ANEWR

Civil Engineering and Development Department
North Development Office
Unit 1501, Level 15, Tower I, Metroplaza
223 Hing Fong Road
Kwai Fong
New Territories

Your reference:

Our reference: HKCEDD14/50/107700

Date: 13 December 2021

Attention: Mr Ryan Chau

BY EMAIL & POST
(email: hlchau@cedd.gov.hk)

Dear Sirs

Agreement No.: NDO 16/2018
Independent Environmental Checker for
Pre-construction Environmental Monitoring and Audit Works for the Advance and First Stage Works of Kwu Tung North and Fanling North New Development Areas
Final Baseline Ecological Monitoring Report for Contract No. NDO 14/2018

We refer to email of 29 November 2021 attaching a Final Baseline Ecological Monitoring Report prepared by the Environmental Team (ET) of the captioned.

We have no further comment and hereby verify the Final Baseline Ecological Monitoring Report in accordance with Section 4.1 of the Baseline Ecological Monitoring Plan (BEMP).

Should you have any queries, please do not hesitate to contact the undersigned or our Ms Karen Po on 2618 2831.

Yours faithfully
ANEWR CONSULTING LIMITED

James Choi
Independent Environmental Checker

CPSJ/LCCR/PKWK/lsmt

cc AECOM – Mr Chris Ho (email: chris.ho@aecom.com)
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Date 15 December 2021

Our Ref. MCL/ED/0501/2021/C

The EIA Ordinance Register Office
Environmental Protection Department
27/F, Southorn Centre,
130 Hennessy Road, Wan Chai, Hong Kong

BY E-MAIL

Attn: Mr. Felix Tai

Dear Sir,

Contract No. NDO 14/2018 - Advance and First Stage Works of Kwu Tung North and Fanling North New Development Areas
Submission of Final Baseline Ecological Monitoring Report Rev.F

In accordance with Condition 3.3 of EP-466-2013, EP-467-2013, EP-468-2013A, EP-469-2013, EP-470-2013, EP-473-2013A, EP-475-2013A, we hereby submit the advance soft copy of the captioned Final Baseline Ecological Monitoring Report_Rev.F (0032/19/ED/0464f) which has been certified by Environmental Team Leader for your perusal.

Thank you for your attention. Should you have any queries, please contact our Fenelyn Nabuab at 3565 4168 or our Ray Li at 3565 4156.

Yours faithfully,
for and on behalf of
FUGRO TECHNICAL SERVICES LIMITED

Calvin Leung
Environmental Team Leader

CL/rl

c.c.	CEDD	Attn: Mr. Felix Fan / Mr. Ryan Chau	(by E-mail)
	AECOM	Attn: Ms. Angela Tong / Mr. Chris Ho	(by E-mail)
	IEC	Attn: Mr. James Choi / Ms. Karen Po/ Mr. Ricky Lau	(by E-mail)

Encl.

Baseline Monitoring Report

Advance and First Stage Works of Kwu Tung North and Fanling North New Development Areas – Ecological Baseline Monitoring | Ecology

0032/19/ED/0464f 06 | 25 November 2021

Final

Civil Engineering and Development Department

Civil Engineering and Development Department

Document Control

Document Information

Project Title	Advance and First Stage Works of Kwu Tung North and Fanling North New Development Areas – Ecological Baseline Monitoring
Document Title	Baseline Monitoring Report
Fugro Project No.	0032-19
Fugro Document No.	0032/19/ED/0464f
Issue Number	06
Issue Status	Final
Fugro Legal Entity	Fugro Technical Services Limited
Issuing Office Address	13/F, Fugro House – KCC2, 1 Kwai On Rd, Kwai Chung, NT, Hong Kong

Client Information

Client	Civil Engineering and Development Department
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Client Document No.	Service Contract No. NDO 14/2018

Document History

Issue	Date	Status	Comments on Content	Prepared By	Checked By	Approved By
01	19 Oct 2020	For Review	Awaiting AFCD's comments	FTS/CHKEC	CL	ANewR
02	26 Feb 2021	For Review	Addressed AFCD's comments	FTS/CHKEC	CL	ANewR
03	10 June 2021	For Review	Addressed AFCD's comments	FTS/CHKEC	CL	ANewR
04	18 Oct 2021	For Review	Addressed AFCD's comments	FTS/CHKEC	CL	ANewR
05	24 Nov 2021	For Review	Addressed AFCD's comments	FTS/CHKEC	CL	ANewR
06	25 Nov 2021	For Review	Addressed AFCD's comments	FTS/CHKEC	CL	ANewR

Project Team

Initials	Name	Role
FTS	Fugro Technical Services Limited	Environmental Team
CL	Calvin Leung	ET Leader
CHKEC	China Hong Kong Ecology Consultants Ltd.	Ecologist
ANewR	ANewR Consulting Limited	Independent Environmental Checker

Executive Summary

Fugro Technical Services Limited (FTS) was commissioned by Civil Engineering and Development Department (CEDD) as the Environmental Team (ET) of the pre-construction environmental monitoring and audit works for the Advance and First Stage Works of Kwu Tung North (KTN) and Fanling North (FLN) New Development Areas (NDAs) ("the Project"). As the ET, FTS conducts the baseline ecological monitoring at the ecologically sensitive areas where impacts on habitats and fauna may arise as a consequence of the Project which include, but are not limited to Long Valley, the Ng Tung, Sheung Yue and Shek Sheung Rivers, Ma Tso Lung Stream and its tributaries and Siu Hang San Tsuen Stream. The baseline ecological monitoring is in accordance with the approved Baseline Ecological Monitoring Plan (BEMP) and is supervised by a qualified ecologist.

The baseline ecological monitoring is a 12-month monitoring programme, which commenced on July 2019. The table below shows the summary of the baseline ecological monitoring.

Survey Content	Survey/ Sampling Dates	Findings
Monitoring of Measures to Minimise Disturbance to Waterbirds in Ng Tung River, Sheung Yue River, and Shek Sheung River	3 July 2019 to 22 June 2020	The monthly mean abundance of avifauna recorded ranged from 165 to 263 individuals (ind.). Generally, higher monthly mean abundances were recorded during dry season surveys compared to wet season surveys. A total of 64 species was recorded, of which 21 are waterbirds and 43 are terrestrial species. The most commonly recorded waterbird is the Chinese Pond Heron *Ardeola bacchus* and the most commonly recorded terrestrial species is the Crested Myna *Acridotheres cristatellus*. In terms of species of conservation significance, a total of 18 species was recorded. Foraging and roosting behaviours of avifauna were observed.
Monitoring of Measures to Minimise Impacts to Aquatic Fauna in Ma Tso Lung Stream and Siu Hang San Tsuen Stream	9 July 2019 to 17 June 2020	A total of 56 freshwater macroinvertebrate species was recorded, of which 19 species are native to Hong Kong. The most commonly recorded species were the snails *Sinotaia quadrata, Pomacea canaliculata,* and *Bellamya* sp. A total of 15 fish species was recorded, of which seven species are native to Hong Kong. The most abundant fish species was the exotic Nile Tilapia *Oreochromis niloticus*. No freshwater macroinvertebrate species but four fish species of conservation significance were recorded. The fish species of conservation significance are the Common Carp *Cyprinus carpio*, Mozambique Tilapia *O. mossambicus*, Predaceous Chub *Parazacco spilurus*, and Rose Bitterling *Rhodeus ocellatus*.
Monitoring of Measures to Minimise Impacts on Ecologically Sensitive habitats from Disturbance and Pollution	4 July 2019 to 22 June, 2020	A total of seven mammal species was recorded, of which three are of conservation significance. The most commonly observed mammals are those that are closely associated to humans, i.e. domestic dogs, cats, and ox.

Survey Content	Survey/ Sampling Dates	Findings
		The species of conservation significance included the Fruit Bat *Cynopterus sphinx* and the Pallas's Squirrel *Callosciurus erythraeus*. A total of 17 herpetofauna species was recorded, of which 13 species are native to Hong Kong. The most commonly observed herpetofauna species is the amphibian Asian Common Toad *Duttaphrynus melanostictus*. Three species of conservation significance were recorded which included the Narrow-mouthed Frog *Kalophrynus interlineatus*, Common Rat Snake *Ptyas mucosus*, and Four-clawed Gecko *Gehyra mutilata*. A total of 48 butterfly species and 24 odonate species were recorded. The most commonly recorded butterfly is the Common Indian Crow *Euploea core amymone* while the Wandering Glider *Pantala flavescens* is the most commonly recorded odonate. Two butterfly species were classified as species of conservation significance. i.e. Danaid Eggfly *Hypolimnas misippus* and Yellow Rajah *Charaxes marmax*. No odonate species of conservation significance was recorded.
Monitoring of Measures to Minimise Impacts of Construction and Operation of LVNP (including creation of compensatory wetland habitat) on the Ecological Sensitive Receivers on Long Valley	3 July 2019 to 22 June 2020	The monthly mean abundance of avifauna ranged from 408 ind. to 901 ind. Generally, higher monthly mean abundances were recorded during dry season surveys compared to wet season surveys. A total of 98 species were identified, of which 32 species are waterbirds and 66 are terrestrial species. The most abundant waterbirds were Black-winged Stilt *Himantopus himantopus* while the most abundant terrestrial species was the Scaly-breasted Munia *Lonchura punctulata*. A total of 39 species of conservation significance were recorded. A total of 23 freshwater macroinvertebrate species was recorded, of which three species were native to Hong Kong. The most commonly observed species were the snails *S. quadrata*, *P. canaliculata*, and *Bellamya* sp. and water striders *Metrocoris* sp.. A total of seven fish species was recorded, of which two were native to Hong Kong. No freshwater macroinvertebrate but one fish species of conservation significance was recorded, the Mozambique Tilapia *O. mossambicus*. A total of eight mammal species was recorded with domestic dog, cat, and ox as the commonly observed species. In terms of species of conservation significance, three

Survey Content	Survey/ Sampling Dates	Findings
		species are protected under the Wild Animals Protection Ordinance (Cap. 170) which include the Short-nosed Fruit Bat, Pallas's Squirrel, and Small Asian Mongoose *Herpestes javanicus*. A total of 20 herpetofauna species (9 amphibians and 11 reptiles) were recorded, of which, 15 species were native to Hong Kong. The Asian Common Toad was the most commonly observed amphibians while the Chinese Gecko *Gekko chinensis* was the most commonly observed reptile. A total of five herpetofauna species (two amphibian and three reptile species) of conservation significance was recorded. Amphibian species included the Chinese Bullfrog *Hoplobatrachus rugulosus* and the Spotted Narrow-mouthed Frog and the reptile species included the Common Rat Snake, the Four-clawed Gecko, and Many-banded Krait *Bungarus multicinctus*. A total of 26 butterfly species were recorded with the Indian Cabbage White, *Euploea midamus* as the most commonly observed. The odonates, on the other hand, was composed of 24 species dominated by the Wandering Gliders. Two butterfly and one odonate species of conservation significance were recorded., the butterflies Danaid Eggfly and Yellow Rajah and the odonate Blue Chaser *Potamarcha congener*.

Vegetation surveys that covered Long Valley only, under the BEMP, were conducted by the ET of the construction phase once during the wet season and once during the dry season before the commencement of construction activities. The results of the vegetation surveys are available in the separate 'Vegetation Survey Report'.

During the monitoring period, activities that could potentially pose disturbance to ecological sensitive receivers within the monitoring area were hook and line fishing, construction works at the riverbank of Sheung Yue River, and infrastructure works and vegetation clearance in the vicinity of Ng Tung River.

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1 INTRODUCTION

1.1 Project Background

1.1.1 The Kwu Tung North (KTN) and Fanling North (FLN) New Development Areas (NDAs) are one of the important sources of medium- and long-term land and housing supply. The development of these areas will be implemented in phases for full completion by 2031. The Phase 1 of the NDAs development, comprising the Advance Works and First Stage Works, is targeted to commence in stages starting from the second half of 2019. The Advance and First Stage Works would include site formation, engineering infrastructure works (including roads, drainage, sewerage, waterworks, landscaping works, pumping stations, and fresh water and flushing water service reservoirs), soil remediation, re-provisioning of North District Temporary Wholesale Market, development of a nature park at Long Valley and implementation of environmental mitigation measures.

1.1.2 Fugro Technical Services Limited (FTS) was commissioned by Civil Engineering and Development Department (CEDD) as the Environmental Team (ET) of the pre-construction environmental monitoring and audit works for the Advance and First Stage Works of Kwu Tung North (KTN) and Fanling North (FLN) New Development Areas (NDAs) ("the Project"). The Engineer of this Project is AECOM Asia Company Limited (AECOM) and the Independent Environmental Checker (IEC) is ANewR Consulting Limited.

1.1.3 As the ET, part of the scope of work of FTS, is to conduct the baseline ecological monitoring at the ecologically sensitive areas related to the Project. Prior to the pre-construction ecological monitoring, a Baseline Ecological Monitoring Plan (BEMP) was prepared by the ET, approved by the Engineer, and verified by the IEC. The BEMP was agreed upon with the Agriculture, Fisheries and Conservation Department (AFCD).

1.2 Scope and Purpose of this Report

1.2.1 The baseline ecological monitoring was undertaken in accordance with the agreed BEMP, Long Valley Nature Park Habitat Creation and Management Plan (LVNP HCMP), **Section 14 Ecology of the EM&A Manual**, and **Section 13 Ecological Impact Assessment of the EIA Report** for the North East New Territories (NENT) NDAs.

1.2.2 The baseline ecological monitoring was supervised by a qualified ecologist.

1.2.3 The baseline ecological monitoring, except for the Vegetation Surveys, was carried out in all areas where impacts on habitats and fauna may arise as a consequence of the Project which include, but were not limited to Long Valley, the Ng Tung, Sheung Yue and Shek Sheung Rivers, Ma Tso Lung Stream and its tributaries and Siu Hang San Tsuen Stream.

1.2.4 This document details the results of the July 2019 to June 2020 monitoring, which constitute the entire 12-month ecological baseline monitoring programme.

1.2.5 **Table 1.1** shows the programme for the baseline ecological monitoring, while **Table 1.2** presents the monthly schedule of the monitoring.

Table 1.1: Programme for the baseline ecological monitoring

Activity	Monitoring Period and Frequency											
	Jul 19	Aug 19	Sept 19	Oct 19	Nov 19	Dec 19	Jan 20	Feb 20	Mar 20	Apr 20	May 20	Jun 20
Monitoring of measures to minimise disturbance to water birds on Ng Tung, Sheung Yue and Shek Sheung Rivers						Weekly Avifauna Monitoring						
Monitoring of measures to minimise impacts to Ma Tso Lung Stream, Siu Hang San Tsuen Stream, and Long Valley	Monthly Aquatic Fauna Monitoring									Monthly Aquatic Fauna Monitoring		
Monitoring of measures to minimise impacts on ecologically sensitive habitats from disturbance and pollution			Monthly Mammals, Herpetofauna, and Odonates and Butterflies Monitoring									
Monitoring of measures to minimise impacts of construction and operation of LVNP (including creation of compensatory wetland habitat) on the ecological sensitive receivers in Long Valley			Monthly Monitoring for Mammals, Herpetofauna, and Odonates and Butterflies									
									Additional exuviae surveys for odonates			
	Additional night-time surveys for herpetofauna								Additional night-time surveys for herpetofauna			
					Weekly Avifauna Monitoring							
					Additional twice-monthly night surveys for avifauna							

Table 1.2: Schedule of the baseline ecological monitoring, July 2019 to June 2020

Tasks	Jul 19	Aug 19	Sept 19	Oct 19	Nov 19	Dec 19	Jan 20	Feb 20	Mar 20	Apr 20	May 20	Jun 20
Monitoring of measures to minimise disturbance to water birds on Ng Tung, Sheung Yue and Shek Sheung Rivers	3	2	3	3	6	4	10	7	2	6	5	1
	11	6	12	15	20	12	15	13	9	17	13	11
	16	16	17	22	27	18	21	17	16	20	19	19
	22	22	26	24	29	23	31	27	23	27	25	22
	26	28		31		30			30			
Monitoring of measures to minimise impacts to Ma Tso Lung Stream, Siu Hang San Tsuen Stream, and Long Valley	9	8	9	9						8	13	16
	11	9	10	10						9	14	17
Monitoring measures to minimise impacts on ecologically sensitive habitats from disturbance and pollution	4	6	3	15	20	19	15	13	16	17	13	11
	26	22	17	31	27	23	31	27	30	27	25	22
Monitoring of measures to minimise impacts of construction and operation of LVNP (including creation of compensatory wetland habitat) on the ecological sensitive receivers in Long Valley	3	2	3*	3	6	4	10	7	2	6	5	1
	11	6	17	15*	20*	12	15*	13*	9	17*	13	11
	16	16	26	22	27*	18*	21	17	16*	20	19	19
	22	22	12*	24	29	23*	31*	27*	23	27*	25	22
	26	28		31*		30			30			
	4	6	3	15	20	19	15	13	16	17	13	11
	26	22	17	31	27	23	31	27	30	27	25	22
	4	6	3	15	20	19	15	13	16**	17**	13**	11**
	11**	22	17	31	27	23	31	27	30**	27**	25**	22**
	26											
	4	6	3	15	20	19	15	13	16***	17***	13***	11
		22	17	31	27	23	31	27	30***	27***	25***	22
	4	6	3	15	20	19	15	13	16	17	13	11
	26	22	17	31	27	23	31	27	30	27	25	22
	Weekly avifauna monitoring in Long Valley											
	Monthly monitoring for mammals in Long Valley											
	Monthly monitoring for herpetofauna in Long Valley											
	Monthly monitoring for odonates in Long Valley											
	Monthly monitoring for butterflies in Long Valley											
*	Additional twice-monthly avifauna night-time surveys in Long Valley											
**	Additional herpetofauna night-time surveys in Long Valley											
***	Additional exuviae surveys for odonates in Long Valley											

1.3 Structure of the Report

1.3.1 Following this Introductory Section, this report contains the following subsections:

- Section 2: Methodology
- Section 3: Details of Influencing Factors
- Section 4: Baseline Data
- Section 5: Determination of the Action and Limit Levels
- Section 6: Revisions for Inclusion in the EM&A Manual
- Section 7: Comments, Recommendations, and Conclusions

2 METHODOLOGY

2.1 Monitoring of Measures to Minimise Disturbance to Waterbirds in Ng Tung River, Sheung Yue River, and Shek Sheung River

2.1.1 Location of Transect Routes

2.1.1.1 Where Project development will be undertaken within 200m (the maximum distance at which it is predicted there may be some disturbance, and hence a reduction in numbers, of large waterbirds) of the Ng Tung, Sheung Yue, and Shek Sheung Rivers, avifaunal communities were surveyed quantitatively by transect count.

2.1.1.2 The transect routes are as follows:

- T1. Ng Tung River
- T2. Ng Tung River
- T3. Sheung Yue River
- T4. Shek Sheung River

2.1.1.3 The transect routes are shown in **Appendix A.1** and **Appendix A.2.**

2.1.1.4 As the sensitive receivers (large waterbirds) are easily visible, the transect route only followed one bank of the rivers.

2.1.2 Survey Period and Frequency

2.1.2.1 Monitoring surveys were undertaken on a weekly basis. The survey time for each week was conducted at the highest and lowest possible tidal conditions.

2.1.3 Monitoring Parameters

2.1.3.1 Abundance and location of all birds encountered (including seen and heard through birdcalls) were recorded. Habitat type where the birds were encountered was also noted down. Birds flying over the survey area were recorded but not allocated to any specific location. Bird calls heard which could not be exactly located to a specific habitat type or location were marked as "heard". Species of conservation significance were specified. Notable behaviours such as nesting, presence of recently fledged juveniles, roosting, feeding activities, etc. were also documented.

2.1.3.2 Ornithological nomenclature followed The Avifauna of Hong Kong (Carey et al., 2001), The Birds of Hong Kong and South China (Viney et al., 2005), and the most recent updated list from other sources (e.g. Hong Kong Bird Watching Society).

2.1.3.3 Weather condition, tidal information at the time of the survey and other noticeable activities (natural or anthropogenic) occurring within or in the vicinity of the survey areas were also recorded.

2.1.4 Survey Requirements and Protocol

2.1.4.1 Monitoring surveys were conducted at both high and low tides (it is considered high tide when tidal levels are above 1.5m and low tide when tidal levels is below 1.5m at Tsim Bei Tsui Station, the reference tidal station). The magnitude of how much above or below 1.5m would be subject to the tidal conditions of that week as it varies throughout different times of the year. Nonetheless, the high and low tide relative to the tidal condition of the week were taken into consideration.

2.2 Monitoring of Measures to Minimise Impacts to Aquatic Fauna in Ma Tso Lung Stream and Siu Hang San Tsuen Stream

2.2.1 Location of the Monitoring Stations

2.2.1.1 Aquatic fauna in the streams in Ma Tso Lung and Siu Hang San Tsuen were quantitatively surveyed. The monitoring stations for the streams followed as far as practicable the sampling locations studied in the Ecological Impact Assessment of the EIA for the NENT NDAs as shown **in Appendix A.3** and **Appendix A.5.**

2.2.2 Survey Frequency and Period

2.2.2.1 Surveys were conducted monthly during the wet season period (i.e. July to October 2019 and April to June 2020).

2.2.3 Monitoring Parameters

2.2.3.1 Species composition, relative abundance, and distribution of invertebrates and fish were recorded. Species of conservation significance during the monitoring activities were specified.

2.2.3.2 Weather condition and other noticeable activities (natural or anthropogenic) occurring within or in the vicinity of the survey areas were also noted down.

2.2.4 Survey Requirements and Protocol

2.2.4.1 At each sampling location, quantitative survey was carried out with the collection of three sample replicates for invertebrates and direct counting of fish at three observation points. Direct count was used for larger organisms such as fish while kick-netting or sweep netting was used for invertebrates sampling. Three replicates were collected for invertebrates at each sampling point, if possible. The net was placed in the water in which the mouth of the net faced to the water current. The substratum were disturbed by kicking and the organisms dislodged from the stream bed were trapped in the net. Sweep netting was also employed to aid sampling in areas where kick-netting was not feasible. Smaller organisms that could not be identified with the naked eye were brought to the laboratory for identification under the dissecting microscope. Abundances of different taxa identified were recorded.

2.3 Monitoring of Measures to Minimise Impacts on Ecologically Sensitive Habitats from Disturbance and Pollution

2.3.1 Location of Transect Routes

2.3.1.1 Ecological sensitive receivers such as mammals, insects (butterflies and odonates), and herpetofauna were surveyed quantitatively along the below routes established within the Project boundary.

The transect routes are detailed below:

- T1. Ma Tso Lung riparian zone and associated wetland habitats;
- T1. Green belt areas E1-8, D1-8 and G1-3 in KTN NDA;
- T1. AGR zone C2-4 and C2-2 in KTN NDA;
- T1. Areas north of Ng Tung River;
- T2. Fanling North Freshwater Service Reservoir;
- T3. Area west Siu Hang San Tsuen Stream;
- T4. South side of Fanling Highway and Castle Peak Road in the vicinity of Pak Shek Au;
- T5. Areas west and east of the southern limit of the FLN NDA work area; and
- T6. Areas in the western part of KTN

2.3.1.2 These transect routes are shown in **Appendix A.6** and **Appendix A.7.**

2.3.2 Survey Period and Frequency

2.3.2.1 Monitoring surveys were undertaken on a monthly basis.

2.3.3 Monitoring Parameters

2.3.3.1 Species composition, abundance, and distribution of mammals, insects (butterflies and odonates) and herpetofauna observed were recorded and species of conservation significance were specified.

2.3.4 Survey Requirements and Protocol

2.3.4.1 Mammal Survey

2.3.4.1.1 Mammal surveys covering day- and night-times were conducted in areas along the transect routes which may be potentially utilised by terrestrial mammals. The surveys focused on searching for field signs such as droppings, footprints, diggings or burrows left by larger terrestrial mammals. Mammal identification was made as accurate as possible from the field signs encountered. In addition, any mammal directly observed was identified. The bat surveys were conducted along the transect routes. The surveys started shortly after sunset, with bat detector used to record the echolocation calls of foraging bats (using frequency division). The structure of the echolocation calls were analysed to identify species as far as possible. The relative abundance of each species in the habitat was estimated from the field and from recording using a scale from one (single individual recorded) to five (very abundant). Nomenclature of mammal followed Shek (2006).

2.3.4.2 Herpetofauna Survey (Amphibians and Reptiles)

2.3.4.2.1 Amphibian surveys were conducted whenever possible on evenings following or during periods of rainfall, focusing on areas suitable for amphibians (e.g. forest, shrublands, grasslands, streams, catch waters, fishponds, marshes, etc.). Records of calling amphibians formed the bulk of the data collected, but this was supplemented whenever possible by visual observation of eggs, tadpoles, adult frogs, and toads. Reptile surveys were mainly conducted by actively searching appropriate microhabitats and refugia such as stones, pond bunds, crevices, and leaf litter/debris. In addition to active searching, observations and noting down of exposed, basking, and foraging reptiles were conducted. Nomenclature of amphibian and reptile followed Chan et al. (2005) and Karsen et al. (1998), respectively.

2.3.4.3 Insect Survey (Butterfly and Odonates)

2.3.4.3.1 All butterflies and odonates observed during the transect survey were identified and counted. Special attention was given to any preferable habitats of these fauna groups, including watercourses, fishponds, and vegetated areas. Hand netting was used for collecting specimen to confirm the species identification, if necessary, and the live specimen was released in-situ after identification. Nomenclature and protection status of the species followed Lo et al. (2005) for butterflies and Tam et al. (2011) for odonates.

2.3.4.3.2 Additional surveys of exuviae were conducted in habitats that were intended to provide mitigation and/or enhanced habitat for odonates. Surveys had been conducted from March to May.

2.4 Monitoring of Measures to Minimise Impacts of Construction and Operation of LVNP (including creation of compensatory wetland habitat) on the Ecological Sensitive Receivers on Long Valley

2.4.1 Monitoring of Measures to Minimise Disturbance to Waterbirds

2.4.1.1 Location of Transect Routes

2.4.1.1.1 The transect route for waterbirds monitoring in Long Valley followed the transect route adopted by HKBWS since 2005 (**Appendix A.2).**

2.4.1.2 Survey Period and Frequency

2.4.1.2.1 Monitoring surveys were undertaken on a weekly basis and additional twice-monthly night surveys were conducted from September 2019 to April 2020 to cover migration and wintering periods

2.4.1.3 Monitoring Parameters

2.4.1.3.1 Monitoring parameters followed **Section 2.1.3** of this Report.

2.4.1.4 Survey Requirements and Protocol

2.4.1.4.1 Avifauna monitoring in Long Valley followed the same methodology adopted by the regular HKBWS bird monitoring programme in order to obtain comparable results and complete coverage of the area in the shortest time possible.

2.4.2 Monitoring of Measures to Minimise Impacts to Aquatic Fauna

2.4.2.1 Location of the Monitoring Stations

2.4.2.1.1 As the habitats in Long Valley are dynamic, monitoring stations in Long Valley covered other different habitat types such as reed bed, shallow water habitat, wet agricultural land, stream, and fishpond as listed below and shown in **Appendix A.4**:

- MS 16. Stream
- MS 17. Reed beds
- MS 18. Wet agricultural land
- MS 19. Fishpond
- MS 20. Shallow water habitat

2.4.2.2 Survey Frequency and Period

2.4.2.2.1 Surveys were conducted monthly during the wet season period (i.e. July to October 2019 and April to June 2020).

2.4.2.3 Monitoring Parameters

2.4.2.3.1 Monitoring parameters followed **Section 2.2.3** of this Report.

2.4.2.4 Survey Requirements and Protocol

2.4.2.4.1 Survey requirements and protocol followed **Section 2.2.4** of this Report, as far as practicable.

2.4.3 Monitoring of Measures to Minimise Impacts on Ecologically Sensitive Habitats from Disturbance and Pollution

2.4.3.1 Location of Transect Routes

2.4.3.1.1 Transect route for ecological sensitive receivers (i.e. mammals, insects (butterflies and odonates), and herpetofauna) followed the transect route traversed for the waterbird monitoring.

2.4.3.2 Survey Frequency and Period

2.4.3.2.1 Monitoring surveys were undertaken on a monthly basis.

2.4.3.3 Monitoring Parameters

2.4.3.3.1 Species composition, relative abundance, and distribution of mammals, insects (butterflies and odonates) and herpetofauna observed were recorded and species of conservation significance were specified.

2.4.3.4 Survey Requirements and Protocol

2.4.3.4.1 Mammal Survey

For mammal survey in Long Valley, in addition to the survey methods described in **Section 2.3.4.1.1** of this Report, infra-red camera "traps" were also used to monitor secretive and crepuscular/nocturnal species. Use of camera traps ensured effective assessment of composition and abundance of mammal species occurring in this area. A set of 10 cameras with high sensitivity, large detection zone, and fast trigger speed were deployed covering in all major zones and habitats in Long Valley. The location of the camera traps is shown **in Appendix A.8.**

2.4.3.4.2 Herpetofauna Survey (Amphibians and Reptiles)

Survey methods for herpetofauna survey in Long Valley followed **Section 2.3.4.2.1** of this Report. Moreover, additional monthly night-time surveys from March to July (early wet season) were conducted and concentrated on recording the distinctive vocalizations of advertising males, for which the peak activity occurs during this season, especially after dusk and during or after rain.

2.4.3.4.3 Insect (Butterflies and Odonates)

Survey requirements and protocol for butterflies and odonates **followed Section 2.3.4.3** of this Report.

3 DETAILS OF INFLUENCING FACTORS

3.1 Potential Disturbance

3.1.1 Different anthropogenic activities or disturbances such as hook-and-line fishing, construction and infrastructure works, and vegetation management were noted in the vicinity of some transect routes during the survey activities. Hook-and-line fishing was observed along the transect routes in Ng Tung River throughout the survey duration. This passive fishing method may only pose minor disturbances to the birds and other wildlife utilizing this river channel as fishermen are mostly stationary throughout their fishing activities. Other anthropogenic activities such construction works (minor excavation) on the banks of Sheung Yue River along transect T3 in July 2019; and both infrastructure works (manual maintenance of grasscrete) and vegetation management (weeding) in the vicinity of Ng Tung River in December 2019 were also observed. However, these works were only temporary and were not observed during dawn and dusk when waterbirds utilizing the area are most active.

3.2 Weather Conditions

3.2.1 Wet season survey covered the months of July to October 2019 and April to June 2020 and dry season survey the months of November 2019 to March 2020. The average rainfall during wet season was 300 mm while during the dry period was 37 mm with the months of August 2019 (596 mm), May (352 mm) and June 2020 (397 mm) having high rainfall volumes. Heavy rainfall (**Table 3.1**), an important factor for the different fauna groups as brought about by red rainstorm, black rainstorm, and tropical cyclones during the monitoring period had also influenced these fauna communities to various extents. The influence could be in terms of the fauna's foraging efficiency and/or life stages (Boyle et al., 2020). Throughout the monitoring duration, a total of six tropical cyclones (MUN, WIPHA, BAILU, PODUL, KAJIKI and NURI) passed Hong Kong (Hong Kong Observatory, 2020).

Table 3.1: Dates with Red and Black Rainstorms; and Tropical Cyclones with Warnings Hoisted

Red Rainstorm	Black Rainstorm	Tropical Cyclones and Warnings Hoisted
31 Jul 2019	6 Jun 2020	2-3 Jul 2019 Tropical Cyclone MUN (Signal Number 1)
26 Aug 2019		30 Jul 2019 Tropical Cyclone WIPHA (Signal Number 1)
21 May 2020		30-31 Jul 2019 Tropical Cyclone WIPHA (Signal Number 3)
25 May 2020		31 Jul 2019 Tropical Cyclone WIPHA (Signal Number 8 NE)
30 May 2020		31 Jul Tropical Cyclone WIPHA (Signal Number 3)
6 Jun 2020		1 Aug 2019 Tropical Cyclone WIPHA (Signal Number 3)
7 Jun 2020		1-2 Aug 2019 Tropical Cyclone WIPHA (Signal Number 1)
		24-25 Aug 2019 Tropical Cyclone BAILU (Signal Number 1)
		28-29 Aug 2019 Tropical Cyclone PODUL (Signal Number 1)
		1 Sep 2019 Tropical Cyclone KAJIKI (Signal Number 1)
		1-2 Sep 2019 Tropical Cyclone KAJIKI (Signal Number 3)
		2-3 Sep 2019 Tropical Cyclone KAJIKI (Signal Number 1)

Red Rainstorm	Black Rainstorm	Tropical Cyclones and Warnings Hoisted
		12-13 Jun 2020 Tropical Cyclone NURI (Signal Number 1)
		13-14 Jun 2020 Tropical Cyclone NURI (Signal Number 3)
		14 Jun 2020 Tropical Cyclone NURI (Signal Number 1)

3.3 Site Conditions of Aquatic Fauna Monitoring Stations

3.3.1 Monitoring stations exhibited differences in water level, turbidity, flow velocity, and watercourse width. Site conditions ranged from being dried-up to those with deep water levels; clear to turbid water columns; stagnant ponds to fast flowing streams; and width of approximately 0.25 meters to a large pond. Differences in riparian vegetation composition, substratum type, and adjacent land use were also observed.

3.3.2 The aforementioned environmental factors may influence aquatic fauna communities to various extents, e.g. watercourses with pronounced flow have higher number of bottom-associated species, i.e. benthic fauna, than that in watercourses where the flow velocity is low. Moreover, the differences in flow velocity may determine which species would be able to survive depending on their adaptations such as presence of adhesive organs, specialized claw, etc. (Hussain and Pandit, 2012). In terms of substratum type, relatively coarse and strongly structured, stable substratum are attractive to benthic fauna because they represent sites of minimal disturbance during floods and help to define refugia from where recolonization can occur following floods (Rempel et al., 1999). Riparian vegetation, on the other hand, may influence large-scale inputs of nutrients while at the same time may hinder autotrophic production by shading (http://www.fao.org/3/t0537e/t0537e03.htm).

4 Baseline Data

4.1 Monitoring of Measures to Minimise Disturbance to Waterbirds in Ng Tung River, Sheung Yue River, and Shek Sheung River

4.1.1 Abundance

The monthly mean abundance of avifauna identified in the river channels ranged from 165 to 263 individuals (ind.). The highest monthly mean abundance was recorded in January 2020 and the lowest was in July 2019. Generally, higher monthly mean abundances were recorded during dry season surveys compared to wet season surveys (**Figure 4.1**). This observed seasonal variation in monthly mean abundances may be attributed to the passage of winter visitors, which was also shown by the relatively higher counts of Great Egret *Ardea alba,* Grey Heron *Ardea cinerea,* and Great Cormorant *Phalacrocorax carbo* during dry season surveys.

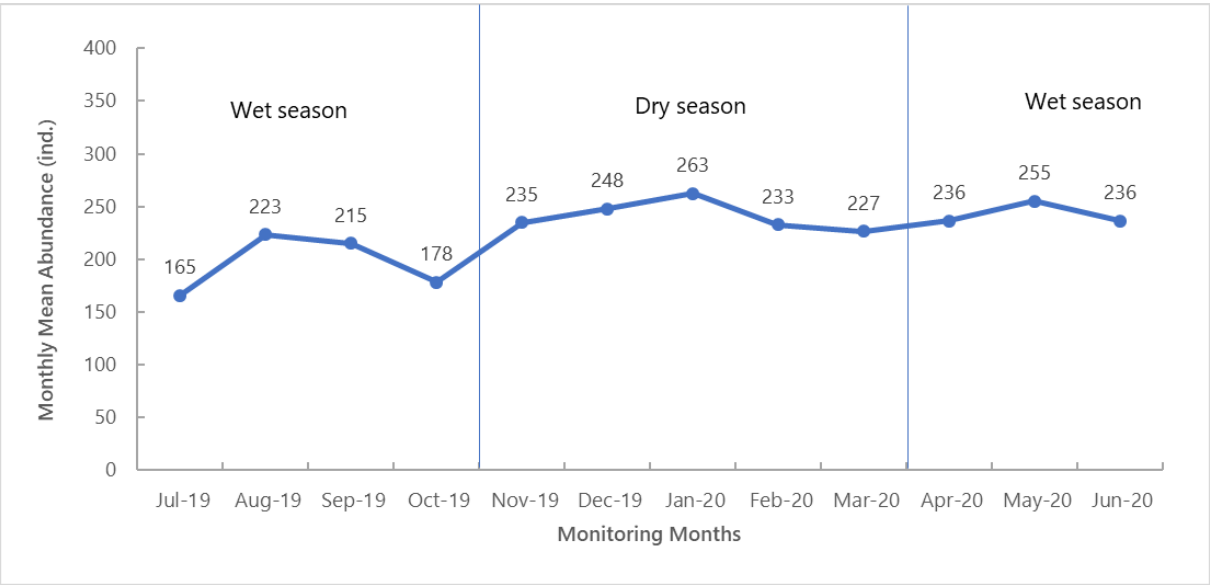

Figure 4.1: Temporal distribution of monthly mean abundance (ind.) of birds, July 2019 to June 2020

It should be noted that to the north of the river channels surveyed is the Ho Sheung Heung Egretry, where Little Egret *Egretta garzetta*, Chinese Pond Heron *Ardeola bacchus*, and Eastern Cattle Egret *Bubulcus coromandus* are nesting (Anon, 2018). Moreover, as reported in the EIA Report for the NENT NDA, Sheung Yue River was known to be an important foraging ground of waterbirds, especially of egrets breeding at the Ho Sheung Heung Egretry. This may have contributed to relatively high overall monthly mean abundance in transect T3 as shown in **Figure 4.2**.

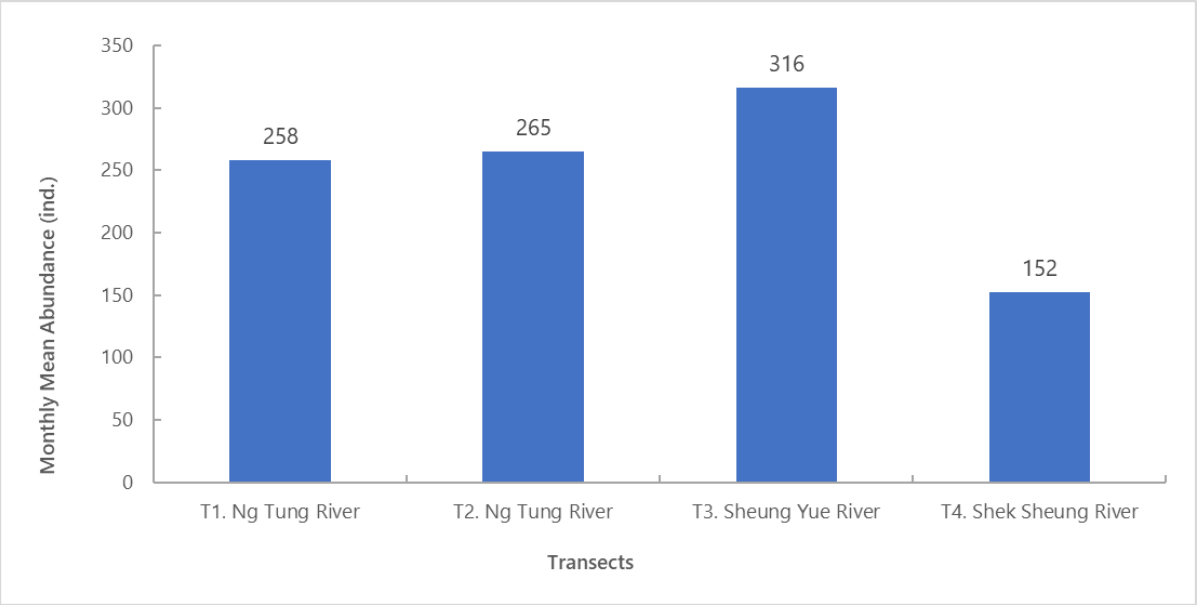

Figure 4.2: Spatial distribution of monthly mean abundance (ind.) of birds in the river channels, July 2019 to June 2020

4.1.2 Species Composition

A total of 64 species were identified in the river channels, of which 21 species are waterbirds and 43 are terrestrial species. The most abundant recorded waterbirds were the Little Egret (952 ind.), Chinese Pond Heron (775 ind.), and Great Egret (239 ind.). Waterbirds utilized the banks of the channels as foraging and roosting sites during high tide while the shallow water areas as foraging sites during low tide. Terrestrial species, on the other hand, were mostly composed of species that were recorded in open fields, urban areas, and woodlands such as Crested Myna *Acridotheres cristatellus* (1421 ind.), Red-whiskered Bulbul *Pycnonotus jocosus* (1339 ind.), and Spotted Dove *Spilopelia chinensis* (1126 ind.) **Figure 4.3** shows the avifaunal species composition by habitat composition.

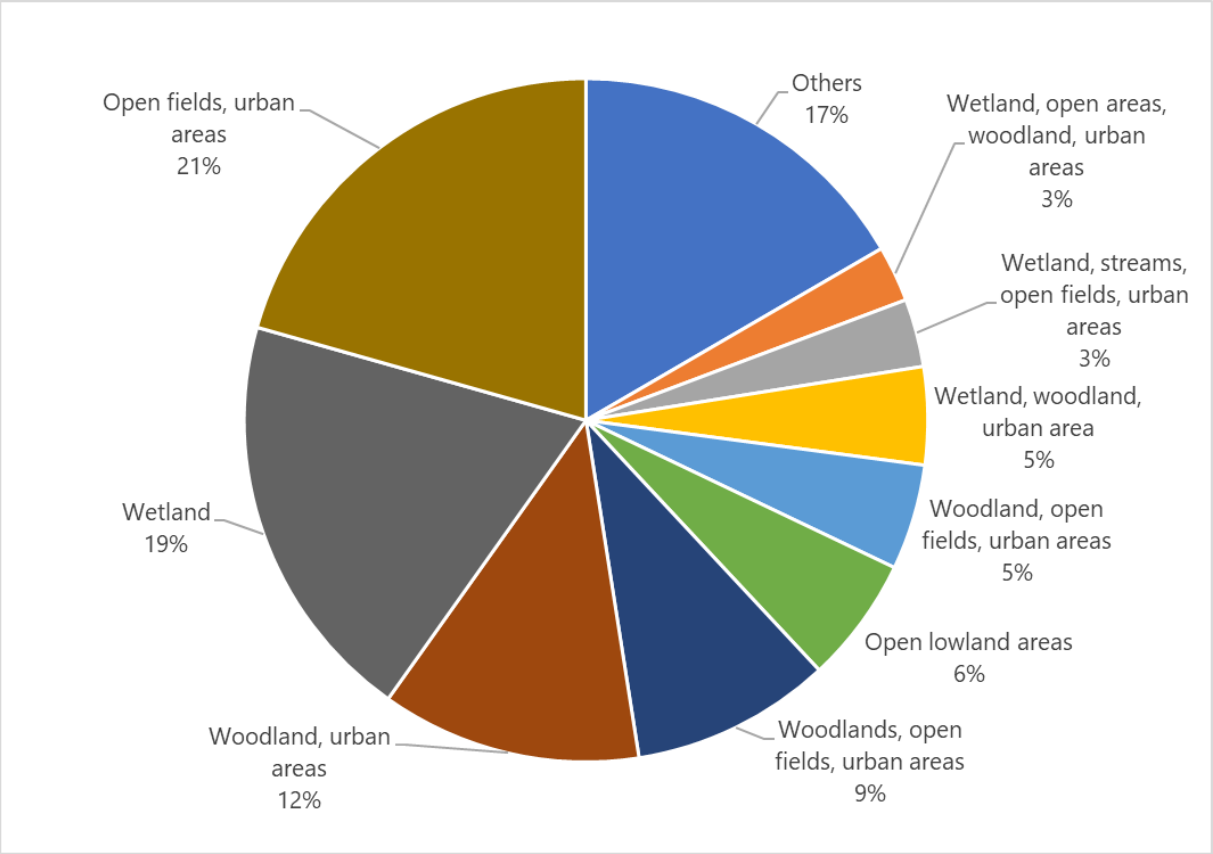

Figure 4.3: Avifaunal species composition by habitat

Of the 64 species identified, 59 species were recorded during the dry season survey and 54 species during wet season. For both seasons the most abundant birds were the Crested Myna, Red-whiskered Bulbul, and Spotted Dove. In terms of waterbirds, the most abundant for both seasons were Little Egret and Chinese Pond Heron.

4.1.2.1 Species of Conservation Significance

A total of 18 species of conservation significance were recorded, of which only one species, i.e. Greater Coucal *Centropus sinensis*, is not classified as waterbirds. A total of 17 species of conservation significance were recorded during dry season and 13 species during wet season. Similar with the temporal distribution of the monthly mean abundance, more number species of conservation significance were recorded during dry season surveys compared to wet season surveys (**Figure 4.4.**), which may be attributed to the increasing number of winter visitors during autumn and winter.

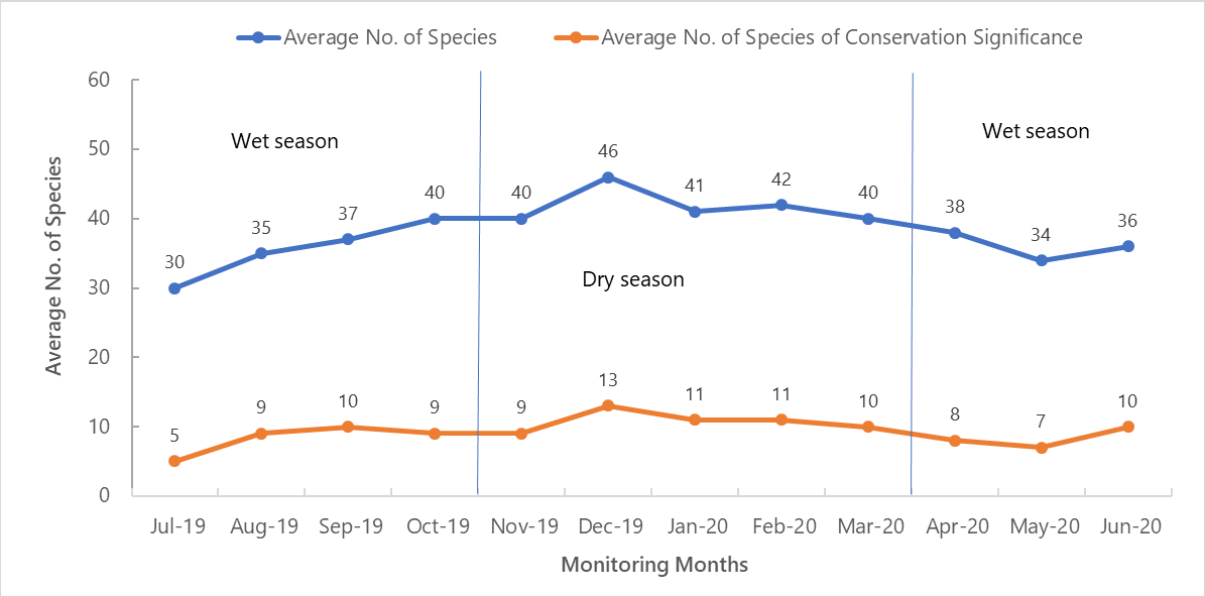

Figure 4.4: Average no. of species of conservation significance, July 2019 to June 2020

4.1.3 Summary

Avifauna species recorded during waterbirds monitoring in Ng Tung River, Sheung Yue River, and Shek Sheung River are presented in **Appendix B.1.1** and the summary of findings are shown in **Table 4.1** and **Table 4.2.**

Table 4.1: Summary of findings for monitoring of measures to minimise disturbance to waterbirds in Ng Tung River, Sheung Yue River, and Shek Sheung River

Abundance (Total)	Dry Season (Average)	Wet Season (Average)
11,897	Nov-19 (235) Dec-19 (248) Jan-20 (263) Feb-20 (233) Mar-20 (227)	Jul-19 (165) Aug-19 (223) Sep-19 (215) Oct-19 (178) Apr-20 (236) May-20 (255) Jun-20 (236)

Table 4.2: Summary of findings for monitoring of measures to minimise disturbance to waterbirds in Ng Tung River, Sheung Yue River, and Shek Sheung River

	Total	Dry Season (Average)	Wet Season (Average)
Species Richness	64	Nov-19 (40) Dec-19 (46) Jan-20 (41) Feb-20 (42) Mar-20 (40)	Jul-19 (30) Aug-19 (35) Sep-19 (37) Oct-19 (40) Apr-20 (38) May-20 (34) Jun-20 (36)

	Total	Dry Season (Average)	Wet Season (Average)
Most Common Species	Crested Myna (1421 ind.)	Nov-19 (31 ind.) Dec-19 (21 ind.) Jan-20 (29 ind.) Feb-20 (25 ind.) Mar-20 (28 ind.)	Jul-19 (22 ind.) Aug-19 (27 ind.) Sep-19 (32 ind.) Oct-19 (22 ind.) Apr-20 (29 ind.) May-20 (30 ind.) Jun-20 (29 ind.)
Most Common Waterbird Species	Little Egret (952 ind.)	Nov-19 (14 ind.) Dec-19 (23 ind.) Jan-20 (20 ind.) Feb-20 (23 ind.) Mar-20 (20 ind.)	Jul-19 (14 ind.) Aug-19 (17 ind.) Sep-19 (17 ind.) Oct-19 (13 ind.) Apr-20 (20 ind.) May-20 (17 ind.) Jun-20 (19 ind.)
Most Common Species of Conservation Significance			

4.2 Monitoring of Measures to Minimise Impacts to Aquatic Fauna in Ma Tso Lung Stream and Siu Hang San Tsuen Stream

4.2.1 Macroinvertebrate

4.2.1.1 Abundance

Species of macroinvertebrate observed was reported in terms of relative abundance. More "+" symbols indicate relatively higher number of individuals of a species (**Appendix B.2.1** and **Appendix B.2.2**). Relative abundances of macroinvertebrates were observed to be higher in Stations MS_08, MS_06, MS_07, and MS_04. The most common species in Station MS_08 were the snails, *Sinotaia quadrata*, *Pomacea canaliculata,* and *Bellamya* sp. which mostly graze on macrophytes, epiphytic vegetation, and algal covers/phytobenthos, food sources that are highly available in this station. The high abundances of these snails might also be attributed to their high reproductive potential (Hayes et. al., 2008). Community assemblage in both Stations MS_06 and MS_04, on the other hand, were dominated by the Water Strider *Metrocoris* sp.. Water striders were frequently observed beneath the overhanging riparian vegetation possibly preying on insects present in the lower vegetation layer that may fell to the water surface (Olejniczak et. al., 2007).

4.2.1.2 Species Composition

A total of 56 freshwater macroinvertebrate species was recorded, of which, 19 species were native to Hong Kong. Station MS_06 supported the highest number (28) of species, followed by Station MS_08 with 25 species; and both Station MS_04 and MS_07, each with 24 species. The relatively higher number of species in these stations might be attributed to their habitat complexity shaped by the substratum type and presence of plant litter packs. The sandy to cobble substratum could retain more coarse particulate organic matter and microalgae that are used as food sources by the macroinvertebrate community (Jun et al., 2011) and the

presence of riparian vegetation could contribute to the litter packets (Buendia et. al., 2011) in the substratum that could enhance microhabitats for the macroinvertebrate communities.

4.2.1.2.1 Species of Conservation Significance

No macroinvertebrate species of conservation significance was recorded.

4.2.2 Fish

4.2.2.1 Abundance

Species of fish observed was reported in terms of relative abundance. More "+" symbols indicate relatively higher number of individuals of a species (**Appendix B.3.1** and **Appendix B.3.2**). Relative abundance of fish was observed to be generally higher in Station MS_10. Station MS_10 is a natural watercourse with high numbers of Nile Tilapia *Oreochromis niloticus* and Red-belly Tilapia *Coptodon zillii*. Nile Tilapia was the most abundant species in the community assemblage throughout the survey period. Tilapia species are one of the most prolific species grown in aquaculture and their abundance during the survey might be attributed to the habitat type and profuse food resources such as periphyton, aquatic plants, small invertebrates and detritus (FAO, 2007).

4.2.2.2 Species Composition

A total of 15 fish species was recorded, of which seven were native to Hong Kong. Station MS_13 supported the highest number of species (eight); followed by Stations MS_04 and MS_06, each with seven species. The relatively high taxonomic composition in these stations could be due to the abundance of food items and habitat complexity.

4.2.2.2.1 Species of Conservation Significance

A total of four species of conservation significance was recorded. These include the Common Carp *Cyprinus carpio* and Mozambique Tilapia *O. mossambicus* both considered with Vulnerable status by IUCN; the Predaceous Chub *Parazacco spilurus* (Vulnerable by CRDB); and Rose Bitterling *Rhodeus ocellatus* as considered to be of Local Concern by Fellowes et. al (2002). However, these species are still found in other areas aside from that of the monitoring stations such that the Common Carp still occurs in many reservoirs and cultivated in fishponds as food fish; the Mozambique Tilapia, an exotic species, being widespread in freshwater ponds, ditches, rivers and reservoirs and also cultivated in some local fish farms. Additionally, the Predaceous Chub still occurs in most unpolluted hill streams in both upper and lower courses; the Cyprinid as also present in reservoir catchments on Hong Kong Island, Tuen Mun and Tai Po; and finally the Rose Bitterling as still recorded in localities of New Territories and a reservoir in Sha Tin (Hong Kong Biodiversity Database, 2020).

4.3 Monitoring of Measures to Minimise Impacts on Ecologically Sensitive Habitats from Disturbance and Pollution

4.3.1 Mammal

4.3.1.1 Abundance

Species of mammal observed was reported in terms of relative abundance. More "+" symbols indicate relatively higher number of individuals of a species (**Appendix B.4.1**). Relative abundances of mammals were observed to be generally high in almost all transects (i.e. Transects T1, T3, T4, and T5). Commonly observed mammals in these transects were Domestic Dog *Canis lupus familiaris* and Domestic Cat *Felis catus* as they were abundant and ubiquitous due to their close association with humans, i.e. domesticated as pets. Moreover, Short-nosed Fruit Bat *Cynopterus sphinx,* a very widely distributed species in countryside areas (Hong Kong Biodiversity Database, 2020) and a very common species under protection of Wild Animals Protection Ordinance (Cap.170), was also commonly recorded.

4.3.1.2 Species Composition

A total of seven mammal species was recorded with the highest number of species recorded in Transect T1, which also showed high relative abundance. Relatively high abundance and species richness in this transect might be attributed to the diversity of the habitat types covered by this transect, i.e. Ma Tso Lung riparian zone and associated wetland habitats.

4.3.1.2.1 Species of Conservation Significance

Two species of conservation significance under the Wild Animals Protection Ordinance (Cap. 170) were recorded in the transects which include the Pallas's Squirrel *Callosciurus erythraeus* and Short-nosed Fruit Bat. The Pallas's Squirrel that is fairly distributed throughout Hong Kong, was particularly observed in Transects T1 and T3 while the Short-nosed Fruit Bat was recorded in all of the transects.

4.3.2 Herpetofauna

4.3.2.1 Abundance

Species of herpetofauna observed was reported in terms of relative abundance. More "+" symbols indicate relatively higher number of individuals of a species (**Appendix B.5.1**). Relative abundance of herpetofauna were observed to be generally high in almost all transects. The Asian Common Toad *Duttaphrynus melanostictus* and Brown Tree Frog *Polypedates megacephalus* were the most abundant recorded amphibians. The abundance of Asian Common Toad could be due to its opportunistic breeding habit which allows it to utilize various permanent and temporary bodies of water as well as cisterns and gutters for reproduction (Saidapur and Girish 2001). Additionally, being a dietary generalist, it readily feed on a variety of invertebrates (Döring et al. 2017). The reptiles, on the other hand, were dominated by the Chinese Gecko *Gekko chinensis*. Its abundance in the area could be due to the abundance of its food items including various insects such as flies, mosquitoes and tiny moths.

Differences in taxa abundance were noted in both the amphibian and reptile communities between the wet and dry seasons such that during dry season lower abundances were recorded compared to wet season.

4.3.2.2 Species Composition

A total of 17 herpetofauna species (seven amphibian and 10 reptile species) was recorded, of which 13 species are native to Hong Kong. Transects T1 and T6 have the highest number of amphibian species, where all seven species were recorded. In terms of reptile species, Transect T1 have nine species and T6 with seven species.

Differences in taxa composition were noted in the community between the wet and dry seasons. During the dry season, a total of five amphibian species was recorded, four species lower compared to the wet season period with nine noted species. The low number of species recorded during the dry season could be due to their sheltering strategies to avoid desiccation during that period (Seebacher and Alford, 2002). In addition to this, their reproduction is also restricted during the dry season due to a decrease in the number of water bodies available for their egg deposition (Bertolucci and Rodriguez, 2002). Similar condition was also observed for the reptile community in the monitoring stations such that only nine species were noted during the dry period compared to the thirteen species present during the wet season which could be due to their most active period only at the wet season.

Moreover, additional night-time monitoring activities recorded that the Asian Common Toad was the most abundant species. Several amphibian species such as the Paddy Frog *Fejervarya limnocharis*, Asiatic Painted Frog, Brown Tree Frog, and Gunther's Frog *Hylarana guentheri* were also visually observed or their mating calls heard.

4.3.2.2.1 Species of Conservation Significance

A total of three herpetofauna species (one amphibian and two reptile species) of conservation significance was recorded. The amphibian species of conservation significance is the Spotted Narrow-mouthed Frog *Kalophrynus interlineatus* (Near Threatened in Red List of China's Vertebrates), which has a wide distribution from low to moderate altitudes in Northern and Central New Territories. On the other hand, the two reptile species of conservation significance included the Common Rat Snake *Ptyas mucosus* (Cap. 586 Protection of Endangered Species of Animals and Plants Ordinance; Endangered in China Red Data Book; and Potential Regional Concern by Fellowes et. al., 2002) and the Four-clawed Gecko *Gehyra mutilata* (Vulnerable in Red List of China's Vertebrates).

4.3.3 Insects (Butterflies and Odonates)

4.3.3.1 Abundance

Species of butterflies and odonates observed was reported in terms of relative abundance. More "+" symbols indicate relatively higher presence of individuals of a species (**Appendix B.6.1**). Relative abundance of butterflies and odonates were observed to be high in Transects

T1 and T3. The most abundant butterfly was the Common Indian Crow *Euploea core amymone*. The high abundance of this species could be the result of its lesser patability due to alkaloids in its body. Hence, it has a lesser risk of being predated. The odonates, on the other hand, was dominated by the Wandering Glider *Pantala flavescens*. Its high abundance could be due to its increased potential to reproduce throughout much of the year (Chapman et. al., 2015).

Differences in taxa abundance were noted in both the butterfly and odonate communities between the wet and dry seasons as the dry season was noted with lower abundance compared to the wet season for both groups.

4.3.3.2 Species Composition

A total of 48 butterfly species and 24 odonate species were recorded. Transect T1 had the highest number (37 butterfly species and 22 odonate species) of species supported. In terms of seasonal variations, the dry season was observed with a lower butterfly total number of taxa (32 species) present in the different monitoring routes as compared to the wet season with 53 recorded species. The difference could be due to the timing and availability of rainfall (more often during the wet season). This factor then exerts a major influence on host plant growth and production which in turn provide butterfly larvae with more readily available food item (Pollard, 1988) for growth and development during wet period. Furthermore, the taxa diversity (17 species) of the odonate community during the dry season was also lower compared to the wet season (28 recorded species). The higher rainfall volume during the wet season may have provided more odonata species with favourable habitats for reproduction at the different monitoring routes.

4.3.3.2.1 Species of Conservation Significance

Two butterfly species of conservation significance were recorded throughout the period. These include the Danaid Eggfly *Hypolimnas misippus* and Yellow Rajah *Charaxes marmax* (both of Local concern by Fellowes et. at., 2002). The Danaid Eggfly was observed in Transect T1. This species is also found in other areas such as Ngau Ngak Shan, Lung Kwu Tan, Hong Kong Wetland Park, Mount Parker, Cloudy Hill and Lin Ma Hang. The Yellow Rajah, on the other hand, was present in all transects except in Transect T5. This species is also found in other areas such as Cloudy Hill, Ma On Shan, Shing Mun, Yung Shue O, Fung Yuen, and Ngong Ping.

4.4 Monitoring of Measures to Minimise Impacts of Construction and Operation of LVNP (including creation of compensatory wetland habitat) on the Ecological Sensitive Receivers on Long Valley

4.4.1 Monitoring of Measures to Minimise Disturbance to Waterbirds

4.4.1.1 Abundance

The monthly mean abundance of avifauna identified in Long Valley ranged from 408 ind. to 901 ind. The highest monthly mean abundance was recorded in December 2019 and the lowest was in May 2020. Generally, higher monthly mean abundances were recorded during dry

season surveys compared to wet season surveys (**Figure 4.5**). This observed seasonal variation in monthly mean abundances may be attributed to the passage of winter visitors, which arrive in autumn and leave in spring.

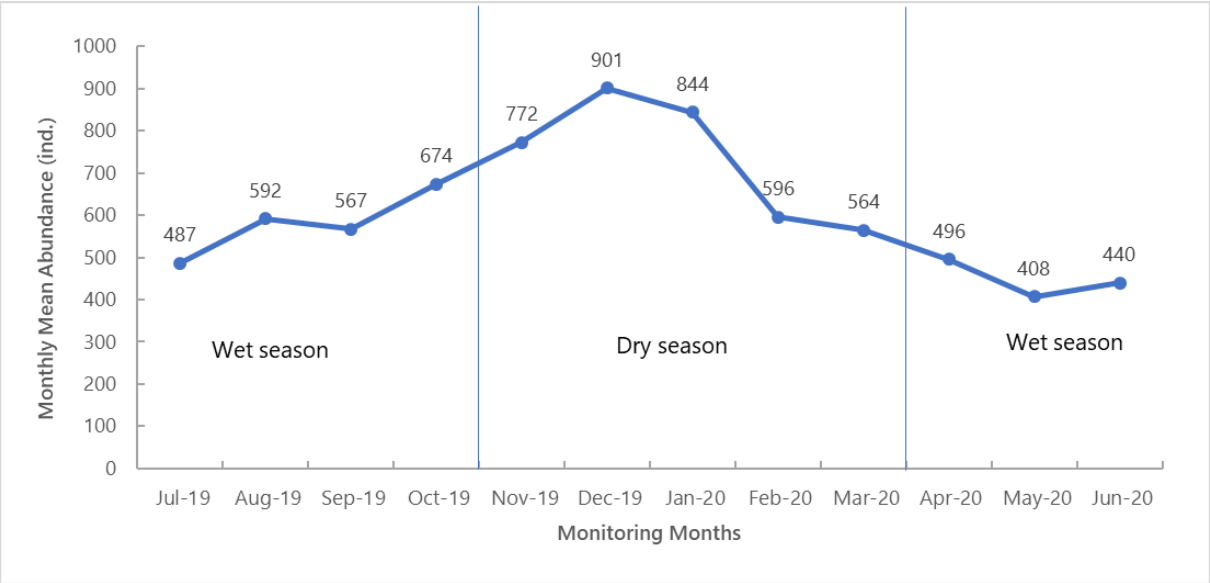

Figure 4.5: Temporal distribution of monthly mean abundance (ind.) of birds in Long Valley, July 2019 to June 2020

Transect routes located in Long Valley covered diverse habitat types including wet agricultural land (WAL), dry agricultural land (DAL), shallow water habitat (SWH), pond (P), reed beds, among others. The highest monthly mean abundance was recorded in T5-WAL and T5-DAL (**Figure 4.6**). The relatively high monthly mean abundance in these stations was due to the high abundance of the Scaly-breasted Munia *Lonchura punctulata* (**Appendix C, Photo 21**) with a total count of 7307 ind.. Scaly-breasted Munia is a Hong Kong resident species and inhabits open fields/countryside. The agricultural lands in Long Valley include open rice fields which could have provided this species with high supply of grains as a food source (Long, 1981).

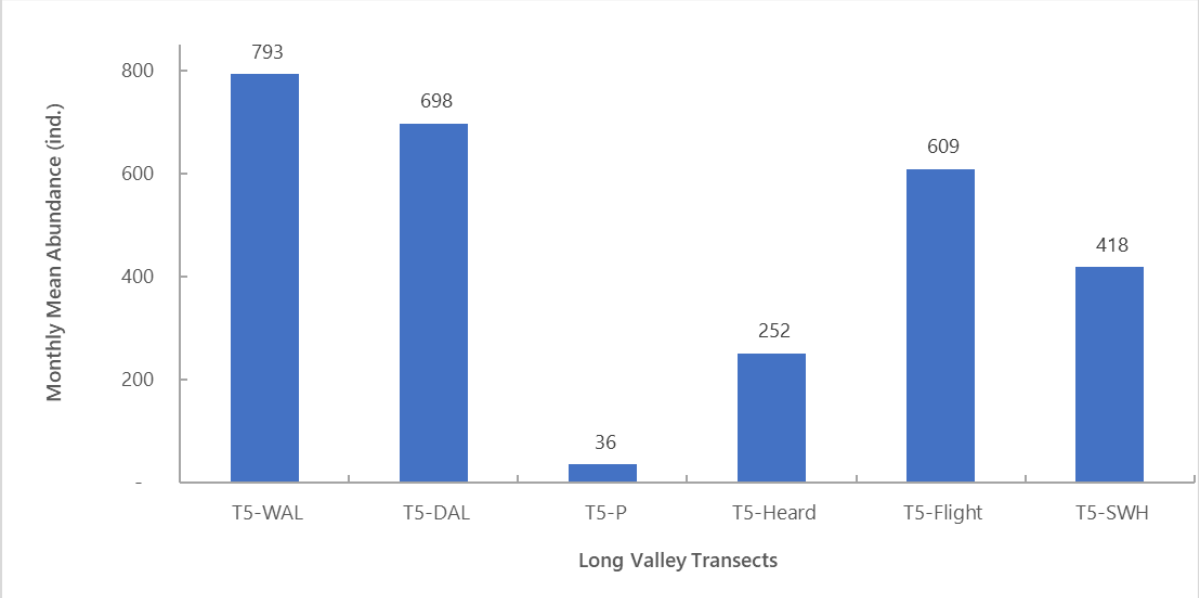

Figure 4.6: Spatial distribution of monthly mean abundance (ind.) of birds in Long Valley, July 2019 to June 2020

4.4.1.2 Species Composition

A total of 98 species were identified in Long Valley, of which 32 species are waterbirds and 66 are terrestrial species. The most abundant waterbirds were Black-winged Stilt *Himantopus himantopus* (1295 ind.), Chinese Pond Heron (1116 ind.), and Wood Sandpiper *Tringa glareola* (1091 ind.). Terrestrial species, on the other hand, were mostly composed of species that were recorded in open grassy areas, open lowland areas, and urban areas such as Scaly-breasted Munia (7037 ind.), Crested Myna (3582 ind.), and Black-collared Starling *Gracupica nigricollis* (2344 ind.). **Figure 4.7** shows the avifaunal species composition by habitat composition.

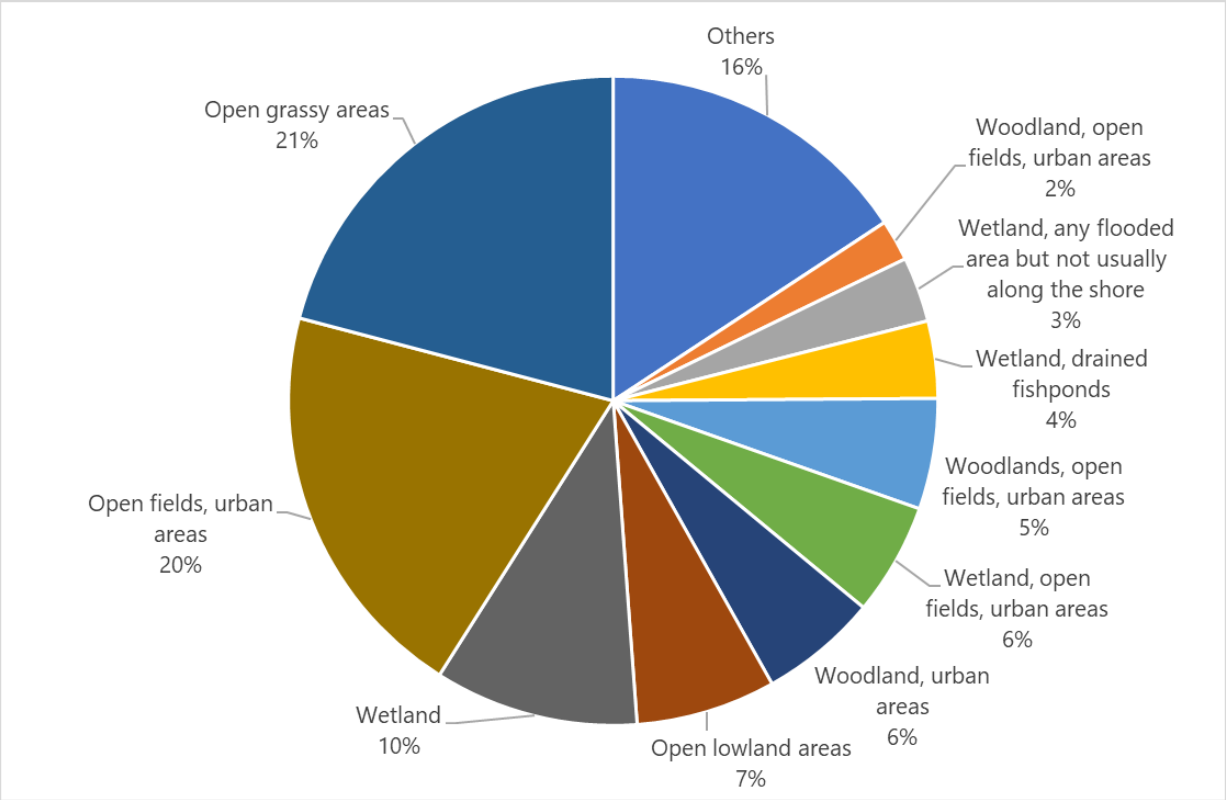

Figure 4.7: Avifaunal species composition by habitat, Long Valley

Of the 98 species identified, 81 species were recorded during the dry season survey and 84 species during wet season. For both seasons the most abundant birds were the Scaly-breasted Munia, Crested Myna, and the Black-collared Starling. In terms of waterbirds, the most abundant for both seasons were Black-winged Stilt and Chinese Pond Heron.

4.4.1.3 Species of Conservation Significance

A total of 39 species of conservation significance were recorded, of which 26 species were classified as waterbirds. A total of 30 species of conservation significance were recorded during dry season and same number of species was recorded during wet season. Similar with the temporal distribution of the monthly mean abundance, more number species of conservation significance were recorded during dry season surveys compared to wet season surveys (**Figure 4.8.**), which may be attributed to the increasing number of winter visitors during autumn and winter.

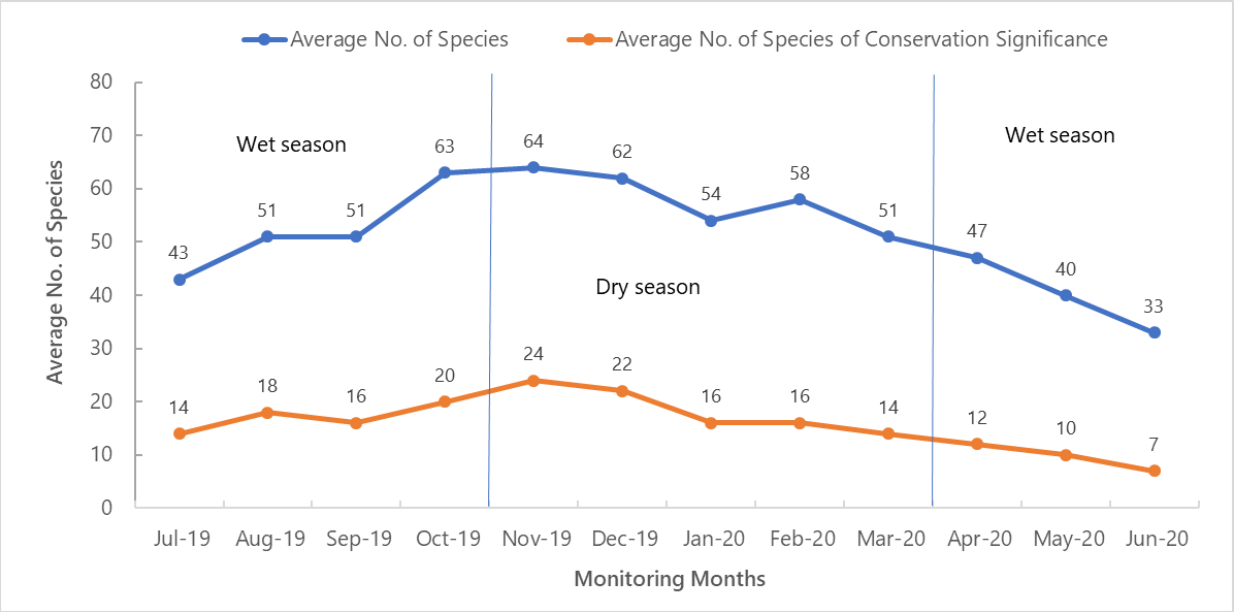

Figure 4.8: Average no. of species of conservation significance, July 2019 to June 2020

4.4.2 Monitoring of Measures to Minimise Impacts to Aquatic Fauna

4.4.2.1 Macroinvertebrates

4.4.2.1.1 Abundance

Species of macroinvertebrate observed was reported in terms of relative abundance. More "+" symbols indicate relatively higher number of individuals of a species (**Appendix B.2.3**). Relative abundances of macroinvertebrates were observed to be relatively higher in Station MS_16, a natural stream in Long Valley with fast flowing clear water, sandy to cobble substratum, and relatively deep-water level.

4.4.2.1.2 Species Composition

A total of 23 freshwater macroinvertebrate species was recorded, of which, 3 species were native to Hong Kong. The most commonly observed species were the snails S. quadrata, *P. canaliculata*, and *Bellamya* sp. and water striders *Metrocoris* sp.. These species were also commonly recorded in Ma Tso Lung and Siu Hang San Tsuen streams.

Station MS_16 supported the highest number of species with a total of 18 species recorded. The relatively higher number of species in this station may be attributed to the natural complexity of the habitat shaped by the substratum type and presence of plant litter packs. The sandy to cobble substratum could retain more coarse particulate organic matter and microalgae that are used as food sources by the macroinvertebrate community (Jun et al., 2011) and the presence of riparian vegetation could contribute to the litter packets (Buendia et. al., 2011) in the substratum that could enhance microhabitats for the macroinvertebrate communities.

4.4.2.1.3 Species of Conservation Importance

No macroinvertebrate species of conservation significance was recorded.

4.4.2.2 Fish

4.4.2.2.1 Abundance

Species of fish observed was reported in terms of relative abundance. More "+" symbols indicate relatively higher number of individuals of a species (**Appendix B.3.3**). Relative abundance of fish was observed to be generally higher in Station MS_19. Station MS_19 is an aquaculture pond with high numbers of Koi *Cyprinus rubrofuscus*, Mozambique Tilapia, *Oreochromis mossambicus*, Nile Tilapia, and Mosquito Fish *Gambusia affinis*.

4.4.2.2.2 Species Composition

A total of seven fish species was recorded, of which two were native to Hong Kong. Station MS_16 supported the highest number of species. Station MS_16 is natural stream with fast flowing clear water, sandy to cobble substratum, and relatively deep water level which could have provided a naturally complex habitat for fish communities.

4.4.2.2.3 Species of Conservation Importance

One (1) species of conservation significance was recorded in Long Valley, the Mozambique Tilapia *O. mossambicus*, which was categorized as Vulnerable by IUCN. The Mozambique Tilapia is an exotic species, being widespread in freshwater ponds, ditches, rivers, and reservoirs and also cultivated in some local fish farms.

4.4.3 Monitoring of Measures to Minimise Impacts on Ecologically Sensitive Habitats from Disturbance and Pollution

4.4.3.1 Mammals

Species of mammal observed was reported in terms of relative abundance. More "+" symbols indicate relatively higher number of individuals of a species (**Appendix B.4.2**). A total of eight mammal species was recorded in Long Valley with the Domestic Dog, Domestic Cat, and Domestic Ox as the commonly observed species. These species were relatively abundant and ubiquitous due to their close association with humans. In terms of species of conservation significance, three species are protected under the Wild Animals Protection Ordinance (Cap. 170) which include the Short-nosed Fruit Bat, Pallas's Squirrel, and Small Asian Mongoose *Herpestes javanicus*.

4.4.3.2 Herpetofauna

Species of herpetofauna observed was reported in terms of relative abundance. More "+" symbols indicate relatively higher number of individuals of a species (**Appendix B.5.2**). A total of 20 species (9 amphibians and 11 reptiles) were recorded in Long Valley, of which 15 species were native to Hong Kong. The Asian Common Toad, Asiatic Painted Frog *Kaloula pulchra*

pulchra, Brown Tree Frog *Polypedates megacephalus*, Chinese Bullfrog *Hoplobatrachus rugulosus*, Greenhouse Frog *Eleutherodactylus planirostris,* Gunther's Frog *Hylarana guentheri* and Paddy Frog *Fejervarya limnocharis* had high abundances. High abundances of these species could be due to suitable reproduction area of the wetland and food items readily available in it. The reptiles, on the other hand, were dominated by the Chinese Gecko and Bowring's Gecko. The abundance of these herpetofauna species could be due to the abundance of their food items in the area such as mosquitoes and tiny moths.

A total of five herpetofauna species (two amphibian and three reptile species) with conservation significance was recorded. Amphibian species include the Chinese Bullfrog *Hoplobatrachus rugulosus* (Class II Protected Species in China; and Potential Regional Concern by Fellowes et. al., 2002) (**Appendix C, Photo 24**) and the Spotted Narrow-mouthed Frog (Near Threatened in Red List of China's Vertebrates). The Chinese Bullfrog is widely distributed in Lantau Island and New Territories while the Spotted Narrow-mouthed Frog has also wide distribution from low to moderate altitudes in Northern and Central New Territories. On the other hand, the three reptile species of conservation significance include the Common Rat Snake (Cap. 586 Protection of Endangered Species of Animals and Plants Ordinance; Endangered in China Red Data Book; and Potential Regional Concern by Fellowes et. al., 2002); the Four-clawed Gecko (Vulnerable in Red List of China's Vertebrates); and the Many-banded Krait *Bungarus multicinctus* (Vulnerable in China Red Data Book; Potential Regional Concern by Fellowes et. al., 2002; and Endangered in Red List of China's Vertebrates) (**Appendix C, Photo** 25) were observed.

Differences in taxa abundance and composition were noted in both the amphibian and reptile communities between the wet and dry seasons such that during dry season lower abundances and number of species were recorded compared to wet season. Moreover, additional night-time monitoring activities recorded that the Asian Common Toad was the most abundant species. Several amphibian species such as the Paddy Frog, Asiatic Painted Frog, Brown Tree Frog, and Gunther's Frog were also visually observed or their mating calls heard.

4.4.3.3 Insects (Butterflies and Odonates)

Species of butterflies and odonates observed were reported in terms of relative abundance. More "+" symbols indicate relatively higher presence of individuals of a species (**Appendix B.6.2**). A total of 26 butterfly species were recorded in Long Valley. The most commonly observed butterfly was the Indian Cabbage White. Its abundance could be due to the abundance of its larval food source (plants of the cabbage family) that were cultivated at Long Valley. The odonates, on the other hand, was composed of 24 species dominated by the Wandering Glider, a species with wide distribution in all of wetland habitats throughout Hong Kong (Hong Kong Biodiversity Database, 2020). Two butterfly and one odonate species of conservation significance were recorded in Long Valley. The butterflies Danaid Eggfly and Yellow Rajah and the odonate Blue Chaser *Potamarcha congener* were of Local concern by Fellowes et. at., 2002.

Differences in taxa abundance and composition were noted in both the butterfly and odonate communities between the wet and dry seasons as the dry season was noted with lower abundance and number of taxa compared to the wet season for both groups. The difference could be due to the timing and availability of rainfall (more often during the wet season). This factor then exerts a major influence on host plant growth and production which in turn provide butterfly larvae with more readily available food item (Pollard, 1988) for growth and development during wet period. Higher rainfall volume during the wet season may have provided more odonata species with favourable habitats for reproduction at the different monitoring routes.

5 Determination of the Action and Limit Levels

Action and limit levels were determined considering different factors, including taxa/species diversity, abundance, conservation status and seasonality as required in the EM&A Manual. Local distributional ranges of different species were also considered in setting the action and limit levels that trigger consequential responses to significant fauna declines.

5.1 Monitoring of Impacts on Long Valley and on Fauna in Long Valley

Ecological monitoring of fauna numbers and their distribution during the construction and operation phases of Long Valley Nature Park (LVNP) shall be undertaken in all areas (including the LVNP itself) where impacts on habitats and fauna may arise as a consequence of the project as required by **Section 14.3.2.1 of the EM&A Manual.**

Measures to respond to decreases in numbers of avifauna in the LVNP and the Action and Limit Levels to trigger these measures at the construction phase are detailed in **Table 5.1.** For the operation phase, given a high degree of flexibility will be required for future management interventions to address specific issues as and when they arise, it may not be appropriate to develop detailed guidelines for management responses at this stage according to **Section 9.4.12 of the HCMP for the LVNP**.

Table 5.1: Action and Limit Levels and responses for avifauna monitoring and general site inspection in the LVNP during construction phase

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent (PP)
Avifauna Monitoring					
Action Level					
Reduction in monthly mean abundance of birds compared to the corresponding month of the baseline survey by 30%. Reduction in monthly mean abundance of *Ardeola bacchus*[1] compared to the corresponding month of the baseline survey by 30%.	Action Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential source(s) of impact; • Immediately inform IEC, Contractor and PP; • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.	• Check monitoring data, analysis and investigation by ET; • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	• Confirm receipt of notification of the exceedance of Action Level in writing; and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection/audit frequency proposed by ET with IEC and the Contractor; and • Supervise the instigated further mitigation measure(s).
Limit Level					

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent (PP)
Reduction in monthly mean abundance of birds compared to the corresponding month of the baseline survey by 50%. Reduction in monthly mean abundance of *Ardeola bacchus* compared to the corresponding month of the baseline survey by 50%.	Limit Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential source(s) of impact; • Immediately inform IEC, Contractor, and PP; • Discuss with the PP, IEC, and Contractor on the need for further mitigation measure(s); • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.	• Check monitoring data, analysis and investigation by ET; • Discuss with the PP, ET, and Contractor on the need for further mitigation measure(s); • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; • Review the effectiveness of the further mitigation measure(s) proposed and implemented by Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	• Confirm receipt of notification of the exceedance of Limit Level in writing; • Propose and implement the remedial measures(s) to mitigate the impact(s) identified; and • Discuss with the PP, IEC, and ET on the need of further mitigation measure(s), then propose and implement the further mitigation measure(s)..	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection and audit frequency proposed by ET with IEC and the Contractor; • Discuss and confirm the further mitigation measure(s) required with the ET, IEC, and Contractor; and • Supervise the instigated further mitigation measure(s).
General Site Inspections					
Action Level					

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent (PP)
Activity likely to cause unacceptable environmental disturbance or damage noted in LVNP.	Action Level exceeded	• Investigate if the activity identified is related to the construction works; • Immediately inform IEC, Contractor, and PP; • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) of the activity identified; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.	• Check the investigation and findings of the ET; • Review the remedial measure(s) proposed by the Contractor, and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	• Confirm receipt of notification of the exceedance of Action Level in writing; and • Propose and implement the remedial measure(s) to mitigate the impact(s) of the activity identified.	• Check the investigation and findings of the ET and IEC; • Discuss the need for increased site inspection and audit frequency proposed by ET with IEC and the Contractor; and • Supervise the instigated further mitigation measure(s).
Limit Level					
Activity causing unacceptable environmental disturbance or damage noted in LVNP.	Limit Level exceeded	• Investigate if the activity identified is related to the construction works; • Immediately inform IEC, Contractor and Project Proponent; • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) of the activity identified;	• Check the investigation and findings of the ET; • Discuss with the PP, ET, and Contractor on the on the need for further mitigation measure(s); • Review the remedial measure(s) proposed by the Contractor, and advise the PP accordingly;	• Confirm receipt of notification of the exceedance of Limit Level in writing; • Propose and implement the remedial measure(s) to mitigate the impact(s) of the activity identified; and • Discuss with the PP, IEC, and ET on the need of further	• Check the investigation and findings of the ET and IEC; • Discuss the need for increased site inspection and audit frequency proposed by ET with IEC and the Contractor; • Discuss and confirm the further mitigation measure(s) required

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent (PP)
		• Discuss with the PP, IEC, and Contractor on the need for further mitigation measure(s); and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.	• Review the effectiveness of the further mitigation measure(s) proposed and implemented by Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	mitigation measure(s), then propose and implement the further mitigation measure(s).	with the ET, IEC, and Contractor; and • Supervise the instigated further mitigation measure(s).
Note: 1. *Ardeola bacchus* was the most abundant waterbird species recorded in Long Valley during baseline survey and was strictly associated with wetland habitats.					

5.2 Monitoring of Measures to Minimise Disturbance to Waterbirds in Ng Tung River, Sheung Yue River, and Shek Sheung River

Measures to respond to decreases in numbers of large waterbirds using the river channels and the Action and Limit Levels to trigger these measures are detailed in **Table 5.2**.

Table 5.2: Action and Limit Levels and responses to evidence of disturbance to large waterbirds using Ng Tung River, Sheung Yue River, and Shek Sheung Rivers

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
Construction Phase					
Action Level					
Reduction in monthly mean abundance of birds compared to the corresponding month of the baseline survey by 30% Reduction in monthly mean abundance of *Ardeola bacchus*[1] compared to the corresponding month of the baseline survey by 30%	Action Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential source(s) of impact; • Immediately inform IEC, Contractor and PP. • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly	• Check monitoring data, analysis and investigation by ET; • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	• Confirm receipt of notification of the exceedance of Action Level in writing; and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection/audit frequency proposed by ET with IEC and the Contractor; and • Supervise the instigated further mitigation measure(s).

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
		implemented by the Contractor, as agreed with the PP.			
Limit Level					
Reduction in monthly mean abundance of birds compared to the corresponding month of the baseline survey by 50% Reduction in monthly mean abundance of *Ardeola bacchus* compared to the corresponding month of the baseline survey by 50%	Limit Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Identify potential source(s) of impact; • Immediately inform IEC, Contractor and Project Proponent; • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; • Discuss with the PP, IEC, and Contractor on the need for further mitigation measure(s); and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.	• Check monitoring data, analysis and investigation by ET; • Discuss with the PP, ET, and Contractor on the need for further mitigation measure(s); • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; • Review the effectiveness of the further mitigation measure(s) proposed and implemented by Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	• Confirm receipt of notification of the exceedance of Limit Level in writing; • Discuss with the PP, IEC, and ET on the need of further mitigation measure(s), then propose and implement the further mitigation measure(s); and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection and audit frequency proposed by ET with IEC and the Contractor; • Discuss and confirm the further mitigation measure(s) required with the ET, IEC, and Contractor; and • Supervise the instigated further mitigation measure(s).
Operational Phase					

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
Action Level					
Reduction in monthly mean abundance of birds compared to the corresponding month of the baseline survey by 30% Reduction in monthly mean abundance of *Ardeola bacchus* compared to the corresponding month of the baseline survey by 30%	Action Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential source(s) of impact; • Immediately inform IEC, Contractor and PP. • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.	• Check monitoring data, analysis and investigation by ET; • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	• Confirm receipt of notification of the exceedance of Action Level in writing; and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection/audit frequency proposed by ET with IEC and the Contractor; and • Supervise the instigated further mitigation measure(s).
Limit Level					
Reduction in monthly mean abundance of birds compared to the corresponding month of	Limit Level exceeded	• Check monitoring data and repeat data	• Check monitoring data, analysis and investigation by ET;	• Confirm receipt of notification of the	• Check the monitoring results and findings from ET and IEC;

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
the baseline survey by 50% Reduction in monthly mean abundance of *Ardeola bacchus* compared to the corresponding month of the baseline survey by 50%		analysis to confirm findings; • Identify potential source(s) of impact; • Immediately inform IEC, Contractor and Project Proponent; • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; • Discuss with the PP, IEC, and Contractor on the need for further mitigation measure(s); and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.	• Discuss with the PP, ET, and Contractor on the need for further mitigation measure(s); • Review the effectiveness of the further mitigation measure(s) proposed and implemented by Contractor and advise the PP accordingly; • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	exceedance of Limit Level in writing; • Discuss with the PP, IEC, and ET on the need of further mitigation measure(s), then propose and implement the further mitigation measure(s); and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Discuss the need for increased site inspection and audit frequency proposed by ET with IEC and the Contractor; • Discuss and confirm the further mitigation measure(s) required with the ET, IEC, and Contractor; and • Supervise the instigated further mitigation measure(s).
Note: 1. *Ardeola bacchus* was the most abundant waterbird species recorded in the river channels during the baseline survey and was strictly associated with wetland habitats.					

5.3 Monitoring of Measures to Minimise Impacts to Aquatic Fauna in Ma Tso Lung Stream and Siu Hang San Tsuen Stream

Measures to respond to decreases in numbers of aquatic fauna utilizing Ma Tso Lung and Siu Hang San Tsuen streams and the Action and Limit Levels to trigger these measures are detailed in **Table 5.3**.

Table 5.3: Action and Limit Levels and responses to evidence of declines in aquatic fauna

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
Construction Phase					
Action Level					
Reduction in the species richness[1] of native species compared to the corresponding month of the baseline survey by 30%	Action Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential source(s) of impact; • Immediately inform IEC, Contractor and PP. • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly	• Check monitoring data, analysis and investigation by ET; • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	• Confirm receipt of notification of the exceedance of Action Level in writing; and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection/audit frequency proposed by ET with IEC and the Contractor; and • Supervise the instigated further mitigation measure(s).

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
		implemented by the Contractor, as agreed with the PP.			
Limit Level					
Reduction in the species richness of native species compared to the corresponding month of the baseline survey by 50%	Limit Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential source(s) of impact; • Immediately inform IEC, Contractor, and PP; • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; • Discuss with the PP, IEC, and Contractor on the need for further mitigation measure(s); and • Conduct necessary site inspections/audits to ensure all remedial measures are properly	• Check monitoring data, analysis and investigation by ET; • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; • Discuss with the PP, ET, and Contractor on the need for further mitigation measure(s); • Review the effectiveness of the further mitigation measure(s) proposed and implemented by Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	• Confirm receipt of notification of the exceedance of Limit Level in writing; • Discuss with the PP, IEC, and ET on the need of further mitigation measure(s), then propose and implement the further mitigation measure(s); and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection and audit frequency proposed by ET with IEC and the Contractor; • Discuss and confirm the further mitigation measure(s) required with the ET, IEC, and Contractor; and • Supervise the instigated further mitigation measure(s).

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
		implemented by the Contractor, as agreed with the PP.			
Operational Phase					
Action Level					
Reduction in the species richness of native species compared to the corresponding month of the baseline survey by 30%	Action Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential source(s) of impact; • Immediately inform IEC, Contractor and PP. • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.	• Check monitoring data, analysis and investigation by ET; • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	• Confirm receipt of notification of the exceedance of Action Level in writing; and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection/audit frequency proposed by ET with IEC and the Contractor; and • Supervise the instigated further mitigation measure(s).
Limit Level					

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
Reduction in the species richness of native species compared to the corresponding month of the baseline survey by 50%	Limit Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential source(s) of impact; • Immediately inform IEC, Contractor and Project Proponent; • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; • Discuss with the PP, IEC, and Contractor on the need for further mitigation measure(s); and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.	• Check monitoring data, analysis and investigation by ET; • Discuss with the PP, ET, and Contractor on the need for further mitigation measure(s); • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; • Review the effectiveness of the further mitigation measure(s) proposed and implemented by Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	• Confirm receipt of notification of the exceedance of Limit Level in writing; • Discuss with the PP, IEC, and ET on the need of further mitigation measure(s), then propose and implement the further mitigation measure(s); and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection and audit frequency proposed by ET with IEC and the Contractor; • Discuss and confirm the further mitigation measure(s) required with the ET, IEC, and Contractor; and • Supervise the instigated further mitigation measure(s).
Note: 1. Species richness is the number or count of native species in the monitoring areas.					

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
2. The number of native species should be site specific. the number of native species in Ma Tso Lung Stream should make reference to the corresponding monthly number of native species of Ma Tso Lung Stream instead of all the surveyed watercourses, etc.					

5.4 Monitoring of Measures to Minimise Impacts on Ecologically Sensitive Habitats from Disturbance and Pollution

Measures to respond to decreases in numbers of non-aquatic fauna in ecologically sensitive habitats (other than Long Valley) and Action and Limit Levels to trigger these measures are detailed in **Table 5.4** and **Table 5.5**.

Table 5.4: Action and Limit Levels and responses to evidence of declines in the seasonal non-aquatic fauna (herpetofauna, butterfly, and odonates) in ecologically sensitive habitats

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
Construction Phase					
Action Level					
Reduction in the species richness[1] of native species compared to the corresponding month of the baseline survey by 30%	Action Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential source(s) of impact; • Immediately inform IEC, Contractor and PP.	• Check monitoring data, analysis and investigation by ET; • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	• Confirm receipt of notification of the exceedance of Action Level in writing; and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection/audit frequency proposed by ET with IEC and the Contractor; and • Supervise the instigated further mitigation measure(s).

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
		• Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.			
Limit Level					
Reduction in the species richness of native species compared to the corresponding month of the baseline survey by 50%	Limit Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential source(s) of impact; • Immediately inform IEC, Contractor and Project Proponent; • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified;	• Check monitoring data, analysis and investigation by ET; • Discuss with the PP, ET, and Contractor on the need for further mitigation measure(s); • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; • Review the effectiveness of the further mitigation measure(s) proposed and implemented by Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial	• Confirm receipt of notification of the exceedance of Limit Level in writing; • Propose and implement the remedial measures(s) to mitigate the impact(s) identified; and • Discuss with the PP, IEC, and ET on the need of further mitigation measure(s), then propose and implement the further mitigation measure(s).	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection and audit frequency proposed by ET with IEC and the Contractor; • Discuss and confirm the further mitigation measure(s) required with the ET, IEC, and Contractor; and • Supervise the instigated further mitigation measure(s).

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
		• Discuss with the PP, IEC, and Contractor on the need for further mitigation measure(s); and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.	measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.		
Operational Phase					
Action Level					
Reduction in the species richness of native species compared to the corresponding month of the baseline survey by 30%	Action Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential source(s) of impact; • Immediately inform IEC, Contractor and PP; • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; and	• Check monitoring data, analysis and investigation by ET; • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	• Confirm receipt of notification of the exceedance of Action Level in writing; and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection/audit frequency proposed by ET with IEC and the Contractor; and • Supervise the instigated further mitigation measure(s).

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
		• Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.			
Limit Level					
Reduction in the species richness of native species compared to the corresponding month of the baseline survey by 50%	Limit Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential source(s) of impact; • Immediately inform IEC, Contractor and Project Proponent; • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; • Discuss with the PP, IEC, and Contractor on the need for further mitigation measure(s); and	• Check monitoring data, analysis and investigation by ET; • Discuss with the PP, ET, and Contractor on the need for further mitigation measure(s); • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; • Review the effectiveness of the further mitigation measure(s) proposed and implemented by Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and	• Confirm receipt of notification of the exceedance of Limit Level in writing; • Discuss with the PP, IEC, and ET on the need of further mitigation measure(s), then propose and implement the further mitigation measure(s); and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection and audit frequency proposed by ET with IEC and the Contractor; • Discuss and confirm the further mitigation measure(s) required with the ET, IEC, and Contractor; and • Supervise the instigated further mitigation measure(s).

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
		• Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.	feedback the audit results to the PP.		
Note: 1. Species richness is the number or count of native species in the monitoring areas					

Table 5.5: Action and Limit Levels and Responses to Evidence of Declines in the Non-seasonal Non-aquatic Fauna (Mammals) on Ecologically Sensitive Habitats

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
Construction Phase					
Action Level					
Reduction in the species richness[1] of native species compared to the corresponding month of the baseline survey by 30%).	Action Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential sources of impacts; • Immediately inform IEC, Contractor and PP.	• Check monitoring data, analysis and investigation by ET; • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and	• Confirm receipt of notification of the exceedance of Action Level in writing; and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection/audit frequency proposed by ET with IEC and the Contractor; and • Supervise the instigated further mitigation measure(s).

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
		• Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.	feedback the audit results to the PP.		
Reduction in the species richness of native species compared to the corresponding month of the baseline survey by 50%).	Limit Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential sources of impacts;; • Immediately inform IEC, Contractor and Project Proponent; • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified;	• Check monitoring data, analysis and investigation by ET; • Discuss with the PP, ET, and Contractor on the need for further mitigation measure(s); • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; • Review the effectiveness of the further mitigation measure(s) proposed and implemented by Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial	• Confirm receipt of notification of the exceedance of Limit Level in writing; • Discuss with the PP, IEC, and ET on the need of further mitigation measure(s), then propose and implement the further mitigation measure(s); and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection and audit frequency proposed by ET with IEC and the Contractor; • Discuss and confirm the further mitigation measure(s) required with the ET, IEC, and Contractor; and • Supervise the instigated further mitigation measure(s).

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
		• Discuss with the PP, IEC, and Contractor on the need for further mitigation measure(s); • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.	measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.		
Operational Phase					
Action Level					
Reduction in the species richness of native species compared to the corresponding month of the baseline survey by 30%).	Action Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential sources of impacts; • Immediately inform IEC, Contractor and PP. • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; and	• Check monitoring data, analysis and investigation by ET; • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and feedback the audit results to the PP.	• Confirm receipt of notification of the exceedance of Action Level in writing; and • Propose and implement the remedial measures(s) to mitigate the impact(s) identified.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection/audit frequency proposed by ET with IEC and the Contractor; and • Supervise the instigated further mitigation measure(s).

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
		• Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.			
Limit Level					
Reduction in the species richness of native species compared to the corresponding month of the baseline survey by 50%).	• Limit Level exceeded	• Check monitoring data and repeat data analysis to confirm findings; • Review relevant ecological data to check if the exceedance is due to natural variation or is construction works related; • Identify potential sources of impacts; • Immediately inform IEC, Contractor and Project Proponent; • Discuss with the Contractor on the remedial measure(s) to mitigate the impact(s) identified; • Discuss with the PP, IEC, and Contractor on the need for further mitigation measure(s); and	• Check monitoring data, analysis and investigation by ET; • Discuss with the PP, ET, and Contractor on the need for further mitigation measure(s); • Review the remedial measure(s) proposed by the Contractor and advise the PP accordingly; • Review the effectiveness of the further mitigation measure(s) proposed and implemented by Contractor and advise the PP accordingly; and • Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP and	• Confirm receipt of notification of the exceedance of Limit Level in writing; and • Discuss with the PP, IEC, and ET on the need of further mitigation measure(s) proposed and implemented by Contractor and advise the PP accordingly.	• Check the monitoring results and findings from ET and IEC; • Discuss the need for increased site inspection and audit frequency proposed by ET with IEC and the Contractor; • Discuss and confirm the further mitigation measure(s) required with the ET, IEC, and Contractor; and • Supervise the instigated further mitigation measure(s).

Level	Event	Action			
		ET	IEC	Contractor	Project Proponent
		• Conduct necessary site inspections/audits to ensure all remedial measures are properly implemented by the Contractor, as agreed with the PP.	feedback the audit results to the PP.		
Note: 1. Species richness is the number or count of native species in the monitoring areas					

6. Revisions for Inclusion in the EM&A Manual

No revisions to be included in the EM&A Manual was suggested.

7. Comments, Recommendations, and Conclusions

The baseline ecological monitoring surveys were undertaken from July 2019 to June 2020 covering the weekly avifauna monitoring in Long Valley and along Ng Tung, Sheung Yue and Shek Sheung Rivers ; wet season monthly aquatic fauna monitoring (July 2019 to October 2019; and April 2020 to June 2020) at the streams in Ma Tso Lung, Siu Hang San Tsuen and Long Valley; monthly mammals, herpetofauna, odonates and butterflies monitoring on ecologically sensitive habitats and Long Valley; additional exuviae surveys for odonates from March to May 2020 in Long Valley; additional night-time surveys for herpetofauna in Long Valley on July 2019 and March 2020 to June 2020; and lastly, additional twice-monthly night surveys for avifauna at Long Valley from September 2019 to April 2020.

The monthly mean abundance of avifauna recorded in the river channels ranged from 165 ind. to 263 ind. Generally, higher monthly mean abundances were recorded during dry season surveys compared to wet season surveys. A total of 64 species was recorded, of which 21 are waterbirds and 43 are terrestrial species. The most commonly recorded waterbird is the Chinese Pond Heron and the most commonly recorded terrestrial species is the Crested Myna. In terms of species of conservation significance, a total of 18 species was recorded. Foraging and roosting behaviours of avifauna were observed.

A total of 56 freshwater macroinvertebrate species was recorded in Ma Tso Lung and Siu Hang San Tsuen streams, of which 19 species are native to Hong Kong. The most commonly recorded species were the snails *S. quadrata*, *P. canaliculata*, and *Bellamya* sp. A total of 15 fish species was recorded in these streams, of which seven species are native to Hong Kong. The most abundant fish species was the exotic Nile Tilapia. No freshwater macroinvertebrate but four fish species of conservation significance were recorded. The fish species of conservation significance are the Common Carp, Mozambique Tilapia, Predaceous Chub, and Rose Bitterling.

A total of seven mammal species was recorded in the ecologically sensitive habitats within the vicinity of the Project site, of which three are of conservation significance. The most commonly observed mammals are those that are closely associated to humans, i.e. domestic dogs, cats, and ox. The species of conservation significance included the Fruit Bat and the Pallas's Squirrel. A total of 17 herpetofauna species was recorded, of which 13 species are native to Hong Kong. The most commonly observed herpetofauna species is the amphibian Asian Common Toad. Three species of conservation significance were recorded which included the Narrow-mouthed Frog, Common Rat Snake, and Four-clawed Gecko. A total of 48 butterfly species and 24 odonate species were recorded. The most commonly recorded butterfly is the Common Indian Crow while the Wandering Glider is the most commonly recorded odonate. Two butterfly

species were classified as species of conservation significance. i.e. Danaid Eggfly and Yellow Rajah. No odonate species of conservation significance was recorded.

The monthly mean abundance of avifauna in Long Valley ranged from 408 ind. to 901 ind. Generally, higher monthly mean abundances were recorded during dry season surveys compared to wet season surveys. A total of 98 species were identified, of which 32 species are waterbirds and 66 are terrestrial species. The most abundant waterbirds were Black-winged Stilt while the most abundant terrestrial species was the Scaly-breasted Munia. A total of 39 species of conservation significance were recorded. A total of 23 freshwater macroinvertebrate species was recorded, of which three species were native to Hong Kong. The most commonly observed species were the snails *S. quadrata*, *P. canaliculata*, and *Bellamya* sp. and water striders *Metrocoris* sp.. A total of seven fish species was recorded, of which two were native to Hong Kong. No freshwater macroinvertebrate but one fish species of conservation significance was recorded, the Mozambique Tilapia. A total of eight mammal species was recorded with Domestic Dog, Domestic Cat, and Domestic Ox as the commonly observed species. In terms of species of conservation significance, three species are protected under the Wild Animals Protection Ordinance (Cap. 170) which include the Short-nosed Fruit Bat, Pallas's Squirrel, and Small Asian Mongoose. A total of 20 herpetofauna species (9 amphibians and 11 reptiles) were recorded, of which 15 species were native to Hong Kong. The Asian Common Toad was the most commonly observed amphibians while the Chinese Gecko was the most commonly observed reptile. A total of five herpetofauna species (two amphibian and three reptile species) of conservation significance was recorded. Amphibian species included the Chinese Bullfrog and the Spotted Narrow-mouthed Frog and the reptile species included the Common Rat Snake, the Four-clawed Gecko, and Many-banded Krait. A total of 26 butterfly species were recorded with the Indian Cabbage White as the most commonly observed. The odonates, on the other hand, was composed of 24 species dominated by the Wandering Gliders. Two butterfly and one odonate species of conservation significance recorded were the butterflies Danaid Eggfly and Yellow Rajah and the odonate Blue Chaser.

The monitoring requirements for the LVNP under Section 14.3.2.1 of the EM&A Manual shall be addressed by another ET at the construction and operational phases.

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Figure: "Non-bird Fauna Survey Coverage in the Study Area" https://www.epd.gov.hk/eia/register/report/eiareport/eia_2132013/eia/pdf/figure/figure_13-2.pdf

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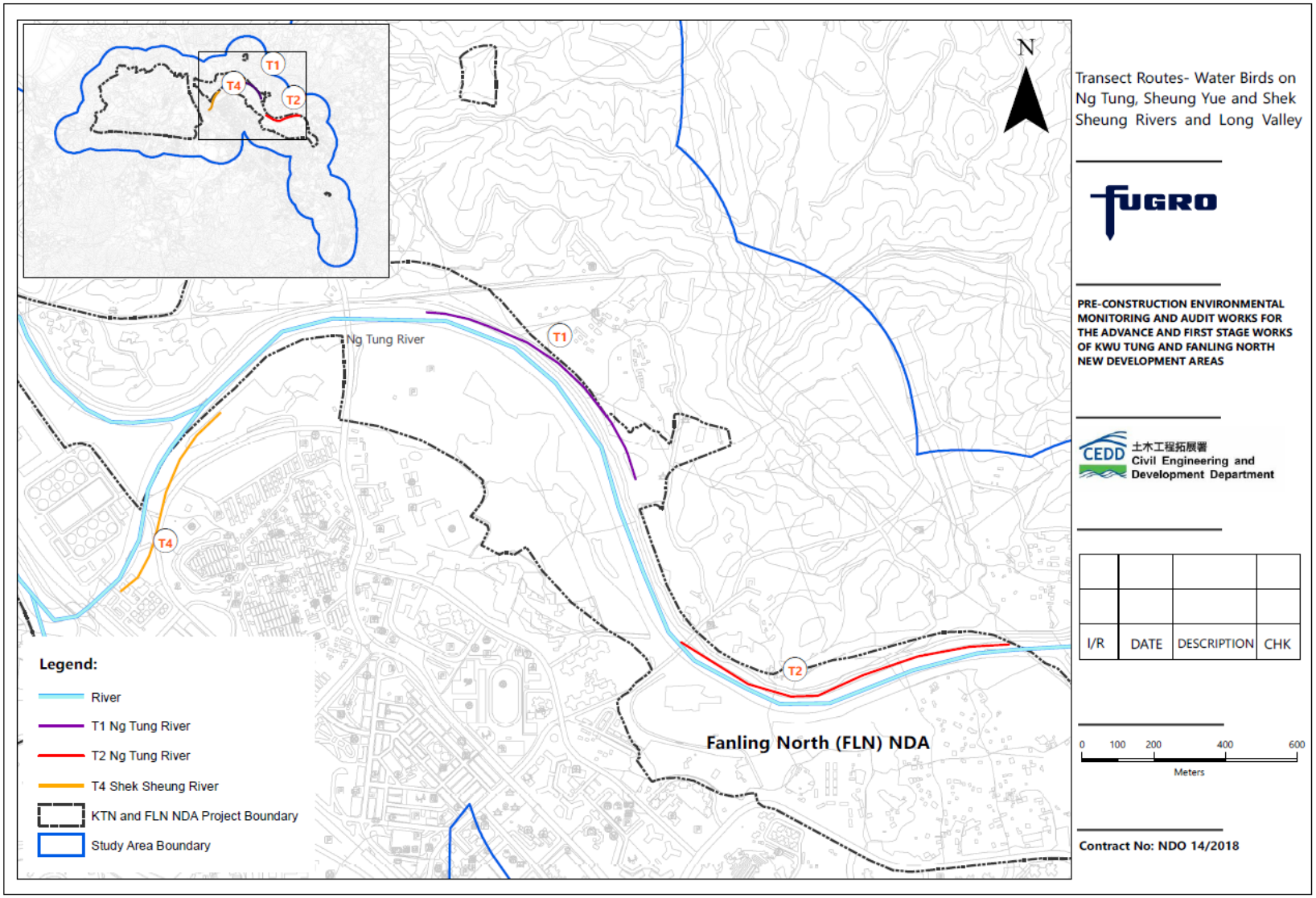
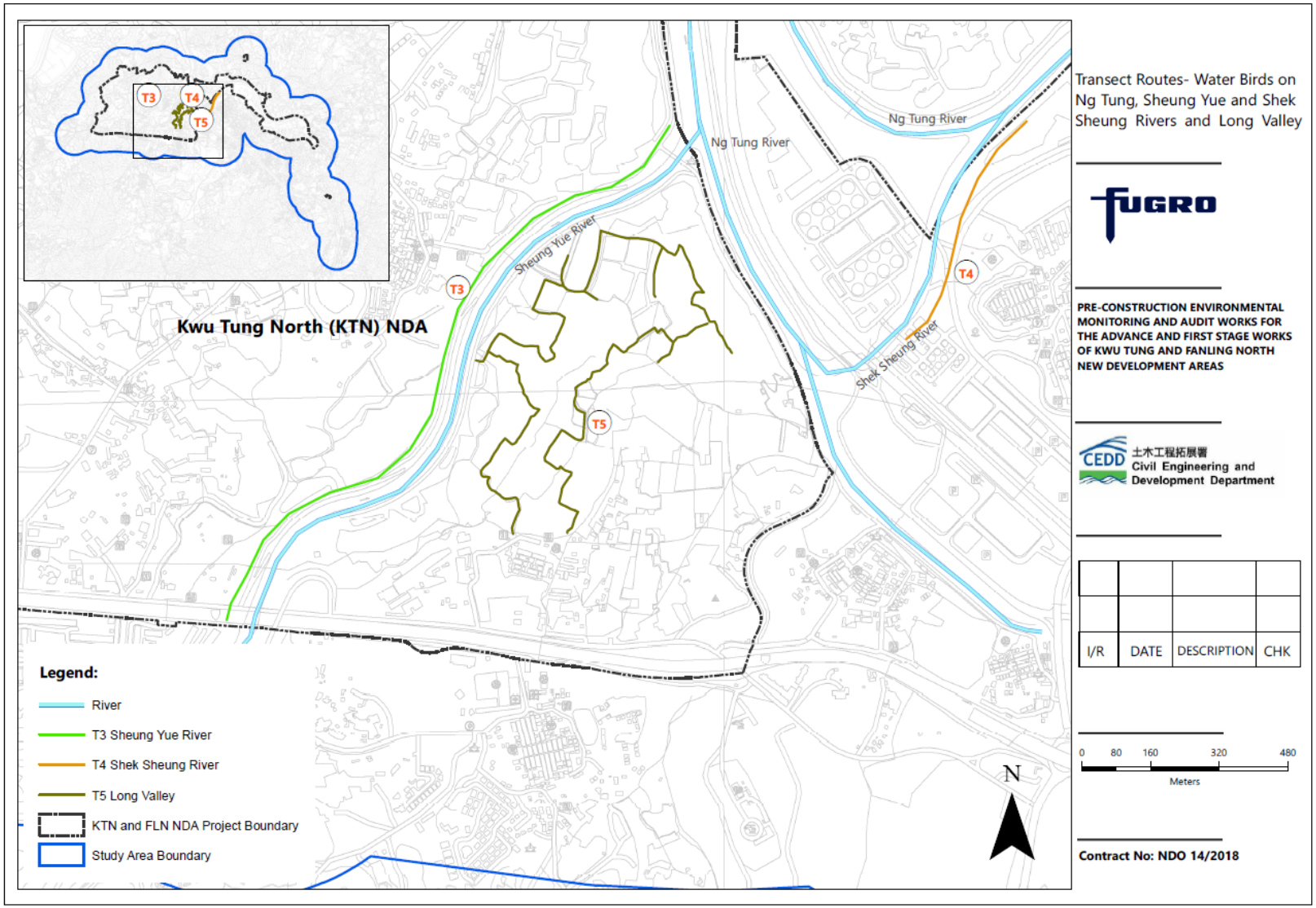
Appendix A

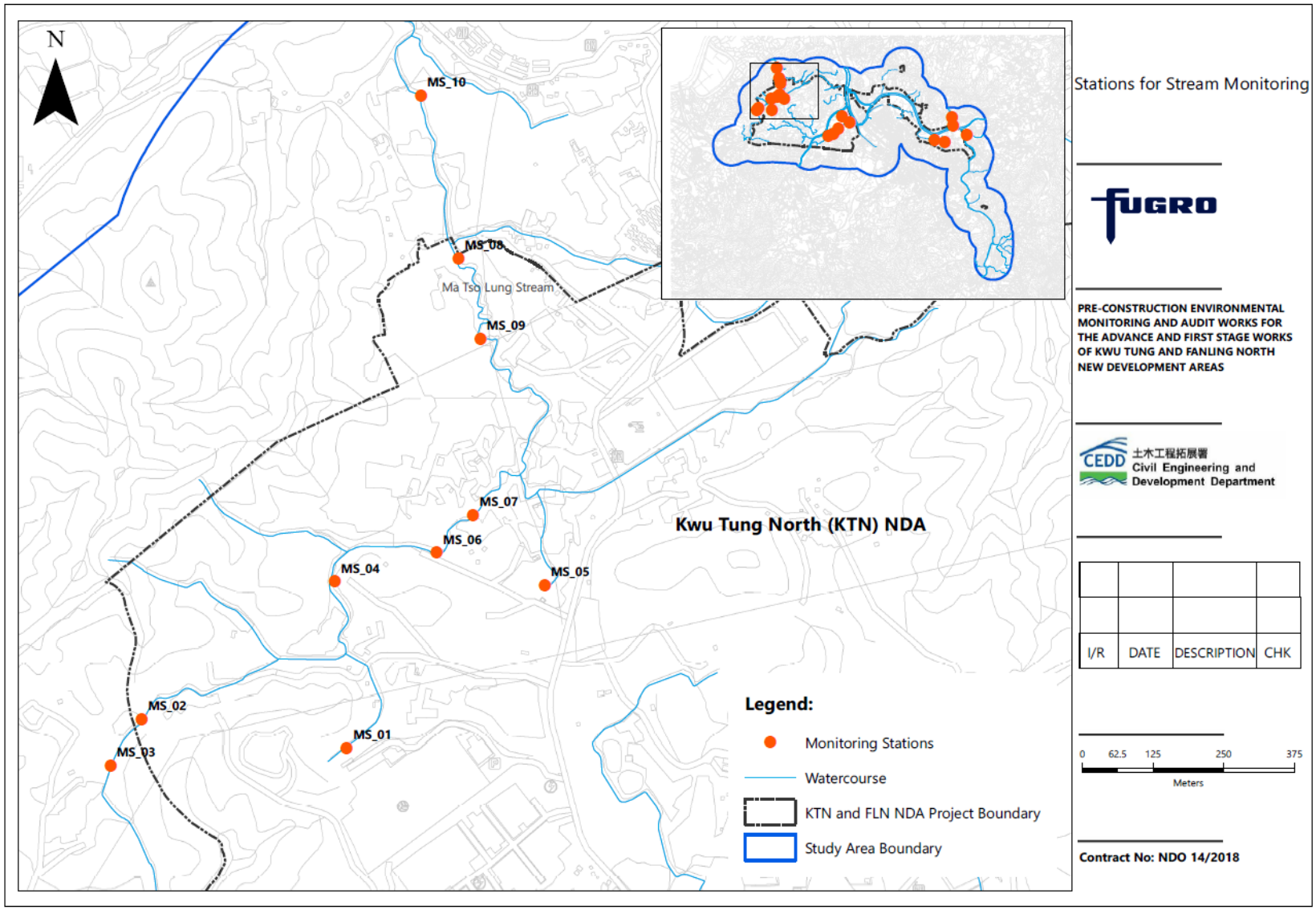
Transect Routes for the Baseline Ecological Monitoring



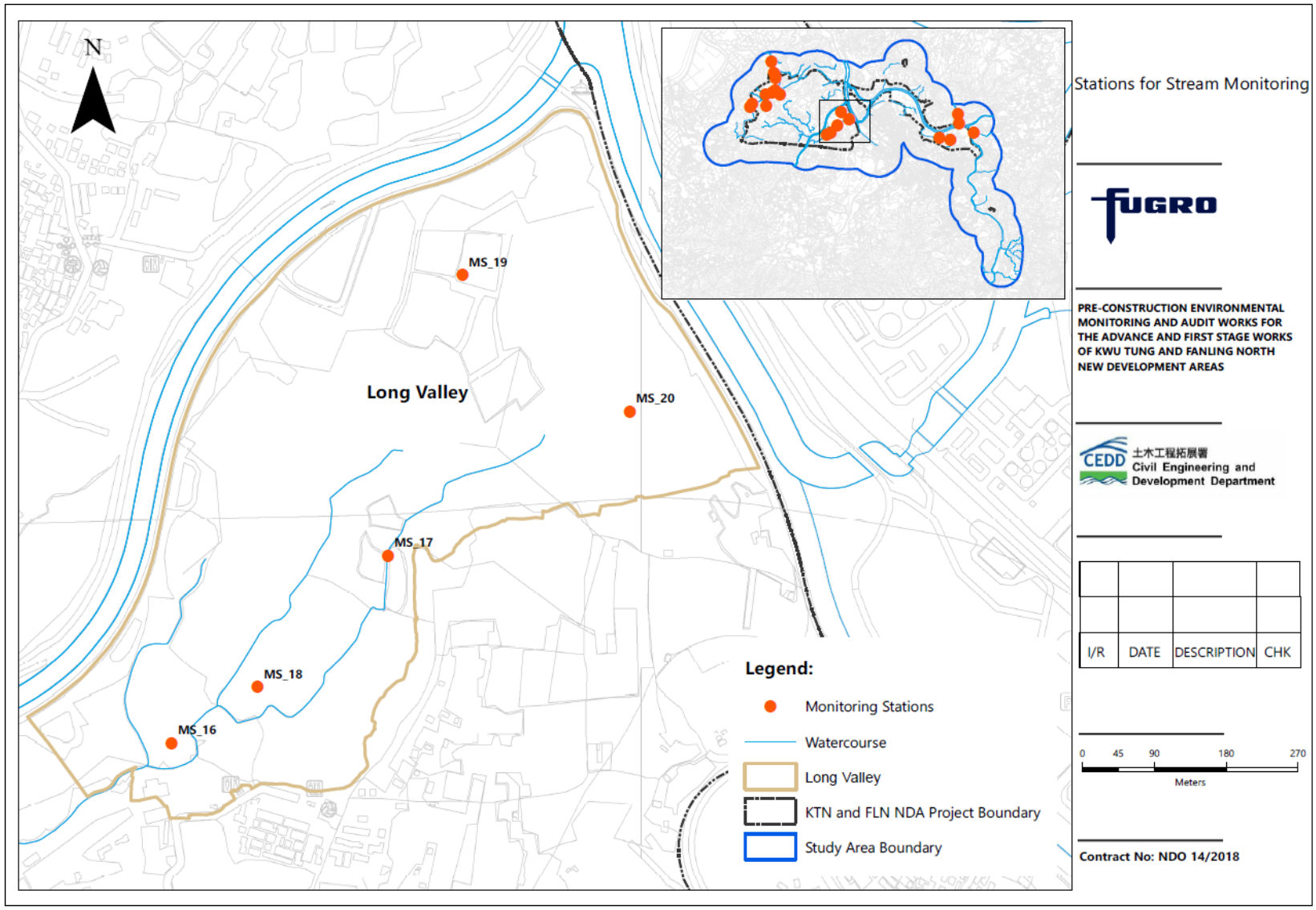
Appendix A.1: Transect Routes at Ng Tung River and Shek Sheung River for Waterbirds Monitoring



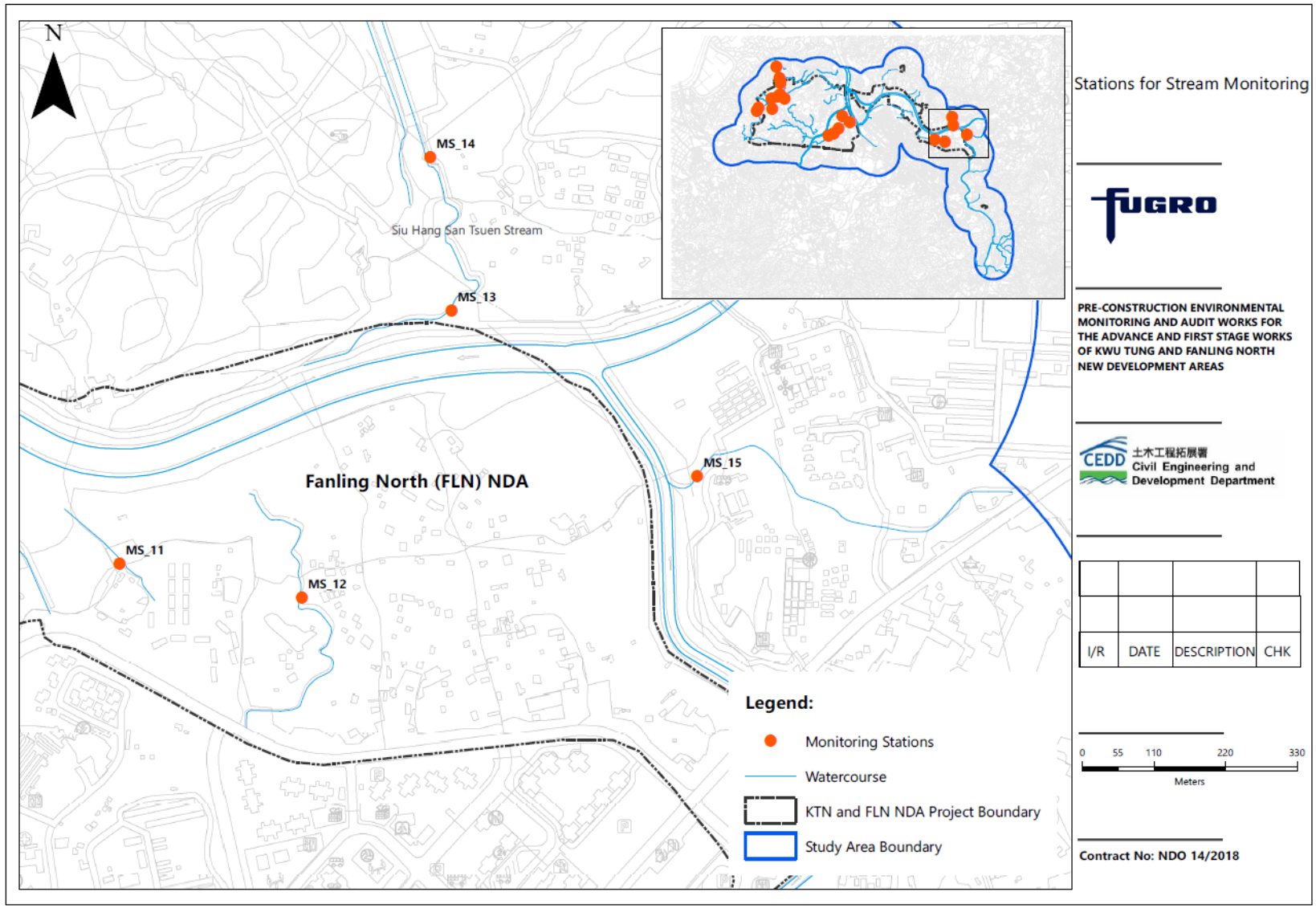
Appendix A.2: Transect Routes at Sheung Yue River, Shek Sheung River, and Long Valley for Waterbirds Monitoring



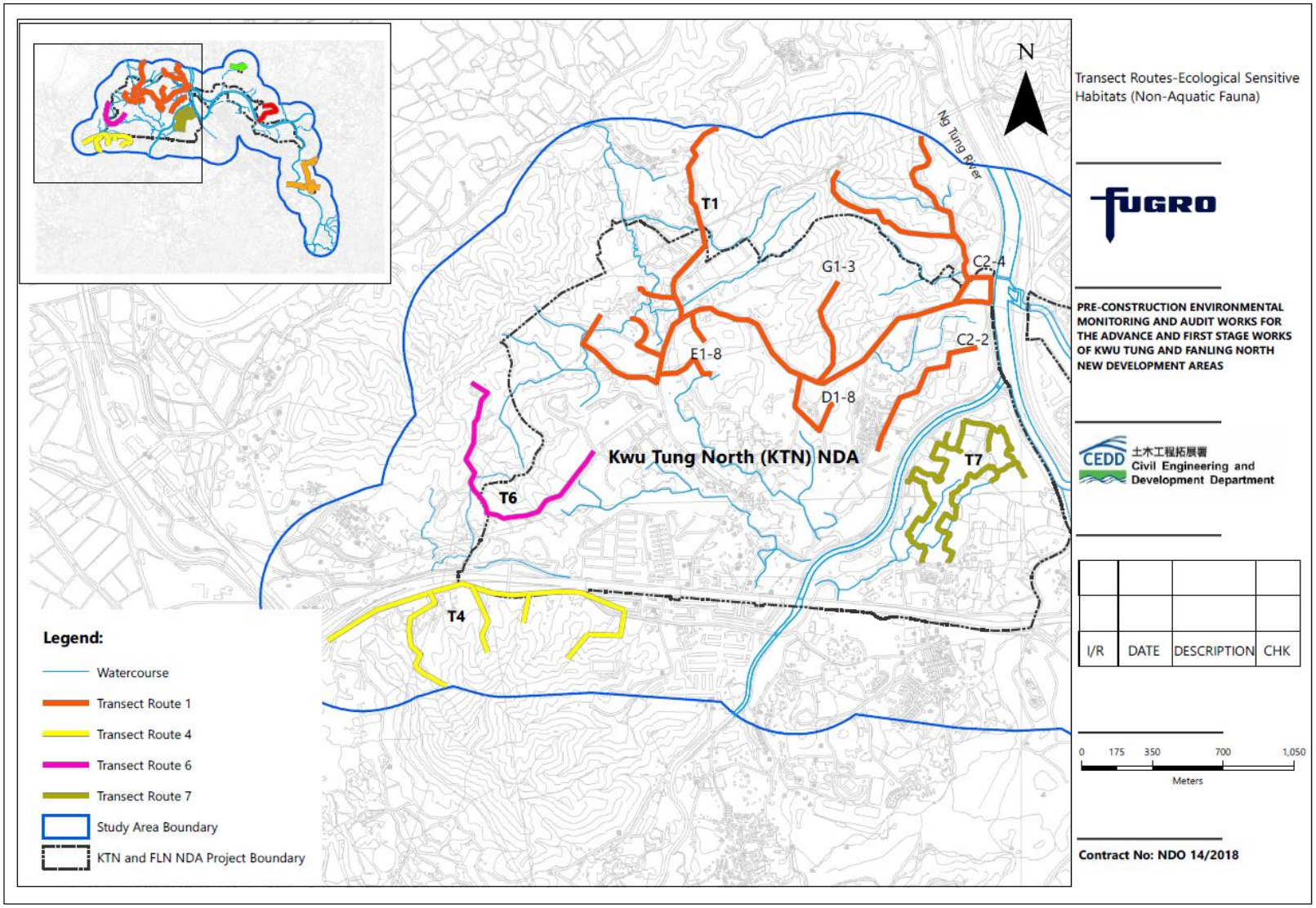
Appendix A.3: Stations at Ma Tso Lung for Aquatic Fauna Monitoring



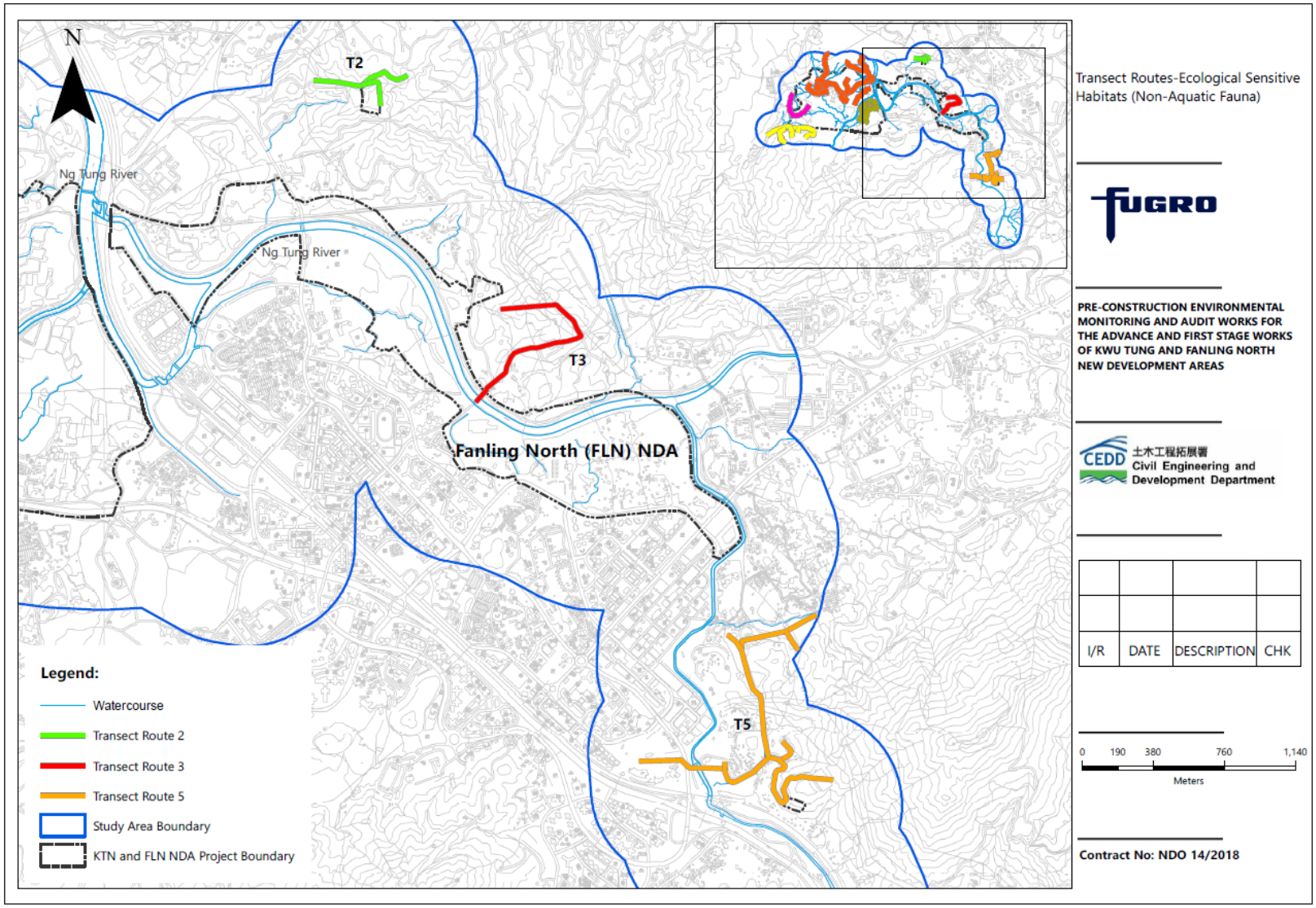
Appendix A.4: Stations at Long Valley for Aquatic Fauna Monitoring



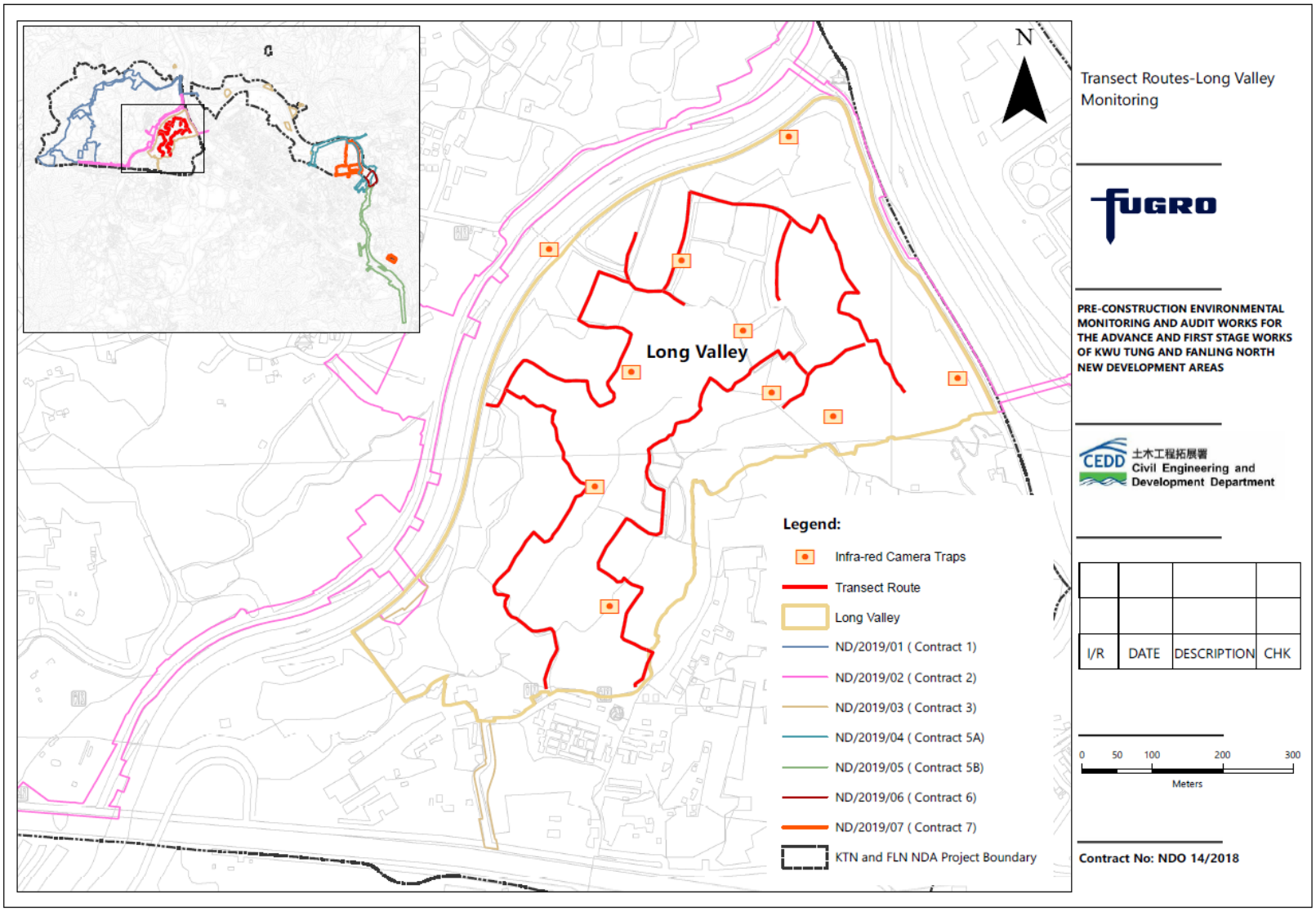
Appendix A.5: Stations at Siu Hang San Tsuen for Aquatic Fauna Monitoring



Appendix A.6: Transect Routes at KTN NDA for Mammals, Insects (butterflies and odonates) and Herpetofauna Ecological Sensitive Habitat Monitoring



Appendix A.7: Transect Routes at FLN NDA for Mammals, Insects (butterflies and odonates) and Herpetofauna Ecological Sensitive Habitat Monitoring



Appendix A.8: Transect Route and Infra-red Camera Traps Locations at Long Valley for Mammal Survey

Appendix B

Species List

B.1 Avifauna

B.1.1 Avifauna species recorded for waterbirds monitoring (Ng Tung River, Sheung Yue River, and Shek Sheung River), July 2019-June 2020

Common Name	Species Name	Chinese Name	Hong Kong Status	Conservation Status	Occurrence Status	Abundance			
						Walk Transect (T1-T4)			
						T1	T2	T3	T4
Arctic Warbler	*Phylloscopus borealis*	極北柳鶯	PM		Native	0	4	2	1
Asian Brown Flycatcher	*Muscicapa latirostris*	北灰鶲	PM, WV		Native	0	1	1	0
Asian Koel	*Eudynamys scolopaceus*	噪鵑	*CR		Native	30	27	41	24
Barn Swallow	*Hirundo rustica*	家燕	PM, Sv		Native	93	91	136	62
Besra	*Accipiter virgatus*	松雀鷹	SR	Cap.586	Native	0	0	0	0
Black Drongo	*Dicrurus macrocercus*	黑卷尾	Sv		Native	16	12	25	3
Black Kite	*Milvus migrans*	黑鳶	RWV	(RC), Cap.586	Native	53	30	17	10
Black-faced Bunting	*Emberiza spodocephala*	灰頭鵐	WV, PM		Native	0	0	0	0
Black-collared Starling	*Gracupica nigricollis*	黑領椋鳥	*CR		Native	196	186	250	77
Black-winged Stilt	*Himantopus himantopus*	黑翅長腳鷸	CPM	RC	Native	0	0	9	0
Blue Whistling Thrush	*Myophonus caeruleus*	紫嘯鶇	*CR		Native	0	0	0	0
Bluethroat	*Luscinia svecica*	藍喉歌鴝	CPM, WV	LC	Native	0	0	0	0
Bull-headed Shrike	*Lanius bucephalus*	牛頭伯勞	RpM		Native	0	0	0	0
Chinese Blackbird	*Turdus mandarinus*	烏鶇	CWV		Native	0	0	2	0
Chinese Bulbul	*Pycnonotus sinensis*	白頭鶇	AR		Native	98	127	69	21
Chinese Pond Heron	*Ardeola bacchus*	池鷺	*CR	PRC(RC)	Native	180	143	246	206
Cinereous Tit	*Parus cinereus*	蒼背山雀	*CR		Native	53	57	54	2
Collared Crow	*Corvus torquatus*	白頸鴉	UR	LC, VU NT-IUCN	Native	9	2	51	0
Common Greenshank	*Tringa nebularia*	青腳鷸	PM, WV	RC	Native	0	0	4	0

Common Name	Species Name	Chinese Name	Hong Kong Status	Conservation Status	Occurrence Status	Abundance			
						Walk Transect (T1-T4)			
						T1	T2	T3	T4
Common Kestrel	*Falco tinnunculus*	紅隼	CaM, WV	Cap.586	Native	0	2	0	0
Common Kingfisher	*Alcedo atthis*	普通翠鳥	CPM, WV		Native	4	10	25	4
Common Moorhen	*Gallinula chloropus*	黑水雞	*CR		Native	0	0	0	0
Common Myna	*Acridotheres tristis*	家八哥	UR		Introduced	2	2	2	0
Common Sandpiper	*Actitis hypoleucos*	磯鷸	WV, CPM		Native	15	20	60	63
Common Snipe	*Gallinago gallinago*	扇尾沙錐	WV, CPM		Native	8	0	8	0
Common Tailorbird	*Orthotomus sutorius*	長尾縫葉鶯	*CR		Native	59	54	57	25
Crested Myna	*Acridotheres cristatellus*	八哥	*CR		Native	375	357	472	217
Crested Serpent Eagle	*Spilornis cheela*	蛇鵰	UR	Cap.586, (VU), LC	Native	0	0	0	0
Daurian Redstart	*Phoenicurus auroreus*	北紅尾鴝	WV		Native	10	33	20	15
Domestic Pigeon	*Columba livia*	原鴿	*CR		Introduced	3	0	4	0
Dusky Warbler	*Phylloscopus fuscatus*	褐柳鶯	CPM,WV		Native	10	16	14	7
Eastern Buzzard	*Buteo japonicus*	普通鵟	WV CWV	Cap.586	Native	0	0	1	0
Eastern Cattle Egret	*Bubulcus coromandus*	牛背鷺	RpM R, CPM	(LC)	Native	4	2	47	0
Eastern Yellow Wagtail	*Motacilla tschutschensis*	東黃鶺鴒	CPM, WV		Native	0	0	0	0
Eurasian Coot	*Fulica atra*	骨頂雞	CWV	RC	Native	0	0	0	0
Eurasian Hobby	*Falco subbuteo*	燕隼	UPM	Cap.586, LC	Native	0	0	0	0
Eurasian Teal	*Anas crecca*	綠翅鴨	CWV	RC	Native	0	0	0	0
Eurasian Tree Sparrow	*Passer montanus*	樹麻雀	AR		Native	164	288	130	78
Eurasian Wigeon	*Mareca penelope*	赤頸鴨	CWV	RC	Native	0	0	0	0
Eurasian Wryneck	*Jynx torquilla*	蟻鴷	UPM, WV		Native	0	0	0	0
Great Cormorant	*Phalacrocorax carbo*	普通鸕鷀	CWV	PRC	Native	3	6	20	3

Common Name	Species Name	Chinese Name	Hong Kong Status	Conservation Status	Occurrence Status	Abundance			
						Walk Transect (T1-T4)			
						T1	T2	T3	T4
Great Egret	*Ardea alba*	大白鷺	*CR, WV	PRC(RC)	Native	64	32	104	39
Greater Coucal	*Centropus sinensis*	褐翅鴉鵑	*CR	(VU)	Native	2	5	5	0
Greater Painted-snipe	*Rostratula benghalensis*	彩鷸	R, PM, WV	LC	Native	0	0	0	0
Green Sandpiper	*Tringa ochropus*	白腰草鷸	UPM, WV		Native	0	0	5	0
Grey Heron	*Ardea cinerea*	蒼鷺	CWV	PRC	Native	24	12	111	15
Grey Wagtail	*Motacilla cinerea*	灰鶺鴒	CPM, WV		Native	2	13	8	25
House Swift	*Apus nipalensis*	小白腰雨燕	SpM, *CR		Native	1	0	30	0
Intermediate Egret	*Egretta intermedia*	中白鷺	CPM	RC	Introduced	0	0	0	0
Kentish Plover	*Charadrius alexandrinus*	環頸鴴	WV	RC	Native	0	0	0	0
Large-billed Crow	*Corvus macrorhynchos*	大嘴烏鴉	*CR		Native	0	0	9	0
Large Hawk Cuckoo	*Hierococcyx sparverioides*	大鷹鵑	CPM, Sv		Native	1	1	8	0
Little Bunting	*Emberiza pusilla*	小鵐	CPM, WV		Native	0	0	0	0
Little Egret	*Egretta garzetta*	小白鷺	*CR	PRC(RC)	Native	223	172	340	217
Little Grebe	*Tachybaptus ruficollis*	小鸊鷉	*CR	LC	Native	31	33	0	0
Little Ringed Plover	*Charadrius dubius*	金眶鴴	CWV, PM	(LC)	Native	0	0	0	0
Masked Laughingthrush	*Garrulax perspicillatus*	黑臉噪鶥	AR		Native	201	193	185	15
Northern Shoveler	*Spatula clypeata*	琵嘴鴨	WV	RC	Native	0	0	0	0
Olive-backed Pipit	*Anthus hodgsoni*	樹鷚	CPM, WV		Native	11	10	13	5
Oriental Magpie	*Pica serica*	喜鵲	R		Native	0	3	37	1
Oriental Magpie Robin	*Copsychus saularis*	鵲鴝	AR		Native	48	56	47	41
Oriental Turtle dove	*Streptopelia orientalis*	山斑鳩	CWV, PM		Native	0	0	0	0
Pacific Swift	*Apus pacificus*	白腰雨燕	CSpM, Sv	LC	Native	0	0	0	0
Pallas's Leaf Warbler	*Phylloscopus proregulus*	黃腰柳鶯	CWV		Native	19	20	15	9

Common Name	Species Name	Chinese Name	Hong Kong Status	Conservation Status	Occurrence Status	Abundance			
						Walk Transect (T1-T4)			
						T1	T2	T3	T4
Peregrine Falcon	*Falco peregrinus*	遊隼	SR, WV	Cap.586, LC	Native	0	0	0	0
Pied Avocet	*Recurvirostra avosetta*	反嘴鷸	WV	RC	Native	0	0	0	0
Pied Kingfisher	*Ceryle rudis*	斑魚狗	UR	(LC)	Native	1	0	2	0
Pintail Snipe	*Gallinago stenura*	針尾沙錐	CPM		Native	0	0	0	0
Plain Prinia	*Prinia inornata*	純色鷦鶯	*CR		Native	20	28	32	23
Plaintive Cuckoo	*Cacomantis merulinus*	八聲杜鵑	USV		Native	1	0	2	0
Red Turtle Dove	*Streptopelia tranquebarica*	火斑鳩	UPM		Native	0	0	0	0
Red-billed Blue Magpie	*Urocissa erythroryncha*	紅咀藍鵲	*CR		Native	30	14	18	0
Red-billed Starling	*Spodiopsar sericeus*	絲光椋鳥	CWV	GC	Native	0	0	0	0
Red-necked Stint	*Calidris ruficollis*	紅頸濱鷸	ASpM	NT, LC	Native	0	0	0	0
Red-rumped Swallow	*Cecropis daurica*	金腰燕	UPM		Native	0	0	22	0
Red-throated Pipit	*Anthus cervinus*	紅喉鷚	CPM, WV	LC	Native	0	0	0	0
Red-whiskered Bulbul	*Pycnonotus jocosus*	紅耳鵯	AR		Native	386	395	381	177
Richard's Pipit	*Anthus richardi*	理氏鷚	CPM, WV		Native	3	2	0	0
Rose-ringed Parakeet	*Psittacula krameri*	紅領綠鸚鵡	SR		Introduced	0	0	0	0
Long-tailed Shrike	*Lanius schach*	棕背伯勞	*CR		Native	6	14	4	2
Russet Sparrow	*Passer cinnamomeus*	山麻雀	SWV		Native	0	0	0	0
Sooty-headed Bulbul	*Pycnonotus aurigaster*	白喉紅臀鵯	UR		Native	0	0	0	0
Spotted Dove	*Spilopelia chinensis*	珠頸斑鳩	AR		Native	389	351	258	128
Scaly-breasted Munia	*Lonchura punctulata*	斑文鳥	*CR		Native	0	45	29	98
Stejneger's Stonechat	*Saxicola stejnegeri*	黑喉石鴴	CPM, WV		Introduced	10	35	24	10
Swinhoe's Egret	*Egretta eulophotes*	黃嘴白鷺	SSM	VU, GC, (EN)	Native	0	0	0	0
Swinhoe's Snipe	*Gallinago megala*	大沙錐	UPM	LC	Native	0	0	0	0

Common Name	Species Name	Chinese Name	Hong Kong Status	Conservation Status	Occurrence Status	Abundance			
						Walk Transect (T1-T4)			
						T1	T2	T3	T4
Swinhoe's White-eye	*Zosterops simplex*	暗綠繡眼鳥	AR		Native	108	132	121	23
Tufted Duck	*Aythya fuligula*	鳳頭潛鴨	UWV	LC	Native	1	0	0	0
Velvet-fronted Nuthatch	*Sitta frontalis*	絨額鴟	*CR		Native	0	0	1	0
White Wagtail	*Motacilla alba*	白鶺鴒	CPM, WV		Native	65	63	123	113
White-breasted Waterhen	*Amaurornis phoenicurus*	白胸苦惡鳥	*CR		Native	7	8	12	8
White-headed Munia	*Lonchura maja*	白頭文鳥	R		Native	0	0	0	0
White-rumped Munia	*Lonchura striata*	白腰文鳥	*CR		Native	6	5	0	19
White-throated Kingfisher	*Halcyon smyrnensis*	白胸翡翠	*CR	(LC)	Native	1	1	11	0
Wood Sandpiper	*Tringa glareola*	林鷸	CPM, WV	LC	Native	0	0	2	0
Yellow Bittern	*Ixobrychus sinensis*	黃葦鳽	USV, PM	(LC)	Native	0	0	0	0
Yellow-bellied Prinia	*Prinia flaviventris*	黃腹鷦鶯	*CR		Native	33	45	51	33
Yellow-breasted Bunting	*Emberiza aureola*	黃胸鵐	CPM	RC, CR	Native	0	0	0	0
Yellow-browed Warbler	*Phylloscopus inornatus*	黃眉柳鶯	CWV, SpM		Native	18	20	16	10
Zitting Cisticola	*Cisticola juncidis*	棕扇尾鶯	CPM, WV	LC	Native	0	0	0	0
Total No. of Species						**50**	**49**	**59**	**38**
Total No. of Species of Conservation Significance						**13**	**12**	**15**	**6**

Notes:
Hong Kong Status:
R – Resident; *CR – Common Resident; AR – Abundant Resident; UR – Uncommon resident; SR – Scarce resident; WV – Winter visitor; PM – Passage migrant; CPM – Common passage migrant; UPM – Uncommon passage migrant; CaM - Common autumn migrant; USV - Uncommon Summer visitor; SpM – Spring migrant; ASpM – Abundant Spring Passage Migrant; CSpM – Common spring migrant; Sv – Summer Visitor; CWV – Common winter visitor; SWV – Scarce winter visitor; SSM – Scarce spring migrant
Hong Kong Status was decided according to AFCD biodiversity website (www.hkbiodiversity.net)
Conservation Status:
All bird species are under protection of the Wild Animals Protection Ordinance (Cap. 170).
Cap.586: Endangered Species of Animals and Plants Ordinance (Cap. 586)
IUCN Red List Status: VU= Vulnerable; NT= Near Threatened; CR: Critically Endangered.

Common Name	Species Name	Chinese Name	Hong Kong Status	Conservation Status	Occurrence Status	Abundance			
						Walk Transect (T1-T4)			
						T1	T2	T3	T4

China Red Data Book Status: (VU)= Vulnerable; (EN)= Endangered
Fellowes et al. (2002); RC=Regional Concern; LC=Local Concern; PRC=Potential Regional Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence
Occurrence Status was according to BirdLife Intenational website (http://datazone.birdlife.org/species/search)
All birds were visually observed, hence no data under 'heard' was noted

B.1.2 Avifauna species recorded for water birds monitoring, Long Valley, July 2019-June 2020

Common Name	Species Name	Chinese Name	Hong Kong Status	Conservation Status	Occurrence Status	Abundance					
						Walk Transect (T5)					
						WAL	DAL	SWH	P	Heard	Flight
Arctic Warbler	*Phylloscopus borealis*	極北柳鶯	PM		Native	0	3	0	0	0	0
Asian Brown Flycatcher	*Muscicapa latirostris*	北灰鶲	PM, WV		Native	0	0	1	0	0	0
Asian Koel	*Eudynamys scolopaceus*	噪鵑	*CR		Native	2	4	1	1	68	9
Barn Swallow	*Hirundo rustica*	家燕	PM, Sv		Native	16	11	0	0	0	423
Besra	*Accipiter virgatus*	松雀鷹	SR	Cap.586	Native	1	0	0	0	0	0
Black Drongo	*Dicrurus macrocercus*	黑卷尾	Sv		Native	29	24	10	1	3	50
Black Kite	*Milvus migrans*	黑鳶	RWV	(RC), Cap.586	Native	1	1	0	0	0	59
Black-collared Starling	*Gracupica nigricollis*	黑領椋鳥	*CR		Native	407	526	119	0	517	775
Black-faced Bunting	*Emberiza spodocephala*	灰頭鵐	WV, PM		Native	0	1	0	0	0	0
Black-winged Stilt	*Himantopus himantopus*	黑翅長腳鷸	CPM	RC	Native	474	16	622	46	0	137
Blue Whistling Thrush	*Myophonus caeruleus*	紫嘯鶇	*CR		Native	0	0	0	0	1	0

Common Name	Species Name	Chinese Name	Hong Kong Status	Conservation Status	Occurrence Status	Abundance					
						Walk Transect (T5)					
						WAL	DAL	SWH	P	Heard	Flight
Bluethroat	*Luscinia svecica*	藍喉歌鴝	CPM, WV	LC	Native	1	0	0	0	0	0
Bull-headed Shrike	*Lanius bucephalus*	牛頭伯勞	RpM		Native	1	0	0	0	0	0
Chinese Blackbird	*Turdus mandarinus*	烏鶇	CWV		Native	2	2	1	0	0	0
Chinese Bulbul	*Pycnonotus sinensis*	白頭鵐	AR		Native	107	113	18	0	6	35
Chinese Pond Heron	*Ardeola bacchus*	池鷺	*CR	PRC(RC)	Native	438	138	239	16	0	285
Cinereous Tit	*Parus cinereus*	蒼背山雀	*CR		Native	6	17	2	0	5	2
Collared Crow	*Corvus torquatus*	白頸鴉	UR	LC, VU NT-IUCN	Native	2	0	0	0	0	33
Common Greenshank	*Tringa nebularia*	青腳鷸	PM, WV	RC	Native	5	0	7	0	0	0
Common Kestrel	*Falco tinnunculus*	紅隼	CaM, WV	Cap.586	Native	0	0	0	0	0	5
Common Kingfisher	*Alcedo atthis*	普通翠鳥	CPM, WV		Native	8	5	2	4	1	29
Common Moorhen	*Gallinula chloropus*	黑水雞	*CR		Native	15	0	53	11	0	0
Common Myna	*Acridotheres tristis*	家八哥	UR		Introduced	7	76	9	1	0	9
Common Sandpiper	*Actitis hypoleucos*	磯鷸	WV, CPM		Native	16	4	1	0	0	5
Common Snipe	*Gallinago gallinago*	扇尾沙錐	WV, CPM		Native	102	11	183	0	0	19
Common Tailorbird	*Orthotomus sutorius*	長尾縫葉鶯	*CR		Native	46	78	20	3	66	6
Crested Myna	*Acridotheres cristatellus*	八哥	*CR		Native	515	975	211	12	665	1204
Crested Serpent Eagle	*Spilornis cheela*	蛇鵰	UR	Cap.586, (VU), LC	Native	0	0	0	0	1	1
Daurian Redstart	*Phoenicurus auroreus*	北紅尾鴝	WV		Native	30	31	19	1	1	17
Domestic Pigeon	*Columba livia*	原鴿	*CR		Introduced	13	257	0	0	0	62

Common Name	Species Name	Chinese Name	Hong Kong Status	Conservation Status	Occurrence Status	Abundance					
						Walk Transect (T5)					
						WAL	DAL	SWH	P	Heard	Flight
Dusky Warbler	*Phylloscopus fuscatus*	褐柳鶯	CPM,WV		Native	17	10	26	3	24	0
Eastern Buzzard	*Buteo japonicus*	普通鵟	WV, CWV	Cap.586	Native	0	0	0	0	0	8
Eastern Cattle Egret	*Bubulcus coromandus*	牛背鷺	RpM R, CPM	(LC)	Native	189	179	14	25	0	52
Eastern Yellow Wagtail	*Motacilla tschutschensis*	東黃鶺鴒	CPM, WV		Native	199	110	35	0	0	8
Eurasian Coot	*Fulica atra*	骨頂雞	CWV	RC	Native	0	0	1	3	0	0
Eurasian Hobby	*Falco subbuteo*	燕隼	UPM	Cap.586, LC	Native	0	0	0	0	0	1
Eurasian Teal	*Anas crecca*	綠翅鴨	CWV	RC	Native	8	0	108	170	0	0
Eurasian Tree Sparrow	*Passer montanus*	樹麻雀	AR		Native	391	929	39	5	24	276
Eurasian Wigeon	*Mareca penelope*	赤頸鴨	CWV	RC	Native	4	0	0	36	0	0
Eurasian Wryneck	*Jynx torquilla*	蟻鴷	UPM, WV		Native	0	1	0	0	0	0
Great Cormorant	*Phalacrocorax carbo*	普通鸕鷀	CWV	PRC	Native	0	0	0	0	0	6
Great Egret	*Ardea alba*	大白鷺	*CR, WV	PRC(RC)	Native	40	2	32	0	0	30
Greater Coucal	*Centropus sinensis*	褐翅鴉鵑	*CR	(VU)	Native	4	2	1	0	38	5
Greater Painted-snipe	*Rostratula benghalensis*	彩鷸	R, PM, WV	LC	Native	13	1	12	0	0	3
Green Sandpiper	*Tringa ochropus*	白腰草鷸	UPM, WV		Native	4	0	5	0	0	1
Grey Heron	*Ardea cinerea*	蒼鷺	CWV	PRC	Native	2	1	3	1	0	18
Grey Wagtail	*Motacilla cinerea*	灰鶺鴒	CPM, WV		Native	27	28	9	0	0	6
House Swift	*Apus nipalensis*	小白腰雨燕	SpM, *CR		Native	2	1	1	0	0	102
Intermediate Egret	*Egretta intermedia*	中白鷺	CPM	RC	Introduced	1	0	0	0	0	0

Common Name	Species Name	Chinese Name	Hong Kong Status	Conservation Status	Occurrence Status	Abundance					
						Walk Transect (T5)					
						WAL	DAL	SWH	P	Heard	Flight
Kentish Plover	*Charadrius alexandrinus*	環頸鴴	WV	RC	Native	4	0	0	0	0	0
Large Hawk Cuckoo	*Hierococcyx sparverioides*	大鷹鵑	CPM, Sv		Native	0	0	0	0	2	0
Large-billed Crow	*Corvus macrorhynchos*	大嘴烏鴉	*CR		Native	0	0	0	0	5	18
Little Bunting	*Emberiza pusilla*	小鵐	CPM, WV		Native	0	0	1	0	0	0
Little Egret	*Egretta garzetta*	小白鷺	*CR	PRC(RC)	Native	391	121	236	1	0	305
Little Grebe	*Tachybaptus ruficollis*	小鸊鷉	*CR	LC	Native	0	0	0	0	0	0
Little Ringed Plover	*Charadrius dubius*	金眶鴴	CWV, PM	(LC)	Native	167	22	28	0	0	4
Long-tailed Shrike	*Lanius schach*	棕背伯勞	*CR		Native	60	36	30	2	1	20
Masked Laughingthrush	*Garrulax perspicillatus*	黑臉噪鸝	AR		Native	98	156	36	3	329	68
Northern Shoveler	*Spatula clypeata*	琵嘴鴨	WV	RC	Native	0	0	0	11	0	0
Olive-backed Pipit	*Anthus hodgsoni*	樹鷚	CPM, WV		Native	54	84	5	0	0	0
Oriental Magpie	*Pica serica*	喜鵲	R		Native	2	1	0	0	1	11
Oriental Magpie Robin	*Copsychus saularis*	鵲鴝	AR		Native	31	83	14	0	128	3
Oriental Turtle dove	*Streptopelia orientalis*	山斑鳩	CWV, PM		Native	0	3	0	0	0	0
Pacific Swift	*Apus pacificus*	白腰雨燕	CSpM, Sv	LC	Native	0	0	0	0	0	10
Pallas's Leaf Warbler	*Phylloscopus proregulus*	黃腰柳鶯	CWV		Native	3	6	4	1	37	0
Peregrine Falcon	*Falco peregrinus*	遊隼	SR, WV	Cap.586, LC	Native	1	0	0	0	0	1
Pied Avocet	*Recurvirostra avosetta*	反嘴鷸	WV	RC	Native	0	0	4	0	0	0
Pied Kingfisher	*Ceryle rudis*	斑魚狗	UR	(LC)	Native	0	0	0	0	0	2

Common Name	Species Name	Chinese Name	Hong Kong Status	Conservation Status	Occurrence Status	Abundance					
						Walk Transect (T5)					
						WAL	DAL	SWH	P	Heard	Flight
Pintail Snipe	*Gallinago stenura*	針尾沙錐	CPM		Native	90	1	318	0	0	0
Plain Prinia	*Prinia inornata*	純色鷦鶯	*CR		Native	22	47	18	7	29	2
Plaintive Cuckoo	*Cacomantis merulinus*	八聲杜鵑	USV		Native	1	4	0	0	5	0
Red Turtle Dove	*Streptopelia tranquebarica*	火斑鳩	UPM		Native	1	0	0	0	0	0
Red-billed Blue Magpie	*Urocissa erythrorynchа*	紅咀藍鵲	*CR		Native	0	8	3	0	5	16
Red-billed Starling	*Spodiopsar sericeus*	絲光椋鳥	CWV	GC	Native	6	34	0	0	0	10
Red-necked Stint	*Calidris ruficollis*	紅頸濱鷸	ASpM	NT, LC	Native	1	0	0	0	0	0
Red-rumped Swallow	*Cecropis daurica*	金腰燕	UPM		Native	0	0	0	0	0	39
Red-throated Pipit	*Anthus cervinus*	紅喉鷚	CPM, WV	LC	Native	0	5	0	0	0	0
Red-whiskered Bulbul	*Pycnonotus jocosus*	紅耳鵯	AR		Native	364	498	141	6	383	522
Richard's Pipit	*Anthus richardi*	理氏鷚	CPM, WV		Native	54	123	2	0	0	0
Rose-ringed Parakeet	*Psittacula krameri*	紅領綠鸚鵡	SR		Introduced	0	0	0	0	0	12
Russet Sparrow	*Passer cinnamomeus*	山麻雀	SWV		Native	1	0	0	0	0	0
Scaly-breasted Munia	*Lonchura punctulata*	斑文鳥	*CR		Native	2456	1819	1041	27	62	1632
Sooty-headed Bulbul	*Pycnonotus aurigaster*	白喉紅臀鵯	UR		Native	3	2	0	0	0	0
Spotted Dove	*Spilopelia chinensis*	珠頸斑鳩	AR		Native	360	613	154	4	235	491
Stejneger's Stonechat	*Saxicola stejnegeri*	黑喉石鵐	CPM, WV		Introduced	57	46	22	0	1	12
Swinhoe’s Egret	*Egretta eulophotes*	黃嘴白鷺	SSM	VU, GC, (EN)	Native	1	0	0	0	0	0
Swinhoe's Snipe	*Gallinago megala*	大沙錐	UPM	LC	Native	1	1	3	0	0	0

Common Name	Species Name	Chinese Name	Hong Kong Status	Conservation Status	Occurrence Status	Abundance					
						Walk Transect (T5)					
						WAL	DAL	SWH	P	Heard	Flight
Swinhoe's White-eye	*Zosterops simplex*	暗綠繡眼鳥	AR		Native	58	89	8	0	35	36
White Wagtail	*Motacilla alba*	白鶺鴒	CPM, WV		Native	457	317	179	8	40	191
White-breasted Waterhen	*Amaurornis phoenicurus*	白胸苦惡鳥	*CR		Native	125	50	100	19	118	6
White-headed Munia	*Lonchura maja*	白頭文鳥	R		Native	1	0	0	0	0	0
White-rumped Munia	*Lonchura striata*	白腰文鳥	*CR		Native	867	527	329	0	0	160
White-throated Kingfisher	*Halcyon smyrnensis*	白胸翡翠	*CR	(LC)	Native	9	4	1	2	1	8
Wood Sandpiper	*Tringa glareola*	林鷸	CPM, WV	LC	Native	495	37	508	0	0	51
Yellow Bittern	*Ixobrychus sinensis*	黃葦鳽	USV, PM	(LC)	Native	1	0	0	0	0	1
Yellow-bellied Prinia	*Prinia flaviventris*	黃腹鷦鶯	*CR		Native	21	24	12	3	158	1
Yellow-breasted Bunting	*Emberiza aureola*	黃胸鵐	CPM	RC, CR	Native	16	0	0	0	0	0
Yellow-browed Warbler	*Phylloscopus inornatus*	黃眉柳鶯	CWV, SpM		Native	2	4	1	0	24	0
Zitting Cisticola	*Cisticola juncidis*	棕扇尾鶯	CPM, WV	LC	Native	87	51	18	0	0	0
Total No. of Species						**75**	**62**	**58**	**30**	**34**	**60**
Total No. of Spcies of **Conservation Significance**						**28**	**16**	**17**	**10**	**3**	**23**

Notes:

Hong Kong Status:

R – Resident; *CR – Common Resident; AR – Abundant Resident; UR – Uncommon resident; SR – Scarce resident; WV – Winter visitor; PM – Passage migrant; CPM – Common passage migrant; UPM – Uncommon passage migrant; CaM - Common autumn migrant; USV - Uncommon Summer visitor; SpM – Spring migrant; ASpM – Abundant Spring Passage Migrant; CSpM – Common spring migrant; Sv – Summer Visitor; CWV – Common winter visitor; SWV – Scarce winter visitor; SSM – Scarce spring migrant

Hong Kong Status was decided according to AFCD biodiversity website (www.hkbiodiversity.net)

Conservation Status:

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

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

Common Name	Species Name	Chinese Name	Hong Kong Status	Conservation Status	Occurrence Status	Abundance					
						Walk Transect (T5)					
						WAL	DAL	SWH	P	Heard	Flight

IUCN Red List Status: VU= Vulnerable; NT= Near Threatened; CR: Critically Endangered.
China Red Data Book Status: (VU)= Vulnerable; (EN)= Endangered
Fellowes et al. (2002); RC=Regional Concern; LC=Local Concern; PRC=Potential Regional Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.
Occurrence Status was according to BirdLife Intenational website (http://datazone.birdlife.org/species/search)
Habitats:
WAL: Wet Agricultural Land
DAL: Dry Agricultural Land
SWH: Shallow Water Habitat
P: Pond

B.2 Macroinvertebrates

B.2.1 Freshwater macroinvertebrate species recorded for aquatic fauna monitoring, Ma Tso Lung Stream and Siu Hang San Tsuen Stream, July 2019-June 2020

Common Name	Scientific Name	Conservation Status	Occurrence Status	Kick-netting, sweep netting and direct observation									
				Abundance									
				MS_01	MS_02	MS_03	MS_04	MS_05*	MS_06	MS_07	MS_08	MS_09	MS_10
Apple Snail	*Pomacea canaliculata*	-	Introduced			+++	+++		+++		+++	+++	+++
Asian Amberwing	*Brachythemis contaminata*	-	Native				+						+
Atyid Shrimp	*Caridina* sp.	-	-									+++	
Bee Shrimp	*Caridina cantonensis*	-	Native								+	+	
Black Threadtail	*Prodasineura autumnalis*	-	Native		+	+	+++		+	+++			++
Blackfly	Simuliidae	-	-						+				
Bladder Snail	*Physella acuta*	-	Introduced	+++	+++		+++						

Common Name	Scientific Name	Conservation Status	Occurrence Status	Kick-netting, sweep netting and direct observation									
				Abundance									
				MS_01	MS_02	MS_03	MS_04	MS_05*	MS_06	MS_07	MS_08	MS_09	MS_10
Blood Worm	Chironomidae	-	-		+++				+		++		
	Chironomus sp.	-	-				+		++	++	++		
Caddisfly	*Chematopsyche* sp.	-	-				+		+	+++	+		
	Ecnomus sp.	-	-							++			
	Hydropsyche sp.	-	-				++		+++		++		
	Hydroptila sp.	-	-				+++		+++	+++	+++		
Chinese River Snail	*Sinotaia guangdungensis*	-	Native			+						+	+
Common Blue Skimmer	*Orthetrum glaucum*	-	Native			+	++				+		
Common Bluetail	*Ischnura senegalensis*	-	Native						++		+		+
Cranefly	Tipulidae	-	-		+				+				
Crimson Darter	*Crocothemis servilia*	-	Native			+						+	
Crimson Dropwing	*Trithemis aurora*	-	Native				+				+		++
Damselfly	*Copera* sp.	-	-		++	+	+						+
Dragonfly	Libellulidae	-	-								+	+	
Freshwater Snail	*Bellamya* sp.	-	-		++	+++	++			+++	+++	+	+++
	Radix plicatulus	-	Introduced	+++	++					++			
	Tricula sp.	-	-		++								
Glider Dragonfly	*Pantala* sp.	-	-		+	++			++	++		+	
Golden Freshwater Clam	*Corbicula fluminea*	-	Native								+		
Leech	Hirudinea	-	-		++					+			
Marshglider Dragonfly	*Trithemis* sp.	-	-										+
Mayfly	*Baetis* sp.	-	-						+++	+	+++		

Common Name	Scientific Name	Conservation Status	Occurrence Status	Kick-netting, sweep netting and direct observation									
				Abundance									
				MS_01	MS_02	MS_03	MS_04	MS_05*	MS_06	MS_07	MS_08	MS_09	MS_10
	Caenis sp.	-	-				++		+++	+	+		
	Cloeodes sp.	-	-				+			+			
	Cloeon sp.	-	-						++	+			
	Heptageniidae	-	-						+		+		
	Procloeon sp.	-	-			+			+		+		
Mosquito	Culicidae	-	-		++								
Orange-tailed Sprite	*Ceriagrion auranticum*	-	Native				+		+	++			++
Ram's Horn Snail	*Biomphalaria glabrata*	-	Introduced									+	
	Gyraulus convexiusculus	-	Introduced		+++								
Red-rimmed Melania	*Melanoides tuberculata*	-	Introduced		+++	+				++	+++	+++	+
River Snail	*Sinotaia quadrata*	-	Native		++	+++	+++		+++	+++	+++	+++	++
Scarlet Basker	*Urothemis signata*	-	Native								+		
Skimmer Dragonfly	*Crocothemis* sp.	-	-			+			+	+			
	Macromiidae	-	-						+				
	Neurothemis sp.	-	-				+						
	Orthetrum sp.	-	-			+			+		+		+
	Orthetrum sp. 1	-	-		+	++	++		+++			+	+
	Orthetrum sp. 2	-	-			++	+		++	+			
Stonefly	*Togoperla* sp.	-	-						+				
Threadtail Damselfly	*Prodasineura* sp.	-	-			++				+		+	+
True Fly	Tipulidae	-	-				+						
Water Strider	*Metrocoris* sp.	-	-			+++	+++		+++	+++	++	+	+++
	Microvelia sp.	-	-						+	+	++		

Common Name	Scientific Name	Conservation Status	Occurrence Status	Kick-netting, sweep netting and direct observation									
				Abundance									
				MS_01	MS_02	MS_03	MS_04	MS_05*	MS_06	MS_07	MS_08	MS_09	MS_10
	Ptilomera tigrina	-	Native				+++		+++	+++	++		+++
	Rhagovelia sp.	-	-				+++			+	++		
Yellow Featherlegs	*Copera marginipes*	-	Native		+++	+	++		++	+++			
Total No. of Species				**2**	**16**	**18**	**24**	**0**	**28**	**24**	**25**	**14**	**17**
Total No. of Species of Conservation Significance				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Notes:
+: species recorded within the monitoring station (no. of individuals from 1-10)
++: species commonly recorded within the monitoring station (no. of individuals from 11-20)
+++: most abundant species recorded within monitoring station (no. of individuals from 21 and above)
*: dried-up monitoring station
Dash under Occurrence Status indicates no information available

B.2.2 Freshwater macroinvertebrate species recorded for aquatic fauna monitoring, Ma Tso Lung Stream and Siu Hang San Tsuen Stream, July 2019-June 2020

Common Name	Scientific Name	Conservation Status	Occurrence Status	Kick-netting, sweep netting and direct observation				
				Abundance				
				MS_11	MS_12	MS_13	MS_14	MS_15
Apple Snail	*Pomacea canaliculata*	-	Introduced			+++	+++	+++
Atyid Shrimp	*Caridina* sp.	-	-			+		
Black Threadtail	*Prodasineura autumnalis*	-	Native			+	+	
Bladder Snail	*Physella acuta*	-	Introduced	+++				+++
Blood Worm	Chironomidae	-	-	++				+++
Caddisfly	*Hydropsyche* sp.	-	-					+++
Chinese River Snail	*Sinotaia guangdungensis*	-	Native			+		
Crimson Dropwing	*Trithemis aurora*	-	Native			+		
Freshwater Snail	*Bellamya* sp.	-	-			+++		
	Radix plicatulus	-	Introduced	+ +++				+

Common Name	Scientific Name	Conservation Status	Occurrence Status	Kick-netting, sweep netting and direct observation				
				Abundance				
				MS_11	MS_12	MS_13	MS_14	MS_15
	Sulcospira hainanensis	-	Native					++
Ram's Horn Snail	*Biomphalaria glabrata*	-	Introduced		+			
	Gyraulus convexiusculus	-	Introduced					+++
Red-rimmed Melania	*Melanoides tuberculata*	-	Introduced			+		
River Snail	*Sinotaia quadrata*	-	Native	+	++	+++	++	++
Total No. of Species				**4**	**2**	**8**	**3**	**8**
Total No. of Species of Conservation Significance				**0**	**0**	**0**	**0**	**0**

Notes:
+: species recorded within the monitoring station (no. of individuals from 1-10)
++: species commonly recorded within the monitoring station (no. of individuals from 11-20)
+++: most abundant species recorded within monitoring station (no. of individuals from 21 and above)
Dash under Occurrence Status indicates no information available

B.2.3 Freshwater macroinvertebrate species recorded for aquatic fauna monitoring, Long Valley, July 2019-June 2020

Common Name	Scientific Name	Conservation Status	Occurrence Status	Kick-netting, sweep netting and direct observation				
				Abundance				
				MS_16	MS_17	MS_18	MS_19	MS_20
Apple Snail	*Pomacea canaliculata*	-	Introduced	+++	+++	+++		+++
Atyid Shrimp	*Caridina* sp.	-	-				+++	
Backswimmer	Notonectidae	-	-					++
Blood Worm	Chironomidae	-	-	+				
	Chironomus sp.	-	-	+++				
Bristle Worm	Polychaeta	-	-	+				
Caddisfly	*Ecnomus* sp.	-	-	+				
	Hydroptila sp.	-	-	++				
Chinese River Snail	*Sinotaia guangdungensis*	-	Native	++	+			
Dragonfly	Libellulidae	-	-	+				
Freshwater Snail	*Bellamya* sp.	-	-	+++	+++			
	Tricula sp.	-	-	+				
Leech	Hirudinea	-	-	+				
Mayfly	*Baetis* sp.	-	-	+				

Common Name	Scientific Name	Conservation Status	Occurrence Status	Kick-netting, sweep netting and direct observation				
				Abundance				
				MS_16	MS_17	MS_18	MS_19	MS_20
	Caenis sp.	-	-	+++				
	Cloeon sp.	-	-	+				
Ram's Horn Snail	*Biomphalaria glabrata*	-	Introduced	++				
	Gyraulus convexiusculus	-	Introduced	+				
Red-rimmed Melania	*Melanoides tuberculata*	-	Introduced	+++				
River Snail	*Sinotaia quadrata*	-	Native	+++	+++	+		++
Water Boatman	Corixidae	-	-					+++
Water Strider	*Metrocoris* sp.	-	-				+++	+++
	Ptilomera tigrina	-	Native					+++
Total No. of Species				**18**	**4**	**2**	**2**	**6**
Total No. of Species of Conservation Significance				**0**	**0**	**0**	**0**	**0**

Notes:
+: species recorded within the monitoring station (no. of individuals from 1-10)
++: species commonly recorded within the monitoring station (no. of individuals from 11-20)
+++: most abundant species recorded within monitoring station (no. of individuals from 21 and above)
Dash under Occurrence Status indicates no information available

B.3 Fish

B.3.1 Freshwater fish species recorded for aquatic fauna monitoring, Ma Tso Lung Stream and Siu Hang San Tsuen Stream, July 2019-June 2020

Common Name	Scientific Name	Conservation Status	Occurrence Status	Kick-netting, sweep netting and direct observation									
				Abundance									
				MS_01	MS_02	MS_03	MS_04	MS_05*	MS_06	MS_07	MS_08	MS_09	MS_10
Chinese Barb	*Barbodes semifasciolatus*	-	Native				++		+++	+++		+++	+++
Common Carp	*Cyprinus carpio*	VU	Introduced		+				+				
Dwarf Snakehead	*Channa gachua*	-	Native			+++	+++		+++	+			
Goby	*Rhinogobius duospilus*	-	Native		+								
	Rhinogobius sp.	-	-		+								
Mosquito Fish	*Gambusia affinis*	-	Introduced			+++	++		+++	+++	+	++	++

Common Name	Scientific Name	Conservation Status	Occurrence Status	Kick-netting, sweep netting and direct observation									
				Abundance									
				MS_01	MS_02	MS_03	MS_04	MS_05*	MS_06	MS_07	MS_08	MS_09	MS_10
Mozambique Tilapia	*Oreochromis mossambicus*	VU	Introduced				+++		++		+++		+
Nile Tilapia	*Oreochromis niloticus*	-	Introduced			+	++		+++	+++	+++	+++	+++
Redbelly Tilapia	*Coptodon zillii*	-	Introduced				++		++	+++	+++		+++
Spotted Snakehead	*Channa maculata*	-	Native				++			+			++
Total No. of Species				**0**	**3**	**3**	**7**	**0**	**7**	**6**	**4**	**3**	**6**
Total No. of Species of Conservation Significance				**0**	**1**	**0**	**1**	**0**	**2**	**0**	**1**	**0**	**1**

Notes:
VU: Vulnerable in IUCN Red List Status
Occurrence Status was according to The IUCN Red List of Threatened Species website (https://www.iucnredlist.org)
*: dried-up monitoring station
Dash under Occurrence Status indicates no information available
+: species recorded within the monitoring station (no. of individuals from 1-10)
++: species commonly recorded within the monitoring station (no. of individuals from 11-20)
+++: most abundant species recorded within monitoring station (no. of individuals from 21 and above)

B.3.2 Freshwater fish species recorded for aquatic fauna monitoring, Ma Tso Lung Stream and Siu Hang San Tsuen Stream, July 2019-June 2020

Common Name	Scientific Name	Conservation Status	Occurrence Status	Kick-netting, sweep netting and direct observation				
				Abundance				
				MS_11	MS_12	MS_13	MS_14	MS_15
Chinese Barb	*Barbodes semifasciolatus*	-	Native			+		+
Guppy	*Poecilia reticulata*	-	Introduced			+++		+
Mosquito Fish	*Gambusia affinis*	-	Introduced		++	+++	+	+++
Mozambique Tilapia	*Oreochromis mossambicus*	VU	Introduced				+++	
Nile Tilapia	*Oreochromis niloticus*	-	Introduced				+++	+++
Predaceous Chub	*Parazacco spilurus*	(VU)	Introduced					+++
Redbelly Tilapia	*Coptodon zillii*	-	Introduced					+++
Rose Bitterling	*Rhodeus ocellatus*	LC	Introduced					++
Spotted Snakehead	*Channa maculata*	-	Native				+	
Swordtail	*Xiphophorus hellerii*	-	Introduced					+

Common Name	Scientific Name	Conservation Status	Occurrence Status	Kick-netting, sweep netting and direct observation Abundance				
				MS_11	MS_12	MS_13	MS_14	MS_15
White-spotted Walking Catfish	*Clarias fuscus*	-	Native				++	
Total No. of Species				0	1	3	5	8
Total No. of Species of Conservation Significance				0	0	0	1	2

Notes:
VU: Vulnerable in IUCN Red List Status
(VU): Vulnerable in China Red Data Book Status
LC=Local Concern (Fellowes et al.,2002)
Occurrence Status was according to The IUCN Red List of Threatened Species website (https://www.iucnredlist.org)
+: species recorded within the monitoring station (no. of individuals from 1-10)
++: species commonly recorded within the monitoring station (no. of individuals from 11-20)
+++: most abundant species recorded within monitoring station (no. of individuals from 21 and above)

B.3.3 Freshwater fish species recorded for aquatic fauna monitoring, Long Valley, July 2019-June 2020

Common Name	Scientific Name	Conservation Status	Occurrence Status	Kick-netting, sweep netting and direct observation Abundance				
				MS_16	MS_17	MS_18	MS_19	MS_20
Koi	*Cyprinus rubrofuscus*	-	Native				+++	
Mosquito Fish	*Gambusia affinis*	-	Introduced		+++		+++	
Mozambique Tilapia	*Oreochromis mossambicus*	VU	Introduced	++			+++	
Nile Tilapia	*Oreochromis niloticus*	-	Introduced	+++			+++	
North African Catfish	*Clarias gariepinus*	-	Introduced	+	+			
Redbelly Tilapia	*Coptodon zillii*	-	Introduced	++				
Swampy Eel	*Monopterus albus*	-	Native	+				
Total No. of Species				5	2	0	4	0
Total No. of Species of Conservation Significance				1	0	0	1	0

Note:
VU: Vulnerable in IUCN Red List Status
Occurrence Status was according to The IUCN Red List of Threatened Species website (https://www.iucnredlist.org)
+: species recorded within the monitoring station (no. of individuals from 1-10)
++: species commonly recorded within the monitoring station (no. of individuals from 11-20)
+++: most abundant species recorded within monitoring station (no. of individuals from 21 and above)

B.4 Mammals

B.4.1 Mammal species recorded for ecological sensitive habitat monitoring, Transects T1 to T6, July 2019-June 2020

Common Name	Species Name	Chinese Name	Local Restrictedness	Conservation Status	Occurrence Status	Relative Abundance					
						Walk Transect					
						T1	T2	T3	T4	T5	T6
Domestic Cat	*Felis catus*	野貓	Uncommon	-	Introduced	+++		+++	+++	+++	
Domestic Dog	*Canis lupus familiaris*	野狗	Common	-	Introduced	+++	+	+++	+++	+++	+++
Domestic Ox	*Bos taurus*	黃牛	Common	-	Introduced	++		+++			
Grey Shrew	*Crocidura attenuata*	灰麝鼩	Uncommon	-	Introduced	++	+			+	
Pallas's Squirrel	*Callosciurus erythraeus*	赤腹松鼠	Common	Cap. 170	Introduced	+		+			
Roof Rat	*Rattus rattus*	屋頂鼠	Common	-	Introduced	+++		++	+++	+++	
Short-nosed Fruit Bat	*Cynopterus sphinx*	短吻果蝠	Very Common	Cap. 170	Native	+++	+++	+++	+++	+++	+++
Total No. of Species						**7**	**3**	**6**	**4**	**5**	**2**
Total No. of Species of Conservation Significance						**2**	**1**	**2**	**1**	**1**	**1**

Notes:
Cap. 170: Species under protection of Wild Animals Protection Ordinance (Cap. 170)
Occurrence Status was according to The IUCN Red List of Threatened Species website (https://www.iucnredlist.org) or as provided in the References Section of this report
+: species recorded within Study Area (present or 1 ind.)
++: species commonly recorded within Study Area (no. individuals from 2-3)
+++: dominant species within Study Area (no. individuals from 4 and above)

B.4.2 Mammal species recorded for ecological sensitive habitat monitoring, Long Valley, July 2019-June 2020

Common Name	Species Name	Chinese Name	Local Restrictedness	Occurrence Status	Conservation Status	Relative Abundance
						Walk Transect
						T7
Domestic Cat	*Felis catus*	野貓	Uncommon	Introduced	-	+++
Domestic Dog	*Canis lupus familiaris*	野狗	Common	Introduced	-	+++
Domestic Ox	*Bos taurus*	黃牛	Common	Introduced	-	+++
Grey Shrew	*Crocidura attenuata*	灰麝鼩	Uncommon	Introduced	-	++
Pallas's Squirrel	*Callosciurus erythraeus*	赤腹松鼠	Common	Introduced	Cap. 170	++
Roof Rat	*Rattus rattus*	屋頂鼠	Common	Introduced	-	+++
Short-nosed Fruit Bat	*Cynopterus sphinx*	短吻果蝠	Very Common	Native	Cap. 170	+++
Small Asian Mongoose	*Herpestes javanicus*	紅頰獴	Uncommon	Introduced	Cap. 170	+
Total No. of Species						**8**
Total No. of Species of Conservation Significance						**3**

Notes:
Cap. 170: Species under protection of Wild Animals Protection Ordinance (Cap. 170)
Occurrence Status was according to The IUCN Red List of Threatened Species website (https://www.iucnredlist.org) or as provided in the References Section of this report
+: species recorded within Study Area (present or 1 ind.)
++: species commonly recorded within Study Area (no. individuals from 2-3)
+++: dominant species within Study Area (no. individuals from 4 and above)

B.5 Herpetofauna

B.5.1 Herpetofauna species recorded for ecological sensitive habitat monitoring, Transects T1 to T6, July 2019-June 2020

Common Name	Species Name	Chinese Name	Conservation Status	Occurrence Status	Abundance					
					Walk Transect					
					T1	T2	T3	T4	T5	T6
Amphibian										
Asian Common Toad	*Duttaphrynus melanostictus*	黑眶蟾蜍	-	Native	+++	+++	+++	+++	+++	+++
Asiatic Painted Frog	*Kaloula pulchra pulchra*	花狹口蛙	-	Native	+++	+++	++	+++	+	+++
Brown Tree Frog	*Polypedates megacephalus*	斑腿泛樹蛙	-	Native	+++		+++	+++	+++	+++
Greenhouse Frog	*Eleutherodactylus planirostris*	溫室蟾	-	Introduced	+++	++	++	+++	+	+++
Gunther's Frog	*Hylarana guentheri*	沼蛙	-	Native	+++		+++	+++	+	+++
Paddy Frog	*Fejervarya limnocharis*	澤蛙	-	-	+++		++			++
Spotted Narrow-mouthed Frog	*Kalophrynus interlineatus*	花細狹口蛙	(NT)	Native	+++					+
Reptile										
Bamboo Snake	*Cryptelytrops albolabris*	青竹蛇	-	Native		+				
Bowring's Gecko	*Hemidactylus bowringii*	原尾蜥虎	-	Native	+++		+++	+++	+++	+++
Changeable Lizard	*Calotes versicolor*	變色樹蜥	-	Native	+++	+++	+++	++	+	+++
Chinese Gecko	*Gekko chinensis*	壁虎	-	Native	+++	+++	++	+++	+++	+++
Chinese Skink	*Plestiodon chinensis chinensis*	石龍子	-	Native	+++	+++	+++	+	++	+++
Common Rat Snake	*Ptyas mucosus*	滑鼠蛇	Cap.586, EN, PRC	-	+					
Four-clawed Gecko	*Gehyra mutilata*	截趾虎	(VU)	Native	+++					
Long-tailed Skink	*Eutropis longicaudata*	長尾南蜥	-	Native	+++	+	++	++	+++	+++

Common Name	Species Name	Chinese Name	Conservation Status	Occurrence Status	Abundance					
					Walk Transect					
					T1	T2	T3	T4	T5	T6
Red-eared Slider	*Trachemys scripta*	巴西龜	-	Introduced	+		+++		+++	+
Red-necked Keelback	*Rhabdophis subminiatus*	紅脖游蛇	-	Native	+					+
Total No. of Species					**16**	**8**	**12**	**10**	**11**	**14**
Total No. of Species of Conservation Significance					**3**	**0**	**0**	**0**	**0**	**1**

Notes:
Cap. 586: Protection of Endangered Species of Animals and Plants Ordinance
Red List of China's Vertebrates: (NT)= Near Threatened; (VU)= Vulnerable
Fellowes et al. (2002); PRC=Potential Regional Concern.
Occurrence Status was according to The IUCN Red List of Threatened Species website (https://www.iucnredlist.org) or as provided in the References Section of this report
+: species recorded within transect routes (present or 1 ind.)
++: species commonly recorded within transect routes (no. individuals from 2-3)
+++: represent recorded species is a dominant species within transect routes (no. individuals from 4 and above)
Dash under Occurrence Status indicates no information available

B.5.2 Herpetofauna species recorded for ecological sensitive habitat monitoring, Long Valley, July 2019-June 2020

Common Name	Species Name	Chinese Name	Conservation Status	Occurrence Status	Abundance
					Walk Transect
					T7
Amphibian					
Asian Common Toad	*Duttaphrynus melanostictus*	黑眶蟾蜍	-	Native	+++
Asiatic Painted Frog	*Kaloula pulchra pulchra*	花狹口蛙	-	Native	+++
Brown Tree Frog	*Polypedates megacephalus*	斑腿泛樹蛙	-	Native	+++
Chinese Bullfrog	*Hoplobatrachus rugulosus*	虎紋蛙	PRC, CII	Native	+++
Greenhouse Frog	*Eleutherodactylus planirostris*	溫室蟾	-	Introduced	+++
Gunther's Frog	*Hylarana guentheri*	沼蛙	-	Native	+++
Ornate Pigmy Frog	*Microhyla fissipes*	飾紋姬蛙	-	Native	+
Paddy Frog	*Fejervarya limnocharis*	澤蛙	-	-	+++
Spotted Narrow-mouthed Frog	*Kalophrynus interlineatus*	花細狹口蛙	(NT)	Native	+
Reptile					
Bowring's Gecko	*Hemidactylus bowringii*	原尾蜥虎	-	Native	+++
Changeable Lizard	*Calotes versicolor*	變色樹蜥	-	Native	+++

Common Name	Species Name	Chinese Name	Conservation Status	Occurrence Status	Abundance Walk Transect T7
Chinese Gecko	*Gekko chinensis*	壁虎	-	Native	+++
Chinese Skink	*Plestiodon chinensis chinensis*	石龍子	-	Native	+++
Common Rat Snake	*Ptyas mucosus*	滑鼠蛇	Cap.586, EN, PRC	-	+
Four-clawed Gecko	*Gehyra mutilata*	截趾虎	(VU)	Native	+++
Long-tailed Skink	*Eutropis longicaudata*	長尾南蜥	-	Native	+++
Many-banded Krait	*Bungarus multicinctus*	銀環蛇	VU, PRC, (EN)	Native	++
Red-eared Slider	*Trachemys scripta*	巴西龜	-	Introduced	+++
Taiwan Kukri Snake	*Oligodon formosanus*	台灣小頭蛇	-	Native	+
Yellow-spotted Keelback	*Xenochrophis flavipunctatus*	黃斑漁游蛇	-	Introduced	+++
Total No. of Species					**20**
Total No. of Species of Conservation Significance					**5**

Notes:
CII = Listed as "Class II Protected Species" in China
Cap. 586: Protection of Endangered Species of Animals and Plants Ordinance
Red List of China's Vertebrates: (NT)= Near Threatened; (VU)= Vulnerable; (EN)= Endangered
China Red Data Book: EN= Endangered; VU: Vulnerable
Fellowes et al. (2002); PRC=Potential Regional Concern.
Occurrence Status was according to The IUCN Red List of Threatened Species website (https://www.iucnredlist.org) or as provided in the References Section of this report
+: species recorded within transect routes (present or 1 ind.)
++: species commonly recorded within transect routes (no. individuals from 2-3)
+++: represent recorded species is a dominant species within transect routes (no. individuals from 4 and above)
Dash under Occurrence Status indicates no information available

B.6 Butterfly

B.6.1 Butterfly species recorded for ecological sensitive habitat monitoring, Transects T1 to T6, July 2019-June 2020

Common Name	Species Name	Chinese Name	Local Restrictedness	Conservation Status	Occurrence Status*	Relative Abundance					
						Walk Transect					
						T1	T2	T3	T4	T5	T6
Angled Castor	*Ariadne ariadne*	波蛱蝶	Common	-	-			+++			++
Banded Tree Brown	*Lethe confusa*	白帶黛眼蝶	Common	-	-		++		++	+++	+
Blue Admiral	*Kaniska canace*	琉璃蛱蝶	Common	-	-	+					
Blue Tiger	*Tirumala limniace*	青斑蝶	Common	-	-	++	+++			+++	
Blue-spotted Crow	*Euploea midamus*	藍點紫斑蝶	Very Common	-	-	+++	+++		+++	+++	
Bush Hopper	*Ampittia dioscorides*	黃斑弄蝶	Uncommon	-	-	+++	+		+++		+
Chestnut Bob	*Iambrix salsala*	雅弄蝶	Uncommon	-	-				+		
Chocolate Pansy	*Junonia iphita*	鉤翅眼蛱蝶	Common	-	-			+++	+++		
Common Bluebottle	*Graphium sarpedon*	青鳳蝶	Very Common	-	-	+++	+++	+			+++
Common Five-ring	*Ypthima baldus baldus*	矍眼蝶	Very Common	-	-	+++			+++	++	
Common Grass Yellow	*Eurema hecabe*	寬邊黃粉蝶	Very Common	-	-	++	+++	+++		+++	+++
Common Hedge Blue	*Acytolepis puspa gisca*	鈕灰蝶	Common	-	-	+++	+++	+++		++	+++
Common Indian Crow	*Euploea core amymone*	幻紫斑蝶	Common	-	-	+++	+++	+++	+++	+++	+++
Common Jay	*Graphium doson axion*	木蘭青鳳蝶	Common	-	-						+
Common Jester	*Symbrenthia lilaea*	散紋盛蛱蝶	Common	-	-		++				
Common Mapwing	*Cyrestis thyodamas*	網絲蛱蝶	Common	-	-			+++			
Common Mormon	*Papilio polytes*	玉帶鳳蝶	Very Common	-	-	+++	+	+++	++	+++	+++

Common Name	Species Name	Chinese Name	Local Restrictedness	Conservation Status	Occurrence Status*	Relative Abundance					
						Walk Transect					
						T1	T2	T3	T4	T5	T6
Common Sailer	*Neptis hylas*	中環蛺蝶	Very Common	-	-	+++	+	+++		+++	+++
Common Tiger	*Danaus genutia*	虎斑蝶	Common	-	-	+++	++		+++		
Contiguous Swift	*Polytremis lubricans*	黃紋孔弄蝶	Common	-	-	++					
Danaid Eggfly	*Hypolimnas misippus*	金斑蛺蝶	Uncommon	LC	-	+++					
Dark Brand Bush Brown	*Mycalesis mineus*	小眉眼蝶	Very Common	-	-	+	+++		+++		
Five-bar Swordtail	*Pathysa antiphates*	綠鳳蝶	Common	-	-	++		+++		+	+
Glassy Tiger	*Parantica aglea*	絹斑蝶	Common	-	-	+++	+			+++	+++
Great Mormon	*Papilio memnon*	美鳳蝶	Very Common	-	-	+++		+	+++		+++
Great Orange Tip	*Hebomoia glaucippe*	鶴頂粉蝶	Common	-	-						+++
Indian Cabbage White	*Pieris canidia*	東方菜粉蝶	Very Common	-	-	+++	+++	+++	+++	++	+++
Indian Fritillary	*Argyreus hyperbius*	斐豹蛺蝶	Common	-	-		++				
Lemon Emigrant	*Catopsilia pomona*	遷粉蝶	Common	-	-	+++			+++		+++
Long-banded Silverline	*Spindasis lohita*	銀線灰蝶	Common	-	-	+			++		
Long-tailed Blue	*Lampides boeticus*	亮灰蝶	Common	-	-	+++	++	+++	+++		
Mottled Emigrant	*Catopsilia pyranthe*	梨花遷粉蝶	Very Common	-	-	+++			+++		+++
Painted Jezebel	*Delias hyparete*	優越斑粉蝶	Uncommon	-	-	+					
Pale Grass Blue	*Pseudozizeeria maha*	酢漿灰碟	Very Common	-	-	+++	+++	+++	++	+++	+++
Paris Peacock	*Papilio paris*	巴黎翠鳳蝶	Very Common	-	-	+++	+		+++		+++

Common Name	Species Name	Chinese Name	Local Restrictedness	Conservation Status	Occurrence Status*	Relative Abundance					
						Walk Transect					
						T1	T2	T3	T4	T5	T6
Peacock Pansy	*Junonia almana*	美眼蛱蝶	Common	-	-	+					
Plum Judy	*Abisara echerius*	蛇目褐蜆蝶	Very Common	-	-	+++	+++		+++		+++
Punchinello	*Zemeros flegyas*	波蜆蝶	Common	-	-	+++					
Purple Sapphire	*Heliophorus epicles*	斜斑彩灰蝶	Common	-	-	+					
Red Helen	*Papilio helenus*	玉斑鳳蝶	Very Common	-	-	+++	+++	+	+	+++	+
Red Ring Skirt	*Hestina assimilis*	黑脈蛱蝶	Common	-	-	+		+++		+++	
Red-base Jezebel	*Delias pasithoe*	報喜斑粉蝶	Very Common	-	-	+++	+++	++	+	+++	+++
Rustic	*Cupha erymanthis*	黃襟蛱蝶	Very Common	-	-	+++			+++		+++
South China Bush Brown	*Mycalesis zonata*	平頂眉眼蝶	Common	-	-	+++	++		+++		
Tailed Jay	*Graphium agamemnon*	統帥青鳳蝶	Common	-	-		++				++
Three-spot Grass Yellow	*Eurema blanda*	檗黃粉蝶	Common	-	-	+++	+++			+++	++
Water Snow Flat	*Tagiades litigiosus*	沾邊裙弄蝶	Common	-	-		+++			++	
Yellow Rajah	*Charaxes marmax*	螫蛱蝶	Uncommon	LC	-	+++	+	+	++		++
Total No. of Species						**37**	**27**	**18**	**24**	**18**	**26**
Total No. of Species of Conservation Significance						**2**	**1**	**1**	**1**	**0**	**1**

Notes:
Fellowes et al. (2002): LC=Local Concern
+: species recorded within transect routes (present or 1 ind.)
++: species commonly recorded within transect routes (no. individuals from 2-5)
+++: dominant species within transect routes (no. individuals from 6 and above)
*Very limited data are available for the occurrence status (being native to Hong Kong) of butterflies
Dash under Occurrence Status indicates no information available

B.6.2 Butterfly species recorded for ecological sensitive habitat monitoring, Long Valley, July 2019-June 2020

Common Name	Species Name	Chinese Name	Local Restrictedness	Conservation Status	Occurrence Status*	Relative Abundance Walk Transect T7
Angled Castor	*Ariadne ariadne*	波蛱蝶	Common	-	-	+++
Banded Tree Brown	*Lethe confusa*	白帶黛眼蝶	Common	-	-	+++
Blue Tiger	*Tirumala limniace*	青斑蝶	Common	-	-	+++
Blue-spotted Crow	*Euploea midamus*	藍點紫斑蝶	Very Common	-	-	+++
Bush Hopper	*Ampittia dioscorides*	黃斑弄蝶	Uncommon	-	-	+++
Chinese Peacock	*Papilio bianor*	碧鳳蝶	Common	-	Native	+
Chocolate Pansy	*Junonia iphita*	鉤翅眼蛱蝶	Common	-	-	+++
Common Bluebottle	*Graphium sarpedon*	青鳳蝶	Very Common	-	-	+++
Common Five-ring	*Ypthima baldus baldus*	矍眼蝶	Very Common	-	-	+++
Common Grass Yellow	*Eurema hecabe*	寬邊黃粉蝶	Very Common	-	-	+++
Common Hedge Blue	*Acytolepis puspa gisca*	鈕灰蝶	Common	-	-	++
Common Indian Crow	*Euploea core amymone*	幻紫斑蝶	Common	-	-	+++
Common Mapwing	*Cyrestis thyodamas*	網絲蛱蝶	Common	-	-	++
Common Mormon	*Papilio polytes*	玉帶鳳蝶	Very Common	-	-	+++
Common Sailer	*Neptis hylas*	中環蛱蝶	Very Common	-	-	+++
Common Tiger	*Danaus genutia*	虎斑蝶	Common	-	-	+++
Danaid Eggfly	*Hypolimnas misippus*	金斑蛱蝶	Uncommon	LC	-	+++
Dark Brand Bush Brown	*Mycalesis mineus*	小眉眼蝶	Very Common	-	-	+++
Five-bar Swordtail	*Pathysa antiphates*	綠鳳蝶	Common	-	-	+++
Glassy Tiger	*Parantica aglea*	絹斑蝶	Common	-	-	+++
Great Mormon	*Papilio memnon*	美鳳蝶	Very Common	-	-	+++

Common Name	Species Name	Chinese Name	Local Restrictedness	Conservation Status	Occurrence Status*	Relative Abundance Walk Transect T7
Great Orange Tip	*Hebomoia glaucippe*	鶴頂粉蝶	Common	-	-	+
Indian Cabbage White	*Pieris canidia*	東方菜粉蝶	Very Common	-	-	+++
Indian Fritillary	*Argyreus hyperbius*	斐豹蛱蝶	Common	-	-	+++
Large Faun	*Faunis eumeus*	串珠環蝶	Common	-	-	+
Lemon Emigrant	*Catopsilia pomona*	遷粉蝶	Common	-	-	+++
Long-banded Silverline	*Spindasis lohita*	銀線灰蝶	Common	-	-	++
Long-tailed Blue	*Lampides boeticus*	亮灰蝶	Common	-	-	+++
Mottled Emigrant	*Catopsilia pyranthe*	梨花遷粉蝶	Very Common	-	-	+++
Pale Grass Blue	*Pseudozizeeria maha*	酢漿灰碟	Very Common	-	-	+++
Paris Peacock	*Papilio paris*	巴黎翠鳳蝶	Very Common	-	-	+++
Plain Tiger	*Danaus chrysippus*	金斑蝶	Uncommon	-	-	+
Plum Judy	*Abisara echerius*	蛇目褐蜆蝶	Very Common	-	-	+++
Punchinello	*Zemeros flegyas*	波蜆蝶	Common	-	-	++
Red Helen	*Papilio helenus*	玉斑鳳蝶	Very Common	-	-	+++
Red Ring Skirt	*Hestina assimilis*	黑脈蛱蝶	Common	-	-	+
Red-base Jezebel	*Delias pasithoe*	報喜斑粉蝶	Very Common	-	-	+++
Rustic	*Cupha erymanthis*	黃襟蛱蝶	Very Common	-	-	+++
Small Cabbage White	*Pieris rapae*	菜粉蝶	Rare	-	-	+
South China Bush Brown	*Mycalesis zonata*	平頂眉眼蝶	Common	-	-	++
Swallowtail	*Papilio xuthus*	柑橘鳳蝶	Rare	-	-	+

Common Name	Species Name	Chinese Name	Local Restrictedness	Conservation Status	Occurrence Status*	Relative Abundance Walk Transect T7
Tailed Jay	*Graphium agamemnon*	統帥青鳳蝶	Common	-	-	++
Tawny Rajah	*Charaxes bernardus*	白帶螫蛺蝶	Common	-	-	+
Three-spot Grass Yellow	*Eurema blanda*	檗黃粉蝶	Common	-	-	+++
Water Snow Flat	*Tagiades litigiosus*	沾邊裙弄蝶	Common	-	-	+++
Yellow Rajah	*Charaxes marmax*	螫蛺蝶	Uncommon	LC	-	++
Total No. of Species						**46**
Total No. of Species of Conservation Significance						**2**

Notes:
Fellowes et al. (2002): LC=Local Concern
Occurrence Status was according to DBpedia website (https://dbpedia.org/page/Papilio_bianor)
*Very limited data are available for the occurrence status (being native to Hong Kong) of butterflies
+: species recorded within transect routes (present or 1 ind.)
++: species commonly recorded within transect routes (no. individuals from 2-5)
+++: dominant species within transect routes (no. individuals from 6 and above)
Dash under Occurrence Status indicates no information available

B.7 Odonates

B.7.1 Odonata species recorded for ecological sensitive habitat monitoring, Long Valley, July 2019-June 2020

Common Name	Species Name	Chinese Name	Local Restrictedness	Conservation Status	Occurrence Status	Relative Abundance
						Walk Transect
						T7
Asian Amberwing	*Brachythemis contaminata*	黃翅蜻	Abundant	-	Native	+++
Black Threadtail	*Prodasineura autumnalis*	烏微橋原蟌	Abundant	-	Native	+++
Blue Chaser	*Potamarcha congener*	濕地狹翅蜻	Common	LC	Native	++
Blue Dasher	*Brachydiplax flavovittata*	藍額疏脈蜻	Common	-	Native	+++
Common Blue Jewel	*Heliocypha perforata*	三斑陽鼻蟌	Abundant	-	Native	+++
Common Blue Skimmer	*Orthetrum glaucum*	黑尾灰蜻	Abundant	-	Native	+++
Common Bluetail	*Ischnura senegalensis*	褐斑異痣蟌	Abundant	-	Native	+++
Common Flangetail	*Ictinogomphus pertinax*	霸王葉春蜓	Common	-	Native	+++
Common Red Skimmer	*Orthetrum pruinosum*	赤褐灰蜻	Abundant	-	Native	+++
Crimson Darter	*Crocothemis servilia servilia*	紅蜻	Abundant	-	Native	+++
Crimson Dropwing	*Trithemis aurora*	曉褐蜻	Abundant	-	Native	+++
Green Skimmer	*Orthetrum sabina*	狹腹灰蜻	Abundant	-	Native	+++
Indigo Dropwing	*Trithemis festiva*	慶褐蜻	Abundant	-	Native	+++
Lesser Emperor	*Anax parthenope julius*	碧偉蜓	Common	-	-	+++
Marsh Skimmer	*Orthetrum luzonicum*	呂宋灰蜻	Abundant	-	Native	+++
Orange-faced Sprite	*Pseudagrion rubriceps*	丹頂斑蟌	Common	-	Native	+++
Orange-tailed Sprite	*Ceriagrion auranticum*	翠胸黃蟌	Abundant	-	Native	+++
Pied Percher	*Neurothemis tullia*	截斑脈蜻	Common	-	Native	+++
Pied Skimmer	*Pseudothemis zonata*	玉帶蜻	Common	-	Native	+
Red-faced Skimmer	*Orthetrum chrysis*	華麗灰蜻	Abundant	-	Native	+++
Russet Percher	*Neurothemis fulvia*	網脈蜻	Common	-	Native	+++
Variegated Flutterer	*Rhyothemis variegata arria*	斑麗翅蜻	Common	-	Native	+++

Common Name	Species Name	Chinese Name	Local Restrictedness	Conservation Status	Occurrence Status	Relative Abundance
						Walk Transect
						T7
Wandering Glider	*Pantala flavescens*	黃蜻	Abundant	-	Native	+++
Yellow Featherlegs	*Copera marginipes*	黃狹扇蟌	Abundant	-	Native	+++
Total No. of Species						**24**
Total No. of Species of Conservation Significance						**1**

Notes:
Fellowes et al. (2002): LC=Local Concern
Occurrence Status was according to The IUCN Red List of Threatened Species website (https://www.iucnredlist.org) or as provided in the References Section of this report
+: species recorded within transect routes (present or 1 ind.)
++: species commonly recorded within transect routes (no. individuals from 2-5)
+++: dominant species within transect routes (no. individuals from 6 and above)
Dash under Occurrence Status indicates no information available

B.7.2 Odonata Species Recorded for Ecological Sensitive Habitat Monitoring, Transects T1 to T6, July 2019-June 2020

Common Name	Species Name	Chinese Name	Local Restrictedness	Conservation Status	Occurrence Status	Relative Abundance					
						Walk Transect					
						T1	T2	T3	T4	T5	T6
Asian Amberwing	*Brachythemis contaminata*	黃翅蜻	Abundant	-	Native	+		+++	++		
Black Threadtail	*Prodasineura autumnalis*	烏微橋原蟌	Abundant	-	Native	+++		+++		+++	
Black-banded Gossamerwing	*Euphaea decorata*	方帶溪蟌	Abundant	-	Native	+++	+++			+++	
Black-kneed Featherlegs	*Pseudocopera ciliata*	毛狹扇蟌	Common	-	Native	+					
Blue Dasher	*Brachydiplax flavovittata*	藍額疏脈蜻	Common	-	Native						++
Chinese Greenwing	*Neurobasis chinensis*	華艷色蟌	Common	-	Native						+
Common Blue Jewel	*Heliocypha perforata*	三斑陽鼻蟌	Abundant	-	Native	++		+++		+++	
Common Blue Skimmer	*Orthetrum glaucum*	黑尾灰蜻	Abundant	-	Native	+++	++	++	+	++	+++
Common Bluetail	*Ischnura senegalensis*	褐斑異痣蟌	Abundant	-	Native	++		++		+	+++
Common Flangetail	*Ictinogomphus pertinax*	霸王葉春蜓	Common	-	Native	++	+	+		+	+++
Common Red Skimmer	*Orthetrum pruinosum*	赤褐灰蜻	Abundant	-	Native	+++	++	+++			+++

Common Name	Species Name	Chinese Name	Local Restrictedness	Conservation Status	Occurrence Status	Relative Abundance					
						Walk Transect					
						T1	T2	T3	T4	T5	T6
Crimson Darter	*Crocothemis servilia servilia*	紅蜻	Abundant	-	Native	+++		+++	++	+++	+++
Crimson Dropwing	*Trithemis aurora*	曉褐蜻	Abundant	-	Native	+++	+++	+++	+	+++	+++
Elusive Adjutant	*Aethriamanta brevipennis*	紅腹異蜻	Common	-	Non-native	+					
Green Skimmer	*Orthetrum sabina*	狹腹灰蜻	Abundant	-	Native	+++		++	+++	+++	+++
Indigo Dropwing	*Trithemis festiva*	慶褐蜻	Abundant	-	Native	+++	++	+++	+	+++	+++
Marsh Skimmer	*Orthetrum luzonicum*	呂宋灰蜻	Abundant	-	Native	+++	++	+++	+++	++	+++
Orange-tailed Sprite	*Ceriagrion auranticum*	翠胸黃蟌	Abundant	-	Native	+++		+++		+++	
Pied Percher	*Neurothemis tullia*	截斑脈蜻	Common	-	Native	+			+		
Red-faced Skimmer	*Orthetrum chrysis*	華麗灰蜻	Abundant	-	Native	+++		+++	+++	+++	+++
Russet Percher	*Neurothemis fulvia*	網脈蜻	Common	-	Native	+++		+++			+++
Variegated Flutterer	*Rhyothemis variegata arria*	斑麗翅蜻	Common	-	Native	+++			+	+++	+
Wandering Glider	*Pantala flavescens*	黃蜻	Abundant	-	Native	+++	+++	+++	+++	+++	+++
Yellow Featherlegs	*Copera marginipes*	黃狹扇蟌	Abundant	-	Native	++		+++	+		+++
Total No. of Species						**22**	**8**	**17**	**12**	**15**	**16**
Total No. of Species of Conservation Significance						**0**	**0**	**0**	**0**	**0**	**0**

Notes:
Occurrence Status was according to The IUCN Red List of Threatened Species website (https://www.iucnredlist.org) or as provided in the References Section of this report
+: species recorded within transect routes (present or 1 ind.)
++: species commonly recorded within transect routes (no. individuals from 2-5)
+++: dominant species within transect routes (no. individuals from 6 and above)
Dash under Occurrence Status indicates no information available

Appendix C

Site, Activities and Representative Wildlife Photos

Photo 1. Fishing Activity along Ng Tung River

Photo 2. Construction Works at T3 along the banks of Sheung Yue River

Photo 3. Vegetation clearance in the vicinity of Ng Tung River

Photo 4. Infrastructure works in the vicinity of Ng Tung River

Photo 5. Black Kite *Milvus migrans* in flight at Long Valley

Photo 6. Black-winged Stilt *Himantopus himantopus* on a wet agricultural land at Long Valley

Photo 7. Chinese Pond Heron *Ardeola bacchus* at a shallow water habitat in Long Valley

Photo 8. Collared Crow *Corvus torquatus* at Long Valley

Photo 9. Common Greenshank *Tringa nebularia* at the Sheung Yue River bed

Photo 10. Eastern Cattle Egret *Bubulcus coromandus* in a dry agricultural land at Long Valley

Photo 11. Eurasian Coot *Fulica atra* on a pond at Long Valley

Photo 12. Eurasian Teal *Anas crecca* on a pond at Long Valley

Photo 13. Great Egret *Ardea alba* along the bank of Ng Tung River

Photo 14. Greater Painted-snipe *Rostratula benghalensis* on a shallow water habitat at Long Valley

Photo 15. Grey Heron *Ardea cinerea* along the bank of Sheung Yue River

Photo 16. Little Egret *Egretta garzetta* at the Shek Sheung River bed

Photo 17. Little Grebe *Tachybaptus ruficollis* at Ng Tung River

Photo 18. Little Ringed Plover *Charadrius dubius* on a wet agricultural land at Long Valley

Photo 19. Northern Shoveler *Spatula clypeata* on a pond at Long Valley

Photo 20. Swinhoe's Egret *Egretta eulophotes* on a wet agricultural land at Long Valley

Photo 21. Scaly-breasted Munia *Lonchura punctulata* on a dry agricultural land at Long Valley

Photo 22. White-throated Kingfisher *Halcyon smyrnensis* perching above a pond at Long Valley

Photo 23. Zitting Cisticola *Cisticola juncidis* on a dry agricultural land at Long Valley

Photo 24. Chinese bullfrog *Hoplobatrachus rugulosus* on a shallow water habitat at Long Valley

Photo 25. Many-banded Krait *Bungarus multicinctus* on a dry agricultural land at Long Valley

Photo 26. Blue Chaser *Potamarcha congener* on a shallow water habitat at Long Valley

Appendix D

Site Photos and Description of Aquatic Fauna Monitoring Stations

Station Code	Station Name	Coordinates	Site Observations	Site Photo
MS_01	Ma Tso Lung Land Fill Drainage Channel Station	22°30.725′ N 114°05.700′ E	Generally with a very shallow water level during the wet season that eventually dried-up during the dry season. Shaded area. Approximately 0.80 meters wide. Adjacent to a closed landfill. Habitat type: Drainage channel[2]	
MS_02	Ma Tso Lung Fruit Farm Channelized Watercourse Station	22°30.753′ N 114°05.491′ E	Slow flowing to nearly stagnant moderately turbid water. Very shallow water level. Concrete substratum naturally overlaid with thin sandy layer deposited from the upper portion of the watercourse. Approximately three meters wide. Banks with aroids, shrubs, epiphytes, ferns and trees. In close proximity to a fruit farm. Habitat type: Channelized watercourse[2]	

Station Code	Station Name	Coordinates	Site Observations	Site Photo
MS_03	Ma Tso Lung Fruit Farm Natural Watercourse Station	22°30.707′ N 114°05.463′ E	Slow flowing turbid water. Shallow water level. Partly shaded area. Silty to cobble substratum. Banks with very thick growth of shrubs, epiphytes, ferns and trees. Plastic litter present. Approximately 1.5 meters wide Adjacent land use is agricultural. Habitat type: Natural watercourse (Stream) [2]	
MS_04	Ma Tso Lung Open area Natural Watercourse Station	22°30.887′ N 114°05.689′ E	Slow flowing slightly turbid water. Shallow. Partly shaded area. Sand to cobble substratum. Approximately one meter wide. Banks with thick aroids, shrubs, epiphytes, ferns and trees. Habitat type: Natural watercourse (Stream) [2]	

Station Code	Station Name	Coordinates	Site Observations	Site Photo
MS_05	Ma Tso Lung Dried-up Drainage Channel	22°30.879′ N 114°05.907′ E	Dried-up station of approximately one-meter width adjacent to residential area with aroids, herbs, shrubs and trees on its banks. Habitat type: Drainage channel[1]	
MS_06	Ma Tso Lung Natural Watercourse Residential Area A	22°30.914′ N 114°05.795′ E	Moderate to slow flowing clear water. Shallow water level. Partly shaded area. Sand to cobble substratum. Approximately four meters wide. Banks with aroids, shrubs, epiphytes, ferns and trees. Adjacent to a residential area. Habitat type: Natural watercourse (Stream)[2]	

Station Code	Station Name	Coordinates	Site Observations	Site Photo
MS_07	Ma Tso Lung Natural Watercourse Residential Area B	22°30.946′ N 114°05.827′ E	Moderate to slow flowing clear water. Shallow water level. Partly shaded area. Sandy to cobble substratum. Approximately three meters wide. Ferns, trees and creepers at the left side of the riparian area while devegetated at the other for maintenance purposes. Nearby residential area. Habitat type: Natural watercourse (Stream)[2]	
MS_08	Ma Tso Lung Natural Watercourse Project Footprint Boundary	22°31.197′ N 114°05.823′ E	Moderate to slow flowing slightly turbid water. Shallow water course with deep downstream sections. Open area. Silty to cobble substratum. Approximately three meters wide. Grasses on the bank opposite the concrete side. Adjacent to a wide grassland area. Habitat type: Natural watercourse (Stream)[2]	

Station Code	Station Name	Coordinates	Site Observations	Site Photo
MS_09	Ma Tso Lung Natural Watercourse Grassland Area	22°31'10.32"N 114° 5'50.37"E	Slow flowing moderately turbid water. Shallow water level with silty to sandy substratum. Open area. Approximately one meter wide. Grasses, ferns and creepers present on the banks. Adjacent to a grassland area. Habitat type: Natural watercourse (Stream)[2]	
MS_10	Ma Tso Lung Natural Watercourse Residential Area C	22°31.354' N 114°05.778' E	Slow flowing turbid water. Deep water level. Open area. Approximately one meter wide with silty to sandy substratum. Thick growth of grasses, herbs and creepers at the riparian area. Adjacent to residential area. Habitat type: Natural watercourse (Stream)[2]	

Station Code	Station Name	Coordinates	Site Observations	Site Photo
MS_11	Siu Hang San Tsuen Natural Watercourse Residential Area A	22°30.275′ N 114°08.305′ E	Generally with a very shallow water level during the wet season that eventually dried-up during the dry season. Algal mats attached on mud to cobble substratum. Open area. Approximately 0.25 meters wide. Patches of herbs present at the riparian area. Adjacent to residential area. Habitat type: Natural watercourse (Stream)[2]	
MS_12	Siu Hang San Tsuen Natural Watercourse Residential Area B	22°30.251′ N 114°08.470′ E	Generally with a shallow water level during the wet season that eventually dried-up during the dry season. Plant litter present on the once streambed. Partly shaded. Creepers and herbs at the banks. Adjacent land use is residential. Habitat type: Natural watercourse (Stream)[2]	

Station Code	Station Name	Coordinates	Site Observations	Site Photo
MS_13	Siu Hang San Tsuen Adjacent to Grassland Natural watercourse	22°30.489′ N 114°08.602′ E	Slow flowing deep turbid water. Pool area. Silty to sandy substratum. Approximately three meters wide. Open area. Grasses at the banks. Adjacent to a grassland area. Habitat type: Natural watercourse (Stream)[2]	
MS_14	Siu Hang San Tsuen Inactive Agricultural Drainage Channel Area	22°30.618′ N 114°08.588′ E	Slow flowing to nearly stagnant. Clear water column. Shallow water level. Partly shaded area. Approximately 0.50 meters wide. Herbs, aroids and trees at the right bank and residential houses at the other side. Nearby residential area and an inactive agricultural land. Habitat type: Drainage channel[2]	

Station Code	Station Name	Coordinates	Site Observations	Site Photo
MS_15	Siu Hang San Tsuen Channelized Watercourse Residential Area	22°30.352′ N 114°08.825′ E	Slow flowing water. Turbid column. Very shallow water level. Partly shaded area. Approximately five meters wide at the upper section and narrows down to estimated three meters width at lower portion. Banks with creepers, herbs and trees. Nearby residential area. Habitat type: Channelized watercourse[2]	
MS_16	Long Valley Natural Watercourse	22°30.320′ N 114°06.617′ E	Fast flowing clear water. Sandy to cobble substratum. Deep water level. Open area. Approximately one meter wide. Recently cleared portion of bankside vegetation. Adjacent to village and agricultural areas. Habitat type: Natural watercourse (Stream)[2]	

Station Code	Station Name	Coordinates	Site Observations	Site Photo
MS_17	Long Valley Reed Bed	22°30.443' N 114°06.772' E	Slow flowing to nearly stagnant. Turbid water column with silty substratum. Recently cleared reed beds at the left bankside now with herbs and grasses. Open area. Adjacent to agricultural land. Habitat type: Patch of grassland [2]	
MS_18	Long Valley Agricultural Land	22°30.356' N 114°06.682' E	Dried-up area. Herbs and grasses present. Habitat type: Patch of grassland [2]	

Station Code	Station Name	Coordinates	Site Observations	Site Photo
MS_19	Long Valley Aquaculture Pond	22°30.636′ N 114°06.827′ E	Deep turbid water column. Silty substratum. Open area. Used for aquaculture. Adjacent to agricultural areas. Habitat type: Pond[2]	
MS_20	Long Valley Shallow Water Habitat	22°30.546′ N 114°06.952′ E	Area with a shallow water level that eventually was overgrown with grasses and herbs. Open area. Adjacent to agricultural fields. Habitat type: Shallow water[2]	

Notes:
1. Photo taken on July 2019
2. Photo taken on May 2020