1.8	25	1.5	8	1.5	80	1	5	1	25	1.5	80	1.3	5	1.3	25	1.5	80	1.3	5	1.3	25
Blechnaceae	*Blechnum orientale*	烏毛蕨																																										
Poaceae	*Pennisetum alopecuroides*	狼尾草	2	10					2	15	3	5			2	10	3	2			2	10	3	2																				
Araceae	*Alocasia macrorrhizos*	海芋					0.8	1																																				
Lemnaceae	*L emna minor*	浮萍					N.A	1																																				
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					1.5	5		
Onagraceae	*Ludwigia erecta*	美洲水丁香					1	6	1.5	1			2	5	1.5	1			2	5	1.5	1			2	5					2	10					2	10					2	10
Convolvulaceae	*Ipomoea cairica*	五爪金龍																																										
Bare Gound				27		8		80		2		0		75		2		1		72		2		1		72		0		5		25		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	Apr-15						May-15						Jun-15						Jul-15						Aug-15						Sep-15						Oct-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	0.3	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					0.3	17	0.2	10
Poaceae	*Panicum repens*	枯骨草																																									
Asteraceae	*Mikania micrantha*	薇甘菊	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			0.5	10	0.4	20		
Brassicaceae	*Nasturtium officinale*	西洋菜																																									
Moraceae	*Ficus microcarpa*	細葉榕																																									
Moraceae	*Ficus hispida*	對葉榕																																									
Poaceae	*Microstegium ciliatum*	蒭秀竹																																									
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	0.9	30				
Poaceae	*Pennisetum purpureum*	象草																																									
Poaceae	*Coix lacryma-jobi*	薏苡																			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	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	0.3	30	1	15	0.9	1
Blechnaceae	*Blechnum orientale*	烏毛蕨																																									
Poaceae	*Pennisetum alopecuroides*	狼尾草																																									
Araceae	*Alocasia macrorrhizos*	海芋																																									
Lemnaceae	*L emna minor*	浮萍																																									
Polygonaceae	*Polygonum hydropiper*	水蓼																																									
Cyperaceae	*Cyperus involucratus*	風車草			1.5	5					1.4	5					1.4	5					1.2	5					1.2	5					1.2	5			1.2	5	0.4	2
Onagraceae	*Ludwigia erecta*	美洲水丁香					2	10					1.6	5					1.6	5					1.5	50			1.5	50					1.5	50					0.3	15
Convolvulaceae	*Ipomoea cairica*	五爪金龍																					0.3	5					0.3	5					0.3	5			0.3	5		
Bare Gound				0		5		25		50		30		55		45		25		50		13		10		38		13		40		38		13		35		38		28		43		72

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

Table 4.3 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)

					Baseline monitoring						Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring			
Common Name	**Species 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				Jul-13				Dec-13			
					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
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																																												
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
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
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
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
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
Crested Serpent Eagle	*Spilornis cheela*	蛇鵰	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	
Eurasian tree sparrow	*Passer montanus*	麻鵲	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
Great Tit	*Parus major(commixtus)*	大山雀	R	C																																											
Green Sandpiper	*Tringa ochropus*	白腰草鷸	PM&WV	C																																										+		2	
Grey Heron	*Ardea cinerea*	蒼鷺	WV,PRC	C																																												
Grey Wagtail	*Motacilla cinerea*	灰鶺鴒	WV	C							+			1													+	1	2	1					+	1	2	1					++	2	3	3				
Japanese White Eye	*Zosterops japonica(simplex)*	暗綠繡眼鳥	R	C																																												5
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	1	+				+	2	1	1	+	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	2
Night Heron	*Nycticorax nycticorax*	夜鷺	R,LC	C																							+																				+			
Olive Backed Pipit	*Anthus hodgsoni*	樹鷚	WV	C																							+								+				+								++		3	2
Oriental Dollarbird	*Eurystomus orientalis*	三寶鳥	PM	U																																												
Plaintive Cuckoo	*Cacomantis merulinus*	八聲杜鵑	SV	C																																												
Rufous-backed Shrike	*Lanius schach*	棕背伯勞	R	C	+			+			+				+	1			+				+								+								+	1			+				+			
Rufous-capped Babbler	*Stachyridopsis ruficeps*	紅頭穗鶥	R	C																																					+		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
Spotted Munia	*Lonchura punctulata*	斑文鳥	R	C																							+				+				+				++		5		++				++			
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	+		1		++	2	1	1	+	2		1	++	2	4	2
White-breasted Waterhen	*Amaurornis phoenicurus*	白胸苦惡鳥	R	C	+			+			+				+			1	+				+				+				+				+				+				+				+		1	
Yellow Bellid Prinia	*Prinia flaviventris*	黃腹鵐鶯	R	C							+				+			1	+			1	+				+	1			+			1	+				+	1	1		+				+			
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
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

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 4.3 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			
Common Name	**Species name**	**Chinese name**	**Status**	**Commonness**	Jan-14				Feb-14				Mar-14				Apr-14				May-14				Jun-14				Jul-14				Aug-14				Sep-14				Oct-14				Nov-14			
					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
Barn Swallow	*Hirundo rustica*	家燕	PM	C	+				+		2		+	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	
Black-throated Laughingthrush	*Garrulax chinensis*	黑喉噪鹛	R	C																																										
Buzzard (Common Buzzard)	*Buteo buteo*	普通鵟	WV, Cap 586	U									+																																	
Chinese Bulbul	*Pycnonotus sinensis*	白頭鵯	R	C	+	1		2	+	2	3	4	++		2	3	+			2	+				+				+			1	+			2	+	2		3	+			2	+	1		3
Chinese Pond Heron	*Ardeola bacchus*	池鷺	R,RC	C	+	1	3	2	+	1	2	3	+	1	3	2	+	1	2	1	+	1	1		+	1	2		+	2	2	1	++	1	2	2	++	2	1	1	++	2	2		++	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	1	1	+	1		1	+	1	2	1	+	1	1		+	1	2	1	+		1		+	1	1	1	+	1	1		+	1	2	1	+		1	1	+		1	
Crested bulbul	*Pycnonotus jocosus*	紅耳鵯	R	C	++	2	4	6	++	2	2	8	++	3	4	6	++	2	2	5	++	2		4	++	3	2	3	++	2	4	5	++	3	2	4	++	2	4	3	++	3	1	4	++	2	1	3
Crested Goshawk	*Accipiter trivirgatus*	鳳頭鷹	R, CR, Cap.586	U																																									
Crested Myna	*Acridotheres cristatellus*	八哥	R	C	+		3	2	+			3	+		2		+				+				+			2	+		3	2	+	2	2	3	+		3	2	+		2	4	+	3	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	+		2	1	+	1	1		+		1		+				+				+				+		1		+	1			+	1	1		+	1		1
Eurasian tree sparrow	*Passer montanus*	麻雀	R	C	+				+				+		2		+				+	2			+		2	1	+	2		1	+		3	2	+	3	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		+	1			+		1		+			
Great Egret	*Ardea alba*	大白鷺	R,RC	C	+			1	+			1	+			1	+								+				+								+	1			+							
Great Tit	*Parus major(commixtus)*	大山雀	R	C	+				+				+				+																													
Green Sandpiper	*Tringa ochropus*	白腰草鷸	PM&WV	C	+		2		+				+				+				+				+																					
Grey Heron	*Ardea cinerea*	蒼鷺	WV,PRC	C																																									
Grey Wagtail	*Motacilla cinerea*	灰鶺鴒	WV	C	++	2	3	3	++		2	2	++	1	3	2	+		1	1	+								+				+		1	1	+	1	2	1	+		1	1	+			1
Japanese White Eye	*Zosterops japonica(simplex)*	暗綠繡眼鳥	R	C	++			5	++			3	++			6	+	3		4	+			6	++	4	2	3	++			4	++	2	2	5	+			3	+				+			
Large Hawk Cuckoo	*Cuculus sparverioides*	鷹鵑	SV	U																	+																									
Little Egret	*Egretta garzetta*	小白鷺	R,RC	C	+		2	3	+	1	2	2	+	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
Magpie Robin	*Copsychus saularis*	鵲鴝	R	C	+		1	1	+		2		+	1	2	1	+	1	1	2	+	1	1	1	+	1	2	2	+	1	1	1	+	1	1	1	+	1	2	2	+	1		1	+	1	1	1
Night Heron	*Nycticorax nycticorax*	夜鷺	R,LC	C																																									
Olive Backed Pipit	*Anthus hodgsoni*	樹鷚	WV	C	+		1		+				+																																	
Oriental Dollarbird	*Eurystomus orientalis*	三寶鳥	PM	U																																								
Plaintive Cuckoo	*Cacomantis merulinus*	八聲杜鵑	SV	C									+				+				+				+																					
Rufous-backed Shrike	*Lanius schach*	棕背伯勞	R	C	+				+				+				+				+				+												+				+				+			
Rufous-capped Babbler	*Stachyridopsis ruficeps*	紅頭穗鹛	R	C	+				+				+				+				+																+				+							
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	2	4	++	2	6	5	++	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
Spotted Munia	*Lonchura punctulata*	斑文鳥	R	C	++				++		7		++		4		++		6		++		8						+		2		+		3		+		6		+		7		+	6	5	
Stejneger's Stonechat	*Saxicola stejnegeri*	黑喉石鵖	PM,WV	C																																									
White Wagtail	*Motacilla alba*	白鶺鴒	WV	C	+		2	1	+		1	2	+	1	2	1	+		1	1	+		2	1	+		1		+	1	2	2	+	2	2	1	+	2	3	2	+	2	2	1	+	1	2	2
White-breasted Waterhen	*Amaurornis phoenicurus*	白胸苦惡鳥	R	C	+				+				+				+				+				+				+				+				+				+							
Yellow Bellid Prinia	*Prinia flaviventris*	黃腹鵐鶯	R	C	+	1	1		+	1	3	2	+	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						11	26	32		10	34	37		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
No. of species					32	11	16	17	33	11	18	18	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

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

SpM – Spring migrant; Sv - Summer visitor

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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			
Common Name	**Species name**	**Chinese name**	**Status**	**Commonness**	Dec-14				Jan-15				Feb-15				Mar-15				Apr-15				May-15				Jun-15				Jul-15				Aug-15				Sep-15				Oct-15			
					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
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																									+																			
Black Kite	*Milvus lineatus*	蠅鷹	R, RC, Cap.586	C	+				+				+				+		1		+		1																									
Black-necked Starling	*Sturnus nigricollis*	黑領椋鳥	R	C	+	2			+		2	2	+				++		2	2	++		2	2	++	2	2	2	++	1		2	++	2		2	++		3		++		2	2	++		3	
Black-throated Laughingthrush	*Garrulax chinensis*	黑喉噪鸝	R	C																	+		1		+		2		+								+		1		+		1		+		1	
Buzzard (Common Buzzard)	*Buteo buteo*	普通鵟	WV, Cap 586	U					+				+																																		
Chinese Bulbul	*Pycnonotus sinensis*	白頭鵯	R	C	+		2	2	+	1		3	+	1		2	++	2		3	++	1		2	++	2		2	++	3	1	2	++	2	2	2	++		2	2	+		3		++	3	3	
Chinese Pond Heron	*Ardeola bacchus*	池鷺	R,RC	C	+		1		++	1	2	2	++	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																	
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		++	2	1	1	+	1	1		+	1	1		+	1		1	+	1		1	+		1	1	+	2	2		++	2	2		++	1	2		++			
Crested bulbul	*Pycnonotus jocosus*	紅耳鵯	R	C	+++	2	3	2	+++	3	2	4	+++	2	2	4	+++	3	1	4	+++	3	2	3	+++	4	3	3	+++	5	4	4	+++	5	5	7	+++	3	3	8	+++	5	9	5	+++	5	5	7
Crested Goshawk	*Accipiter trivirgatus*	鳳頭鷹	R, CR, Cap.586	U					+				+								+			1																				+			
Crested Myna	*Acridotheres cristatellus*	八哥	R	C	+	1			+			3	+			2	++		2	3	++		1	3	++		2	3	++	3	2	3	++	2	2	1	++			3	++			2	+		3	
Crested Serpent Eagle	*Spilornis cheela*	蛇鵰	R, VU, LC, Cap 586	U													+								+												+		1		+		1		+			
Domestic pigeon	*Columba sp.*	鴿	R	C	++				++				++																																			
Dusky Warbler	*Phylloscopus fuscatus*	褐柳鶯	WV	C	++				++	1	2	1	++		1		+		1		+		1		+		1		+		1		+	1	1		+	1	1		+	1	1		+	1	1	
Eurasian tree sparrow	*Passer montanus*	麻雀	R	C	+++		5	3	+++	2	4	3	+++		3	2	++	2		2	++	2	2	2	++	3	2	2	++	2	3	3	++	3	3	3	++		2	4	++		3	3	+++		6	3
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										+		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																	+			1																	+		1		+			1
Grey Heron	*Ardea cinerea*	蒼鷺	WV,PRC	C																	+			1																							
Grey Wagtail	*Motacilla cinerea*	灰鶺鴒	WV	C	+		1		+		1	2	+	1	2	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	+			3	+			4	+			3	+			4	+			3	+		2	3	+		3	3	+		3	3	+	3	3		+	3	3				
Large Hawk Cuckoo	*Cuculus sparverioides*	鷹鵑	SV	U	+												+				+				+				+																		
Little Egret	*Egretta garzetta*	小白鷺	R,RC	C	+	2	1	1	+	1	2	1	+	2	1	1	+	1	1	2	+		1	1	+	1			1	+		1		1			1	+			1				+			1
Magpie Robin	*Copsychus saularis*	鵲鴝	R	C	+		1		+	1	1	2	+	1		1	++	1	2	1	+	1	2	1	+	2	2	1	+	1	2	2	+	2		2	+		1	2	+		2	2	+	1	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													+				+																									
Rufous-backed Shrike	*Lanius schach*	棕背伯勞	R	C	+				+				+		1		+		1		+			1	+			1	+			1	+	1			+			1	+	1		1			
Rufous-capped Babbler	*Stachyridopsis ruficeps*	紅頭穗鶥	R	C	+				+				+				+				+				+								+			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	+	1	2	2	+	2	3	4	++	2	3	3	++	3	3	1	++	3	1	2	++	2	2	2	++	2	2	2	++	3	3	4	++	3	5	5	++	2	3	2	++	3	3	4	++	3	5	5
Spotted Munia	*Lonchura punctulata*	斑文鳥	R	C	+	5			+		5		+																												+			3	+		4	
Stejneger's Stonechat	*Saxicola stejnegeri*	黑喉石鵖	PM,WV	C																																											
White Wagtail	*Motacilla alba*	白鶺鴒	WV	C	++	1	2	2	++	1	2	2	++	1	2	2	+		1	2	+		1	1	+		1	1	+		1	1	+		1	1	+		1	1	+		1	1	+		1	1	3
White-breasted Waterhen	*Amaurornis phoenicurus*	白胸苦惡鳥	R	C					+				+		1		+		1		+		1		+		1		+		1										+		1				
Yellow Bellid Prinia	*Prinia flaviventris*	黃腹鵐鶯	R	C													+	1	1		+		1		+		1		+	1	+		1	1	+		1		+		1		+		1			
Number of birds						15	19	15		15	16	17		12	19	21		12	19	21		12	21	29		20	24	25		24	24	34		21	24	33		17	31	23		14	37	29		15	35	21
No. of species					21	9	11	7	24	10	13	14	25	9	12	10	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

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
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

Note: NP – Not protected in Hong Kong ; P - Protected in Hong Kong
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"+++" – Species abundance in the study area
Commonness and status were decided accroding to AFCD biodiversity website (www.hkbiodiversity.net)
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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				Impact monitoring				Impact 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			
		Status	Common - ness	Upper stream	Lower stream	Upper stream	Lower stream	Referen	T1	T2	T3	Referer	T1	T2	T3	Referenc	T1	T2	T3	Reference	T1	T2	T3	Referenc	T1	T2	T3	Reference	T1	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	鄰斯溪蟹	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	11	8	7	6	11	8	8	7

Note: NP – Not protected in Hong Kong;

Ｐ - protected species in Hong Kong

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

"+" – Species exists in the study area

"++" – Species common in the study area

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

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

Table 4.5 Aquatic Macro invertebrates recorded at She Shan River

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

				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			
Species	Chinese name	Sampling location		Jan-14				Feb-14				Mar-14				Apr-14				May-14				Jun-14				Jul-14				Aug-14				Sep-14				Oct-14				Nov-14				Dec-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	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	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	10	12	15	6	12	12	14	8	12	12	13	7	12	11	13	7	10	8	13	6

Note: NP – Not protected in Hong Kong;

Ｐ - protected species in Hong Kong

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

“+” – Species exists in the study area

“++” – Species common in the study area

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

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

Table 4.5 Aquatic Macro invertebrates recorded at She Shan River

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

				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			
Species	Chinese name	Sampling location		Jan-15				Feb-15				Mar-15				Apr-15				May-15				Jun-15				Jul-15				Aug-15				Sep-15				Oct-15			
		Status	Common - ness	Reference	T1	T2	T3	Reference	T1	T2	T3	Referen	T1	T2	T3	Referen	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Reference	T1	T2	T3	Referenc	T1	T2	T3	Reference	T1	T2	T3	Referen	T1	T2	T3
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	鄰斷溪蟹	NP	VC																																							
No of Species				10	11	14	6	7	10	12	6	9	12	13	6	9	12	13	6	9	12	13	6	9	12	13	6	9	12	14	6	9	12	15	6	9	13	15	6	9	13	15	6

Note: NP – Not protected in Hong Kong;

Ｐ - protected species in Hong Kong

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

“+” – Species exists in the study area

“++” – Species common in the study area

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

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

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

				Baseline monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Impact monitoring				Post construction monitoring			
				Jul-08		Aug-08		Jan-09				Jul-09				Jan-10				Jul-10				Jan-11				Jul-11				Jan-12				Jul-12				Jul-13				Dec-13				Jan-14			
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	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		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	8	2	4	0	4	2	2	0	5	3	4	2	5	3	4	2	12	16	30	40
		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	8	6	1	0	9	7	7	3	9	8	8	3	8	8	7	6	8	8	7	7
Amphibian																																																
Paramesotriton hongkongensis	香港瘰螈	P, Cap 170, NT, PGC	R																																											+			

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

'V" - Vulerable - in Red China Data Book

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

				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
				Feb-14				Mar-14				Apr-14				May-14			
Species		Status	Commonness	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		30	40	50	60	60	60	70	70	40	40	50	40	20	10	20	10
		No of Species		12	8	7	7	12	11	11	8	12	11	12	9	10	10	13	9
Amphibian																			
Paramesotriton hongkongensis	香港瘰螈	P, Cap 170, NT, PGC	R	+		+		+	+	+				+				+	

				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
				Jun-14				Jul-14				Aug-14				Sep-14			
Species		Status	Commonness	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		12	5	8	6	16	8	10	10	12	10	16	12	20	20	30	16
		No of Species		10	9	11	9	9	8	11	10	9	9	12	10	9	9	12	10
Amphibian																			
Paramesotriton hongkongensis	香港瘰螈	P, Cap 170, NT, PGC	R			+				+				+				+	

				Post construction monitoring				Post construction monitoring				Post construction monitoring				Post construction monitoring			
				Oct-14				Nov-14				Dec-14				Jan-15			
Species		Status	Commonness	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	30	40	30	50	50	60	50	60	50	50	40	50	40	40	50
		No of Species		8	9	11	10	8	9	12	8	7	6	11	9	7	8	11	8
Amphibian																			
Paramesotriton hongkongensis	香港瘰螈	P, Cap 170, NT, PGC	R			+				+				+				+	

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

				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			
				Feb-15				Mar-15				Apr-15				May-15				Jun-15				Jul-15				Aug-15				Sep-15				Oct-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	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	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	20	12	23	12	35	35	25	20
		No of Species		7	9	12	8	8	10	12	9	8	10	12	9	8	9	13	10	8	8	13	10	8	8	13	10	8	8	13	7	8	8	13	6	8	8	13	6
Amphibian																																							
Paramesotriton hongkongensis	香港瘰螈	P, Cap 170, NT, PGC	R			+				+				+				+				+																	

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Table 4.7 Abotic data for the Upper She Shan River

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

	Baseline monitoring	Impact monitoring			Impact monitoring			Impact monitoring			Impact 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			Jan-12			Jul-12			Jul-13		
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)	8.9	--	9.1	8.3	6	5.8	6.5	--	8.9	--	8.2	8.3	8.3	8	8.5	8.8	8	8.5	9	8.6	8.2	8.8	7.7	7.7	6.3	7.8	7.8	7.7
pH	7.29	--	7.51	7.42	7.22	7.16	7.35	--	7.5	--	7.5	7.5	7.5	6.9	7	7.2	7	7.2	7.5	6.9	6.6	7.1	6.7	6.6	6.6	6.8	7.2	7.6
Nitrate (mg N/L)	0.5	--	1.6	1.5	0.22	0.3	0.4	--	0.75	--	0.1	0.14	0.2	0.1	0.2	0.7	0.1	0.3	0.4	0.2	0.2	0.4	0.84	0.86	1.14	0.6	0.61	0.7
Ammonia (mg N/L)	0.1	--	PO4-P (µg P/L) :<100	PO4-P (µg P/L) :110	0.83	0.97	0.99	--	0.03	--	0.25	0.2	0.12	0.1	0.1	0.12	0.1	0.1	0.15	0.2	0.2	0.3	0.05	0.02	1.08	0.14	0.06	0.05
Salinity (ppt)	<0.1	--	0.1	0.1	0	0	0	--	0	--	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0	0	0	0.03	0.04	0.07	0.03	0.03	0.04
Conductivity (µS/cm)	90	--	140	170	116	114	116	--	105	--	410	410	390	110	111	115	120	115	130	122	118	126	121	120	160	94	97	97
BOD (mg/L)	<2	--	<2	4	<2	<2	<2	--	2	--	<2	3.2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.1-0.3	--	<0.01-0.1		<0.01	N.A	<0.01-0.1	--	<0.01-0.1	--	0.1	0	0	0.1	0	0	0.2	0.05	0.1	0.2	0.05	0.1	0.2	0.05	0.1	0.2	0.05	0.1
Water flow at riffle (m/s)	0.4-0.5	--	0.2-0.3		<0.01	N.A	0.2-0.3	--	0.01	--	0.1	0	0	0.1	0	0	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1	0.2	0.1	0.1
Sand (%)	55	65	23	65	23	23	65	5	23	--	5	30	5	5	30	2	5	30	2	10	25	5	10	25	5	15	25	5
Stone (%)	25	30	75	30	75	75	30	40	75	--	40	65	80	40	65	2	40	65	2	45	65	5	45	65	5	65	65	15
Mud (%)	30	5	2	5	2	2	5	5	2	--	5	5	5	5	5	1	5	5	1	5	10	10	5	10	10	10	10	10
Concrete (%)	0	0	0	0	0	0	0	50	0	100	50	0	10	50	0	95	50	0	95	40	0	80	40	0	80	10	0	70

Table 4.7 Abotic data for the Upper She Shan River

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

	Impact monitoring			Post construction monitoring			Post construction monitorin			Post construction monitorin			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	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		
Replicate	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3	T1	T2	T3
DO (mg/L)	8.7	8.6	9.2	8.3	8.2	8.6	7.2	7.6	7.8	7.1	7.2	7.2	7.3	7.5	7.6	7.8	7.6	7.7	7.6	7.8	7.4	7.7	7.7	7.4	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
pH	6.6	6.9	7.1	6.8	7.3	7.4	7.8	6.7	7.6	7.2	6.8	7.5	6.6	7.3	7.2	7.5	7.5	7.4	7.5	7.5	7.4	7.4	7.5	7.3	7.2	7.3	7.1	8.2	8.2	8.2	8.4	8.3	8.1	7.9	8	7.8	8.2	8.5	8.4
Nitrate (mg N/L)	0.78	0.63	0.53	1.2	1.12	1.02	1.5	1.2	1.6	1.2	1.1	0.77	0.6	0.8	1.2	1.1	1.0	1.1	0.5	0.6	0.6	0.8	0.6	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.3	0.4	0.4	0.4	0.5	0.4	0.4	0.4	0.4
Ammonia (mg N/L)	0.08	<0.01	0.42	1.9	1.8	1.73	0.8	1.2	1.4	0.4	0.6	0.01	0.6	0.5	0.8	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Salinity (ppt)	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0.04	0.04	0.06	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
Conductivity (µS/cm)	116	116	134	124	118	132	128	113	132	123	136	140	112	116	120	124	121	123	118	115	119	110	113	111	120	116	108	125	125	123	113	114	116	110	96	106	127	132	121
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<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	0.05	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	0.1-0.2	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	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2-0.4	0.2-0.3	0.2-0.4	0.2-0.5	0.2-0.4	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	0.2-0.5	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 (%)	15	10	5	15	10	5	15	10	5	15	10	5	10	10	5	5	5	5	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 (%)	65	80	20	65	80	20	65	80	20	65	80	20	70	80	30	80	80	30	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 (%)	10	10	5	10	10	5	10	10	5	10	10	5	10	10	5	5	5	2	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	0	70	10	0	70	10	0	70	10	0	70	10	0	60	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63	10	10	63

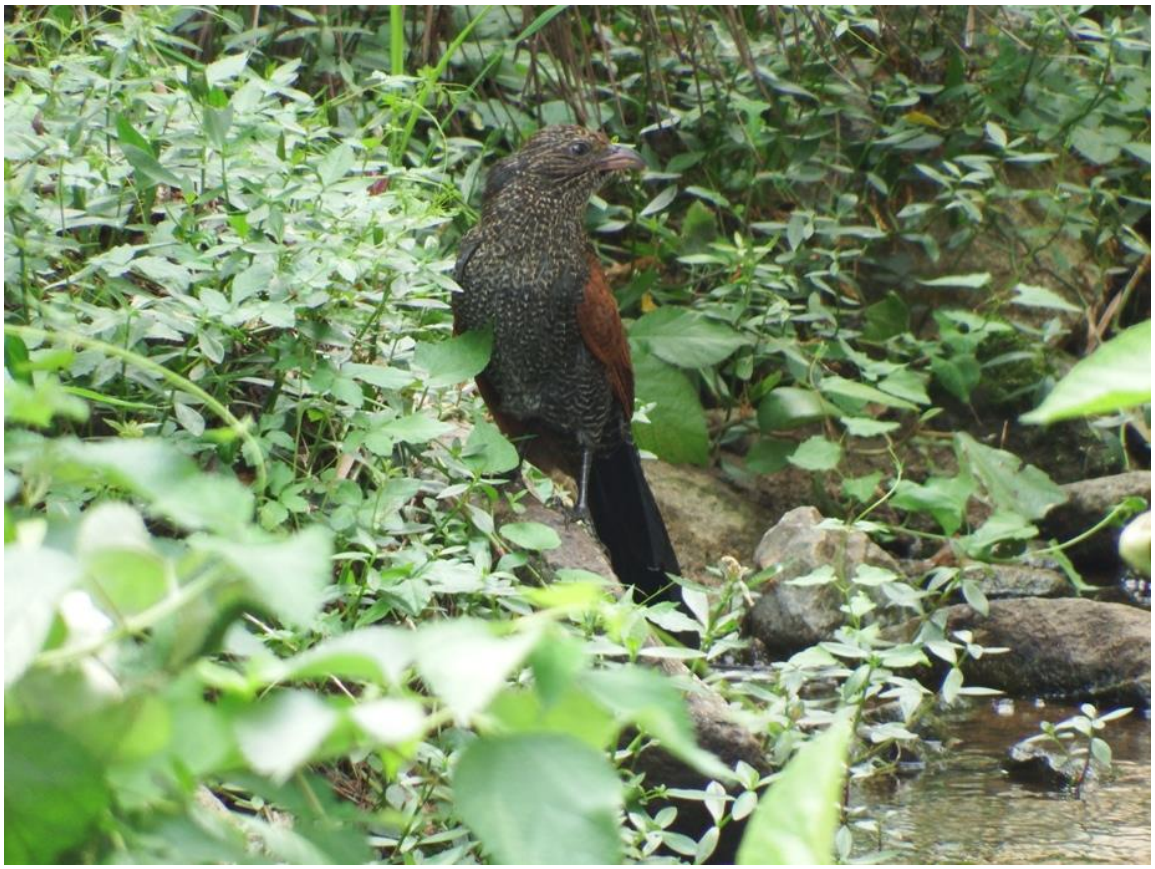
Table 4.7 Abotic data for the Upper She Shan River

(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		
Parameter / date	Jan-15			Feb-15			Mar-15			Apr-15			May-15			Jun-15			Jul-15			Aug-15			Sep-15			Oct-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	T1	T2	T3	T1	T2	T3
DO (mg/L)	8.6	8.6	8.7	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	8	8.1	8.2	8.1	7.9	8
pH	9.0	8.8	8.8	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	7.7	7.7	7.5	7.5	7.5	7.6
Nitrate (mg N/L)	0.4	0.5	0.4	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5	0.4	0.5	0.5
Ammonia (mg N/L)	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1	< 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	0.03	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	0.01	0.01	0.01	0.01	0.01	0.01
Conductivity (µS/cm)	156	162	147	152	153	155	142	138	137	142	138	137	36	39	45	36	39	45	39	45	28	32	38	46	29	31	32	33	32	39
BOD (mg/L)	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2	<2
Water flow at pool (m/s)	0.1-0.2	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	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	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	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	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	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	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. 22) Upper Tai Po River

October 2015



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

Post-Construction Ecological Monitoring Report (No.22) 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 22 post-construction ecological monitoring report for the project conducted **on 27th October 2015**. 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 this post construction monitoring. Apart from fauna species, 67 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 increased in this month;
- The abundance of odonata was still high.
- 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 (Photo 4) with some common plants including invasive species *Mikania micrantha*, and native species *Commelina diffusa*. In total, 67 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. Vegetation regenerated on the area, where has manually cleared last month (Photo 6). 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, 17 species of birds were recorded during bird survey. Among them, 4 species were wetland dependant birds observed feeding in the river channel including *Egretta garzetta* (Photo 7), *Motacilla cinerea*, *Motacilla alba* (Photo 8) and *Ardeola bacchus*. 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. *Centropus sinensis* was noticed foraging in the small stream nearby Tai Po River, this species is considered as Vulnerable in China Red Data Book Status. Bird abundance was similar to those recorded during baseline survey. 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 to the survey conducted in last month and the result was similar to previous surveys conducted in approximate period of last year. In total, 8 species odonata were found, those recorded odonata were common species in Hong Kong (Photos 10-13). Compared with dry season, higher abundance of odonata was due to seasonality. The mean ambient temperature is highly related to their emergence for most species in Hong Kong, their abundance will cease following decreasing ambient temperature

(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 13). 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). And the rare fish *Pseudobagrus trilineatus* was recorded consistently during recent monitoring. The abundance of fish was observed in increase in this 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 assuming that newt was back to lands during current non-breeding season. The rare fish *Pseudobagrus trilineatus* was consistently recorded in the river during recent monitoring. Fish's abundance was recorded in increase in this

month. Bird abundance was similar to those recorded during baseline survey. Species richness of odonata was still high in this month compared with 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

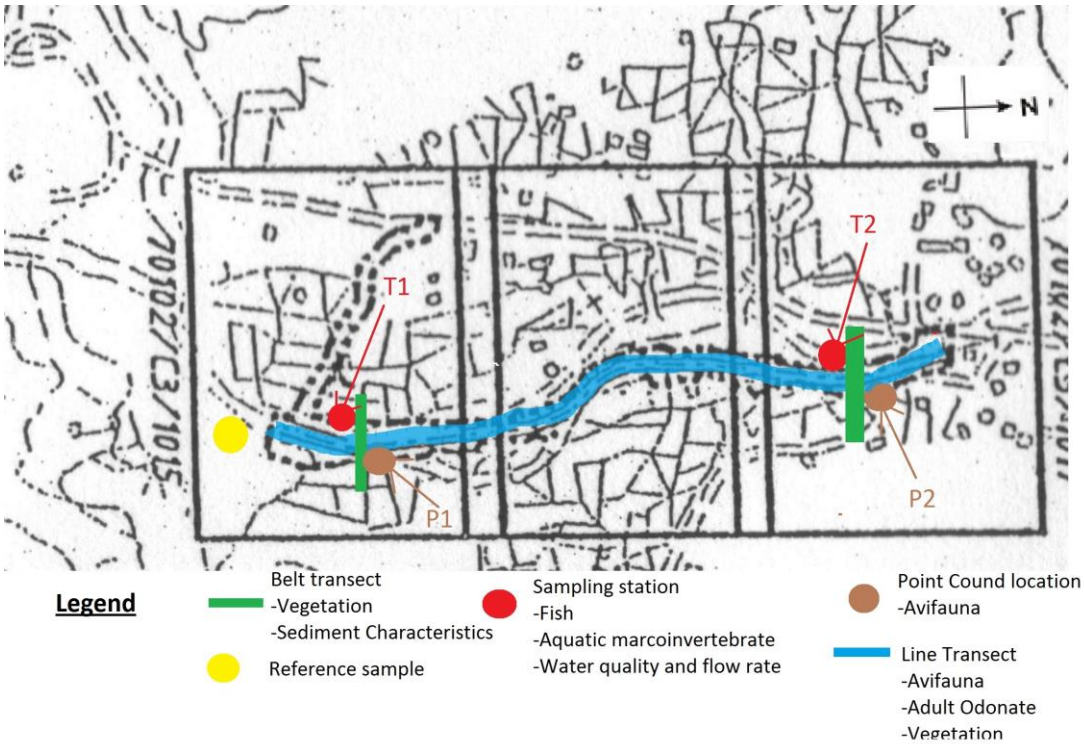

Figure 1. Sampling Location of Ecological Survey and Monitoring at Upper Tai Po River,Tai Po.

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 and river bed
	
Photo 5: Abundant species - *Commelina diffusa* (Middle section)	Photo 6: Vegetation clearance in upper river section

Photo 7: Avifauna – *Egretta garzetta*

Photo 8: Avifauna – *Motacilla alba*

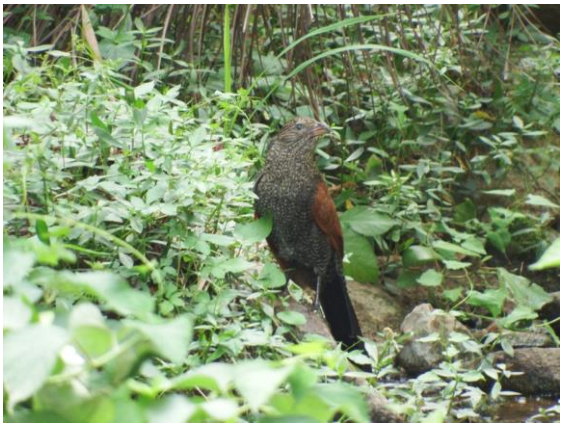

Photo 9: Avifauna – *Centropus sinensis*

Photo 10: Odonata - *Orthetrum glaucum*

Photo 11: Odonata - *Orthetrum chrysis*

Photo 12: Odonata - *Trithemis Aurora*

	
Photo 13: Marco-invertebrate	Photo 14: Fish - *Pseudobagrus trilineatus*

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			
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
Acoraceae	*Acorus gramineus*	金錢蒲															+	+	+	+	+	+	+	+	+				+	+	+	+	+	+
Amaranthaceae	*Alternanthera philoxeroides*	空心蓮子草	+	+	+	+	+	+				+	+	+	+	+	++	++	++	++	++	++	++	++	++	+	+	+	+	+	+	+	+	+	+
Amaranthaceae	*Amaranthus viridis*	野莧										+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Amaranthaceae	*Celosia 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*	黃鵪菜															+	+	+	+	+	+	+			+	+	+	+	+	+	+	+	+	+
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*	缺葉藤															+	+	+	+	+	+	+	+											
Caprifoliaceae	*Viburnum odoratissimum*	珊瑚樹	+	+	+	+	+																												
Caryophyllaceae	*Drymaria cordata*	荷蓮豆															+	+	+	+	+	+	+			+	+	+	+	+	+	+	+	+	+
Caryophyllaceae	*Myosoton aquaticum*	鵝腸菜															+	+	+	+	+	+	+	+											
Commelinaceae	*Commelina diffusa*	節節草	+	+	+	+	+	+	+	+	+	+	+	+	++	++	++	++	++	++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++	+++
Commelinaceae	*Floscopa 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	*Merremia 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	*Mimosa pudica*	含羞草															+	+	+	+	+	+	+	+	+										
Mimosaceae	*Leucaena 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	*Plantago major*	車前草															+	+	+	+	+	+	+	+											
Poaceae	*Panicum repens*	枯骨草	+	+	+	+	+	+	+	+					+	+	+	+	+	+	+	+	+	+	+		+	+	+	+	+	+	+	+	+
Poaceae	*Microstegium ciliatum*	剛秀竹	++	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	++	++	++	++	+	+	+	+	+	+
Poaceae	*Pennisetum purpureum*	象草	+	+	+	+	+	+							+	+	+	+	+	+	+	+	+	++	++	++	++	++	++	+	+	+	+	+	+
Poaceae	*Coix lacryma-jobi*	薏苡	+	+	+	+	+	+		+					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Phragmites karka*	卡開蘆	+	+	+	+	+	+		+					+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Miscanthus floridulus*	五節芒															+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+	+
Poaceae	*Brachiaria mutica*	巴拉草															+	+	+	++	++	++	++	++	++	+++	+++	+++	+++	++	++	++	++	++	++
Poaceae	*Digitaria radicosa*	紅尾翎																	+	+	+	+	+	+	+	++	++	++	++	+	+	+	+	+	+

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			
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
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*	粪箕篤																								+	+	+	+	+	+	+	+	+	+
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

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						Impact monitoring						Impact monitoring					
		Stream	Oct-07				Jan-09						Jul-09						Jan-10						Jul-10						Jan-11						Jul-11						Jan-12					
		Transect	P1		P2		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)	%
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					0.5	10					0.4	20				
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*	刚秀竹	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	1	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					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					1.5	2								
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨	0.4	10							0.4	10					0.4	2																										
Equisetaceae	*Equisetum debile*	笪管草			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	1.2	10					0.4	20		
Commelinaceae	*Commelina diffusa*	節節草																	0.2	5	0.2	5	0.2	5			0.5	20							0.2	4							0.4	10		
Solanaceae	*Solanum nigrum*	龍葵																					0.4	5																	0.5	4				
Euphorbiaceae	*Mallotus paniculatus*	白楸																			0.3	5																								
Poaceae	*Eleusine indica*	牛筋草													0.5	5						5																			0.3	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					0.2	2				
Poaceae	*Panicum repens*	枯骨草																																			1.5	5					1.5	5		
Poaceae	*Coix lacryma-jobi*	薏苡																																									1.5	5		
Convolvulaceae	*Ipomoea cairica*	五爪金龍																																									0.2	5		
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		71		100		89		35		100		100

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

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

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

			Impact monitoring						Impact monitoring						Impact monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring						Post construction monitoring					
		Stream	Jul-12						Mar-13						Jul-13						Jan-14						Feb-14						Mar-14						Apr-14						May-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)	%
Asteraceae	*Mikania micrantha*	薇甘菊	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			0.3	5	0.3	20			0.3	5	0.3	25		
Moraceae	*Ficus hispida*	對葉榕																																													
Ulmaceae	*Celtis sinensis*	朴樹																																													
Poaceae	*Microstegium ciliatum*	刚秀竹	1	55													0.6	3					0.6	3					0.6	5					0.6	5			0.4	5					0.4	5				
Euphorbiaceae	*Macaranga tanarius*	血桐																																							0.5	1				0.5	1		
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													1.2	5					1.2	2					1.2	2					1.2	2					1.5	5					1.5	5				
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨																																													
Equisetaceae	*Equisetum debile*	笪管草																																													
Asteraceae	*Ageratum conyzoides*	勝紅薊																																												
Commelinaceae	*Commelina diffusa*	節節草	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)				0.1	5	(concret section)		0.1	3	(concret section)			
Solanaceae	*Solanum nigrum*	龍葵																																												
Euphorbiaceae	*Mallotus paniculatus*	白楸																																												
Poaceae	*Eleusine indica*	牛筋草															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							0.3	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													0.6	5					0.6	5					0.6	5					0.6	5	0.6	2			0.3	5					0.3	3				
Poaceae	*Coix lacryma-jobi*	薏苡	1.5	5					1.5	3																																						
Convolvulaceae	*Ipomoea cairica*	五爪金龍	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					0.4	10					0.4	15				
Convolvulaceae	*Merremia hederacea*	魚黃草							0.2	5																																						
Poaceae	*Pennisetum alopecuroides*	狼尾草																																							1.5	5				1.5	5		
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*	青箱																																												
Bare Gound				20		100		100		10						20		76				19		74				19		69				19		67				70		69				67		66		

- 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					
		Stream	Jun-14						Jul-14						Aug-14					
		Transect	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)	%
Asteraceae	*Mikania micrantha*	薇甘菊	0.3	5	0.3	25			0.4	8	0.4	25			0.4	10	0.4	28		
Moraceae	*Ficus hispida*	對葉榕																		
Ulmaceae	*Celtis sinensis*	朴樹																		
Poaceae	*Microstegium ciliatum*	剛秀竹	0.4	5					0.6	5					0.6	5				
Euphorbiaceae	*Macaranga tanarius*	血桐			0.5	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					1.8	5				
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨																		
Equisetaceae	*Equisetum debile*	筆管草																		
Asteraceae	*Ageratum conyzoides*	勝紅薊					(concret section)						(concrete section)						(concret section)	
Commelinaceae	*Commelina diffusa*	節節草			0.1	3					0.2	4					0.3	5		
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																		
Poaceae	*Panicum repens*	枯骨草	0.3	3					0.4	3					0.6	3				
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	15					0.4	15					0.4	15				
Convolvulaceae	*Merremia hederacea*	魚黄草																		
Poaceae	*Pennisetum alopecuroides*	狼尾草			1.5	5					1.5	5					1.5	5		
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	*C elosia argentea*	青葙																		
Bare Gound				67		66				64		65				62		61		

			Post construction monitoring						Post construction monitoring						Post construction monitoring					
		Stream	Sep-14						Oct-14						Nov-14					
		Transect	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)	%
Asteraceae	*Mikania micrantha*	薇甘菊	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*	剛秀竹	0.6	5					0.6	10					0.6	15				
Euphorbiaceae	*Macaranga tanarius*	血桐			0.6	1					0.6	1					0.6	1		
Araceae	*Alocasia odora*	海芋																		
Araceae	*Colocasia esculenta*	芋							0.5	5					0.5	5				
Myrtaceae	*Cleistocalyx operculatus*	水翁																		
Athyriaceae	*Callipteris esculenta*	菜蕨																		
Poaceae	*Phragmites karka*	卡開蘆	1.8	5					2	5					2	5				
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨																		
Equisetaceae	*Equisetum debile*	筆管草							0.3	5					0.3	5				
Asteraceae	*Ageratum conyzoides*	勝紅薊					(concrete section)						(concrete section)						(concret section)	
Commelinaceae	*Commelina diffusa*	節節草			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*	蟛蜞菊																		
Asteraceae	*Bidens alba*	白花鬼針草									1	10					1	10		
Poaceae	*Panicum repens*	枯骨草	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	18					0.4	18					0.4	20				
Convolvulaceae	*Merremia hederacea*	魚黄草																		
Poaceae	*Pennisetum alopecuroides*	狼尾草			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	*C elosia argentea*	青葙																		
Bare Gound				58		61				43		4				34		4		

			Post construction monitoring						Post construction monitoring						Post construction monitoring					
		Stream	Dec-14						Jan-15						Feb-14					
		Transect	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)	%
Asteraceae	*Mikania micrantha*	薇甘菊	0.4	12	0.4	30			0.8	15			0.3	10	0.8	15			0.3	10
Moraceae	*Ficus hispida*	對葉榕																		
Ulmaceae	*Celtis sinensis*	朴樹																		
Poaceae	*Microstegium ciliatum*	剛秀竹	0.6	15					1.3	5			1	5	1.3	5			1	5
Euphorbiaceae	*Macaranga tanarius*	血桐			0.6	1							0.6	1					0.6	1
Araceae	*Alocasia odora*	海芋																		
Araceae	*Colocasia esculenta*	芋	0.5	5					0.8	5					0.8	5				
Myrtaceae	*Cleistocalyx operculatus*	水翁																		
Athyriaceae	*Callipteris esculenta*	菜蕨																		
Poaceae	*Phragmites karka*	卡開蘆	2	5					1.7	10					1.7	10				
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨																		
Equisetaceae	*Equisetum debile*	筆管草	0.3	5					0.3	5					0.3	5				
Asteraceae	*Ageratum conyzoides*	勝紅薊					(concret section)				0.3	2					0.3	2		
Commelinaceae	*Commelina diffusa*	節節草			0.3	10			0.2	10			0.4	60	0.3	10			0.5	60
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			1	10			1	5			0.8	2	1	5			0.8	2
Poaceae	*Panicum repens*	枯骨草	0.6	4					0.6	5					0.6	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*	魚黄草																		
Poaceae	*Pennisetum alopecuroides*	狼尾草			2	20							4	10					4	10
Poaceae	*Brachiaria mutica*	巴拉草			1.5	25														
Onagraceae	*Ludwigia erecta*	美洲水丁香									0.2	4					0.3	4		
Malvaceae	*Hibiscus rosa-sinensis*	大紅花																		
Cyperaceae	*Cyperus sp.*	莎草									0.2	6					0.2	6		
Balsaminaceae	*Impatiens walleriana*	非洲鳳仙											1	5					1	5
Amaranthaceae	*C elosia argentea*	青葙							1.7	5					1.7	5				
Bare Gound				34		4				35		88		7		35		88		7

- 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	Mar-14						Apr-14						May-15						Jun-15						Jul-15						Aug-15						Sep-15						Oct-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	0.8	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					0.5	10					0.5	10					0.5	10				
Moraceae	*Ficus hispida*	對葉榕																																														
Ulmaceae	*Celtis sinensis*	朴樹																																														
Poaceae	*Microstegium ciliatum*	剛秀竹	1.3	5			1	5	1.3	5			1	5	1	5			1	3	1	5			1	3	1	5	1	1			1	5	1	1			1	5	1	1			1	5	1	3		
Euphorbiaceae	*Macaranga tanarius*	血桐					0.6	1					0.6	1					0.5	1					0.5	1					1.5	5					1.5	5					1.5	5			1.5	5
Araceae	*Alocasia odora*	海芋																																														
Araceae	*Colocasia esculenta*	芋	0.8	5					0.8	5					0.5	5					0.5	5					0.5	5	1.2	10			0.5	5	1.2	5			0.5	5	1.2	2			0.5	5	1.2	5		
Myrtaceae	*Cleistocalyx operculatus*	水翁																																														
Athyriaceae	*Callipteris esculenta*	菜蕨																																													
Poaceae	*Phragmites karka*	卡開蘆	1.7	10					1.7	10					1.5	10					1.5	10					1.5	10					1.5	10					1.5	10					1.5	10				
Thelypteridaceae	*Cyclosorus parasiticus*	華南毛蕨																																														
Equisetaceae	*Equisetum debile*	笪竹草	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	5																								
Commelinaceae	*Commelina diffusa*	節節草	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	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
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	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	0.7	5			0.5	5	0.7	5			0.5	5	0.7	5			0.5	5
Poaceae	*Panicum repens*	枯骨草	0.6	5					0.6	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					4	10					4	10					2	7					2	7			2.5	20	2	30			2.5	5	2	20			2.5	5	2	20			2	7	2	20
Poaceae	*Brachiaria mutica*	巴拉草																											1.2	50	0.5	15			1.2	30	0.5	15			1.2	2	0.5	15			1.2	2	0.5	15
Onagraceae	*Ludwigia erecta*	美洲水丁香			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	3					0.2	5			0.2	5					0.2	5							0.2	2			0.2	2		
Balsaminaceae	*Impatiens walleriana*	非洲鳳仙					1	5					1	5					1	3					1	3																								
Amaranthaceae	*Celosia argentea*	青箱	1.7	5					1.7	5					1.7	5					1.7	5					1.7	5					1.7	5											1.7	5				
Bare Gound				35		88		7		35		88		7		40		93		46		40		85		46		40		14		5		40		34		25		40		83		25		40		66		25

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

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

Table 4.3 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*	麻鵲	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		
					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		
					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
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*	蘇鷹	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
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
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				
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
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
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
Daurian redstart	*Phoenicurus auroreus*	北紅尾鴝	WV	U							+		1	+																												
Domestic pigeon	*Columba sp.*	鴿	R	C	+			+						+			+																										
Eurasian Tree Sparrow	*Passer montanus*	麻鷓	R	C	+		3	+	2	1	0			++		3	++	3		++		2	++		2	++	3	2	++	3	3	++	5	7	++	5	2	++	4	3	++	4	4
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					
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
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
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
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
Olive Backed pipit	*Anthus hodgsoni*	樹鷚	WV	C																																						
Red-billed blud magpie	*Urocissa erythrorhyncha*	紅嘴藍鵲	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
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*	黑喉石鵲	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
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
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
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

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 4.4. Odonate species recorded at the UpperTai Po River

					Baseline survey	Impact monitoring				Impact monitoring						Post construction monitoring											Post construction 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	Nov-14	Dec-14	Jan-15	Feb-15	Mar-15	Apr-15	May-15	Jun-15	Jul-15	Aug-15	Sep-15	Oct-15
Macrodiplax cora	Coastal Glider	高翔灌蜻	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	紅蜻	NP	VC	+		+		+											+													+	+	+	+	+
Euphaea decorata	Black-banded Gossamerwing	方帶幽蟌	NP	VC							+											+	+														
Neurobasis chinensis	Chinese Greenwing	華翡色蟌	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	六斑曲缘蜻	NP	C									+																			+	+			
Pantala flavescens	Wandering Glider	黃蜻	NP	VC	+		+	+	+	+	++	+	+	+	+										+	+											+
Paracercion calamorum dyeri	Dusky Lilysquatter	基尾蟌	P, LC	C															+																	
Prodasineura autumnalis	Black Threadtail	烏幽原蟌	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	晚褐蜻	NP	VC	+				+									+				+	+	+	+	+	+	+									+
Trithemis festiva	Indigo Dropwing	靡褐蜻	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	6	2	2	1	3	6	7	9	11	10	8	8

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			Post construction 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			Jan-14			Feb-14		
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	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	耳白螺	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.	蠓幼虫	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	13	7	4	14	10	8

Note:

"NP" – Not protected in Hong Kong

"P" - Listed in Wild Animals Protection Ordinance (Cap. 170) and Listed as "Near Threatened" in IUCN Red List Status

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

"+" – Species exists in the study area

"++" – Species common in the study area

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

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

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

				Post construction monitoring																																
Species	Chinese name			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
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	耳白螺	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.	蠓幼虫	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				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

Note:

"NP" – Not protected in Hong Kong

"P" - Listed in Wild Animals Protection Ordinance (Cap. 170) and Listed as "Near Threatened" in IUCN Red List Status

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

"+" – Species exists in the study area

"++" – Species common in the study area

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

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

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

				Post construction monitoring																							
Species	Chinese name			Mar-15			Apr-15			May-15			Jun-15			Jul-15			Aug-15			Post construction monitoring					
																						Sep-15			Oct-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
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	耳白螺	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.	蠓幼虫	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

Note:

"NP" – Not protected in Hong Kong

"P" - Listed in Wild Animals Protection Ordinance (Cap. 170) and Listed as "Near Threatened" in IUCN Red List Status

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

"+" – Species exists in the study area

"++" – Species common in the study area

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

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

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

				Baseline survey		Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact monitoring			Impact 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		
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	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	12	8	6	10	12	10
		No of Speices		10	2	7	3	2	7	4	4	7	5	5	7	9	7	8	5	3	11	2	7	10	3	5	8	2	2	9	2	1	9	4	1	9	4	3	8	5	4
Amphibian																																									
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 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																																		
				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
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		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		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	+			+			+			+			+			+			+			+			+			+			+			+			+		

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 c

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		
				Apr-15			May-15			Jun-15			Jul-15			Aug-15			Sep-15			Oct-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
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
		No of Speices		12	4	4	11	4	4	11	4	4	11	4	4	11	4	3	11	4	3	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 c

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		Oct-15	
Replicate	T1	T2	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	8.2	8.0
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	7.9	7.7
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	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	< 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	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	28	33
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)	0.01-0.3		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		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		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	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	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	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	60	80