Appendix J
Revised Ecological Impact Assessment

Proposed Land Sharing Pilot Scheme for a Site at Various Lots in D.D. 115, Yuen Long, the New Territories

Ecological Impact Assessment Report

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Contents

LIST OF TABLES

LIST OF FIGURES

LIST OF APPENDICES

1. INTRODUCTION

1.1.1 This Ecological Impact Assessment (EcoIA) is prepared for the application of proposed public and private housing development under the Land Sharing Pilot Scheme (LSPS) in various lots at Tung Shing Lei, Yuen Long (Hereafter the "Project" and the "Application Site") (**Figure 1**). The Application Site is approximately 6 hectares in area size and located at "Residential (Group D)" Zone under the approved Nam Sang Wai Outline Zoning Plan (OZP) – S/YL-NSW/8.

1.1.2 As part of Government's multi-pronged strategy to increase land and housing supply in the short-to-medium term, the Chief Executive (CE) put forward a proposed framework of LSPS in the 2018 Policy Address and outlined further details in 2019 Policy Address. Subsequently, the LSPS was launched in May 2020 to receive applications.

1.1.3 This EcoIA comprises two major components, i.e. ecological baseline information and impact assessment. The ecological baseline information for impact assessment was established by both literature review and ecological surveys. As the Application Site is within the Wetland Buffer Area (WBA), a 12-month ecological survey was conducted between Nov 2019 and Oct 2020, to fulfill the requirements stipulated in the Town Planning Board Planning Guideline No. 12C. Other than the 12-month ecological survey, specific flight line surveys for breeding ardeid from Tung Shing Lane Egretry and a new egretry at Kam Po Road were also conducted in 2019, 2020 and 2021.

2. LEGISLATION & GUIDELINES

2.1.1 The relevant legislation and associated guidelines related to this EcoIA include:

- Forests and Countryside Ordinance (Cap. 96A) and its subsidiary legislation, the Forestry Regulations;
- Wild Animals Protection Ordinance (Cap. 170);
- Country Parks Ordinance (Cap. 208) and its subsidiary legislation;
- Environmental Impact Assessment Ordinance (Cap. 499) and the associated Technical Memoranda; and
- Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) and its subsidiary legislation.

2.1.2 Where relevant, this EcoIA also takes into account the following guidelines and standards:

- Hong Kong Planning Standards and Guidelines (HKPSG) Chapter 10, "Conservation";

- Town Planning Board Planning Guideline No. 12C – Application for Developments Within Deep Bay Area;
- PELB Technical Circular 1/97 Works Branch Technical Circular 4/97 "Guidelines for Implementing the Policy on Off-site Ecological Mitigation Measures";
- EIAO Guidance Note No. 6/2010 - Some Observations on Ecological Assessment from the Environmental Impact Assessment Ordinance Perspective;
- EIAO Guidance Note No. 7/2010 – Ecological Baseline Survey for Ecological Assessment; and
- EIAO Guidance Note No. 10/2010 – Methodologies for Terrestrial and Freshwater Ecological Baseline Surveys.

2.1.3 This EcoIA also makes reference to the following Mainland legislation:

- List of State Protected Wild Animals, promulgated by the State Council 國家重點保護野生動物名錄;
- List of State Protected Wild Plants, promulgated by the State Council 國家重點保護野生植物名錄.

2.1.4 Other international conventions and guidelines that are relevant to this EcoIA include the followings:

- Convention on International Trade in Endangered Species of Wild Fauna and Flora ("CITES"): This Convention regulates international trade in animal and plant species considered to be at risk from such trade. The main categories of species relevant to Hong Kong are Appendices I and II. Species listed in Appendix I are species threatened with extinction that are or may be affected by trade; species listed in Appendix II are those that, while not necessarily under current threat of extinction, may become threatened unless trade is subject to strict regulation. Hong Kong's obligations under this Convention are enforced via the Protection of Endangered Species of Animals and Plants Ordinance.
- IUCN: The World Conservation Union maintains, through its Species Survival Commission, a Red List of globally threatened species of wild plants and animals (see http//www.redlist.org). The Red List is considered the authoritative publication to classify species as critically endangered, endangered, vulnerable, or lower-risk.

3. METHODOLOGY

3.1 Application Site and Study Area

3.1.1 The Application Site **(Figure 1)** is situated to the north of Yuen Long Highway and Yuen Long Bypass Floodway, to the west of the Tsing Long Highway, and to the north-west of the Au Tau roundabout, Yuen Long.

3.1.2 It is located within the Wetland Buffer Area (WBA) as defined under Town Planning Board Guideline No. 12C (TPB Guideline No. 12C) "Application for Developments within Deep Bay Area" (**Figure 2**), but is beyond the Wetland Conservation Area (WCA) which is relatively more ecologically sensitive.

3.1.3 The Application Site is largely left vacant and is currently dominated by wasteland habitat. However, there are also a pond, portions of an abandoned pond and a tidal meander, small area of developed area within the Application Site. While the pond to the north of the Application Site is engaged in a Fishpond Management Agreement and was maintained with certain level of activities, it might not be operating for commercial farming based upon on site observations during the ecological surveys over the past years. The abandoned pond was abandoned long time ago and no fish-culture operations were observed. Due to its close proximity to Yuen Long Highway and some village settlements nearby, the existing environment within and near the Application Site has endured a certain level of disturbance from human activities in nearby villages.

3.1.4 The Study Area covers a 500m distance from the Application Site boundary (**Figure 1**), which is for the purposes of assessing off site ecological impacts. Within the Study Area, there were a wooded knoll to the north of the Application Site, abandoned ponds to the east and mitigation wetlands managed by AFCD to the northeast.

3.2 Literature Review

3.2.1 The following available literature covering the Study Area and its vicinity was reviewed:

- EIA-004/1998 Yuen Long Bypass Floodway - Feasibility Study
- EIA-063/2002 – Yuen Long and Kam Tin Sewerage and Sewage Disposal Stage 1 Packages 1A-1T and 1B-1T - Kam Tin Trunk Sewerage Phase I and II
- EIA-159/2008 Construction of Cycle Tracks and the associated Supporting Facilities from Sha Po Tsuen to Shek Sheung River
- EIA-269/2021 Yuen Long Barrage Scheme
- Planning application No. A/YL-NSW/223 (Withdrawn)
- Planning application No. Y/YL-NSW/4
- Planning application No. A/YL-NSW/172

- Planning application No. A/YL-NSW/224
- Planning application No. A/YL-NSW/233
- Planning application No. A/YL-NSW/274
- Planning application No. A/YL-NSW/241
- Planning application No. Y/YL-NSW/3
- Planning application No. A/YL-NSW/242
- Planning application No. A/YL-NSW/275
- Planning application No. A/YL-KTN/268 (Withdrawn)
- The Terrestrial Biodiversity Survey conducted by HKU
- Annual reports and other publications of The Hong Kong Bird Watching Society
- Porcupine! – Newsletter of Division of Ecology & Biodiversity of University of Hong Kong
- Hong Kong Biodiversity – Newsletter of the Department of Agriculture, Fisheries and Conservation
- AFCD publications
- A new species of firefly from Hong Kong – *Pteroptyx maipo* Ballantyne, 2011 (Yiu 2011)
- *Pteroptyx maipo* Ballantyne, a new species of bent-winged firefly (*Coleoptera: Lampyridae*) from Hong Kong, and its relevance to firefly biology and conservation (Ballantyne *et al*. 2011)

3.3 Ecological Survey Methodology

3.3.1 The baseline ecological surveys covered a period of 12 months from November 2019 to October 2020. The surveys included habitat mapping, vegetation, mammal, bird, herpetofauna, butterfly, odonate, firefly, and aquatic fauna.

3.3.2 Besides, specific surveys on flight behavior of breeding ardeid at Tung Shing Lane Egretry were conducted in 2019 and 2020 (between April and July in both years). In 2021 Tung Sing Lane Egretry was abandoned and a new egretry was found at Kam Po Road (over 2 km from the Application Site), additional surveys were thus conducted between May and August 2021 to record the flight behavior of ardeids at the new egretry. Survey methodology of each survey item is described in the following sections.

Habitat and Vegetation

3.3.3 Habitats within the Study Area were mapped based on aerial photos and ground truthing. Walk-over surveys were conducted at representative areas of each habitat type. Vascular plant species in each habitat type were identified (with the aid of binoculars when necessary) and their relative abundance were recorded, with special attention to rare and protected species. Color photographs were taken of all habitats encountered on site and of ecological features of special importance. Habitat map of the Study Area was produced at the

suitable scale using GIS software. Nomenclature of vascular plant species followed Hong Kong Herbarium (2020), whilst their rarity in Hong Kong followed Corlett *et al*. (2000) and Yip *et al*. (2010) where applicable.

Mammal

3.3.4 Mammals within the Study Area were surveyed by active search. All sightings, tracks, and signs of mammals found within the Study Area were recorded. As some mammal species are nocturnal, night surveys were also conducted with spotlight. Nomenclature of mammal followed Agriculture, Fisheries and Conservation Department (AFCD 2020).

Bird

3.3.5 Birds within the Study Area were surveyed quantitatively using transect count method (**Figure 2a**). All birds seen or heard were identified and their abundance recorded by habitat. Birds encountered outside survey transects but within the Study Area were also recorded in order to produce a complete species list. Signs of breeding (e.g. nests, recently fledged juveniles) were also recorded. As some birds (e.g., owls, nightjars) are nocturnal, night surveys were conducted. Nocturnal birds were identified by active searching using spot-light and by their calls. Ornithological nomenclature in this report followed AFCD 2020.

3.3.6 Tung Shing Lane Egretry is located at the periphery of the 500m Study Area (**Figure 2b**). Flight path surveys were conducted simultaneously at 3 vantage points (see **Figure 2b**) to determine the flight behavior of breeding ardeid from the egretry within ardeid breeding season (between April and July) in 2019 and 2020. The flight path surveys were undertaken continuously for 1.5 hours either before sunset or in the morning. The flight paths of ardeid individuals taking off from Tung Shing Lane Egretry were recorded by making reference to land features. The focus was on birds carrying out long-distance flights from the egretry. Flights involving short hops from point to point (such as among different trees) were not considered as flight paths.

3.3.7 Tung Shing Lane Egretry was abandoned in 2021. However, a new egretry at Kam Po Road, which is over 2km from the Application Site, was reported in 2021 (**Figure 2c**). Flight path surveys for the new egretry were therefore conducted between May and August 2021. Five vantage points including near the new egretry and along Kam Tin River Drainage Channel were simultaneously adopted for the survey.

Three dry season flight path surveys were conducted at the same vantage points on **Figure 2b** except the one to the south of Yuen Long Highway (i.e., the surveys were conducted within the Application Site and at Kam Tin River Drainage Channel) between December 2019 and February 2020. The flight path surveys were undertaken continuously for 1.5 hours before sunset from the vantage points

(**Figure 2b**). Particular attention was paid to large-sized species such as waterbirds, but also included other species of conservation importance.

3.3.8 The ardeid night roost surveys at Kam Tin River Drainage Channel near Yuen Long Highway were surveyed at evenings in December 2019, February 2020, April 2020, June 2020, August 2020 and October 2020, with number, species, and the time when the ardeids returned to the roost recorded. Surveys were commenced one hour before sunset and conducted near the night roost (**Figure 2b**).

3.3.9 Evening surveys were conducted to investigate the number and distribution of Great Cormorants roosting at Nam Sang Wai (**Figure 3a**). Surveys were conducted three times between December 2019 and February 2020. All surveys started approximately one hour before sunset to permit counting of all roosting sites before it became too dark to accurately count the number of birds, although care was taken to avoid underestimating numbers on days when birds were still arriving at the start of the count. During the surveys, all groups of trees providing suitable conditions for roosting cormorants were observed and total number of birds seen in each group of trees was recorded.

Herpetofauna

3.3.10 Herpetofauna within the Study Area were surveyed by active search. All reptiles and amphibians sighted were recorded. As herpetofauna are mostly nocturnal, night surveys were carried out. Potential microhabitats of herpetofauna such as wall, fallen logs, litter, channel/nullah, fishpond margins, underneath of stones or other materials, artificial container (e.g., pots) were searched during surveys to locate cryptic or secretive herpetofauna species. Amphibians were also identified by their calls during night surveys. Nomenclature of amphibian followed AFCD (2020).

Butterfly and Odonata

3.3.11 Dragonflies and butterflies within the Study Area were surveyed quantitatively using transect method (**Figure 2a**). Dragonflies and butterflies observed were identified and their abundance recorded by habitat. Dragonflies and butterflies encountered outside survey transects but within the Study Area were also recorded in order to produce a complete species list. Nomenclature of butterfly and odonate followed AFCD (2020).

Firefly

3.3.12 Firefly surveys were conducted monthly between April and October 2020 mainly followed the land-based transects (**Figure 2a**), and boat surveys were conducted in Kam Tin River Meander (**Figure 2a**). The surveys conducted both within and beyond the 500m Study Area. The firefly surveys were started shortly after sunset and continued until 90 minutes after sunset when the fireflies were most active. During the survey, any firefly observed was identified to the species level, where

possible. The abundance and distribution of fireflies, in particular Bent-winged Firefly, were recorded.

3.3.13 Night time light intensity measurements were conducted in parallel to firefly night survey. Whenever firefly was recorded, the background light would be recorded using a light intensity meter at the same time. The light intensity meter had the lowest detection limit down to 0.01 lux. Each measurement was taken at the point of the firefly occurred, if possible, otherwise, the closest location to the firefly was chosen which avoided light source (e.g. street light) to take the measurement.

Aquatic fauna

3.3.14 Aquatic fauna (such as fish and invertebrates) at the six sampling locations (**Figure 2a**) within the Study Area were studied by active searching and direct observation. All aquatic fauna found were identified to the lowest possible taxonomic level with their relative abundance recorded, and the nomenclature for fish followed Lee *et al*. (2004), while those for the macro-invertebrates followed Dudgeon (2003).

3.3.15 Terrestrial fauna survey transects along with aquatic sampling locations (i.e. A, B, C, D, E and F), are shown in **Figure 2a**, while the vantage points of flight behavior and roosting of ardeids are shown in **Figure 2b** and **2c**. Survey schedule of the 12-month survey programme is shown in **Table 3.1**.

Table 3.1 Ecological Survey Programme

Habitat	2019		2020									
	Nov	Dec	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sept	Oct
Habitat / Vegetation			D					D				
Bird	D	D/N	D	D/N	D	D/N	D/N	D	D	D/N	D	D/N
Flight-Line Survey (Wintering Birds)		D	D	D								
*Flight-Line Survey (Breeding Ardeid)						D	D	D	D			
Great Cormorants Night Roost		E	E	E								
Ardeid Night Roost		E		E		E		E		E		E
Mammal		D/N		D/N		D/N	D/N			D/N		D/N
Herpetofauna		D/N		D/N		D/N	D/N			D/N		D/N
Butterfly and Odonata			D			D		D		D		D
Firefly						N	N	N	N	N	N	N
Aquatic fauna			D					D				

Note: D: Day time; N: Night/evening Time; D/N: Day time and Night/evening Time: E: Evening
* flight-line surveys for Tung Shing Lane Egretry were also conducted in the breeding season of 2019 and 2020 (from April to July of both years), and for the new egretry at Kam Po Road were conducted between May and August 2021

3.3.1 Survey data is shown in **Appendix A** to **Appendix I** of this report. Data recorded within the Application Site and those recorded outside the Application Site are presented in separate columns.

4. ECOLOGICAL BASELINE

4.1 Literature Review

4.1.1 The Application Site entirely falls within the **Wetland Buffer Area (WBA)** but outside **Wetland Conservation Area (WCA)** (**Figure 2a**).

4.1.2 WCA comprises the existing and contiguous, active or abandoned fishponds in the Deep Bay Area. According to the Town Planning Board Guidelines for Application for Developments within Deep Bay Area, the planning intention of WCA is to conserve the ecological value of the fishponds which form an integral part of the wetland ecosystem in the Deep Bay Area. A buffer area of about 500 m along the landward boundary of the WCA is designated as WBA. The planning intention of WBA is to protect the ecological integrity of the fishponds and wetlands within the WCA and to prevent development that would have a negative off-site impact on the ecological value of those fishponds.

4.1.3 Development or redevelopment in the WBA would require an ecological impact assessment to demonstrate there would not be negative impacts on the ecological value of the WCA, unless the ecological impact assessment can demonstrate that the negative impacts could be mitigated through positive measures.

4.1.4 **Tung Shing Lane Egretry** – It is the nearest egretry, which is located at approximately 0.5 km southeast from the Application Site. This egretry was first reported in 2001. It is located at several trees on fishpond bunds and near village houses in Tung Shing Lane village. The TSL Egretry was the third largest egretry in 2018 census, with 84 nests which accounted for 7.8% of the total number of the nests in Hong Kong in that year (Anon 2019). However, hard pruning of trees within the nesting area in previous years was noted in the egretry in May 2019, while Typhoon Mangkhut resulted in thinning of vegetation in the same egretry (Anon 2020). According to the census data provided by HKBWS the number of ardeid nests in TSL Egretry decreased by 22.6% from 2018 to 2019 (Anon 2020). Two ardeid species were recorded nesting in this egretry between 2015 and 2020, including Little Egret and Chinese Pond Heron **(Table 4.1).**

4.1.5 Other recognized sites of conservation importance in Northwest New Territories include the Mai Po Inner Deep Bay Ramsar Site, Mai Po Nature Reserve, Mai Po Marshes SSSI, Mai Po Village SSSI Egretry and Shan Pui River Egretry, which are all away from the 500m Study Area.

Table 4.1 Nesting Populations of Ardeid from Tung Shing Lane Egretry between 2015 and 2020 (data extracted from Anon. 2015, 2016, 2017, 2018, 2020a and 2020b.)

Year	Little Egret	Chinese Pond Heron	Total nests (% of total in HK)
2015	30	47	77 (5.4%)
2016	20	41	61 (4.9%)
2017	21	61	82 (6.6%)
2018	49	35	84 (7.8%)
2019	27	38	65 (4.0%)
2020	16	20	36 (1.9%)

4.1.6 **Flight Behavior of Breeding Ardeids** - Among the relevant studies within the Study Area or nearby, the flight paths of the Tung Shing Lane egretry were studied or mapped in the EcoIAs for Planning Applications Y/YL-NSW/3, Y/YL-NSW/4, A/YL-NSW/241, A/YL-NSW/224, A/YL-NSW/233, A/YL-NSW/242, A/YL-NSW/274 and A/YL-NSW/275. The Application Site boundary of the present Study is similar to the boundary of the Planning Application Y/YL-NSW/4.

4.1.7 The EcoIA for Planning Application Y/YL-NSW/3, Y/YL-NSW/4, A/YL-NSW/241 and A/YL-NSW/233 adopted the same set of flight path data, which was conducted between May 2013 and June 2013. According to the EcoIA for the approved Planning Application No. A/YL-NSW/233, approximately 70% of all recorded birds from Tung Shing Lane egretry flew towards north, whilst 30% flew towards east and west. To the north of Yuen Long Highway, six major flight-lines (totally 74 individuals of bird) were recorded.

4.1.8 A verification survey was conducted in July and August 2018 for the Planning Application No. A/YL-NSW/274. The results also showed that the ardeids from Tung Shing Lane Egretry still mainly flew a general northward direction (i.e. flying across the Yuen Long Highway and the Yuen Long Bypass Floodway) with occasional individuals landing at the ponds in front of the egretry or flying westward to Yuen Long Town direction. The findings were consistent with those reported from the previous survey in 2013.

4.1.9 **Great Cormorant Roost at Nam Sang Wai** - A number of Great Cormorant Roosts at Nam Sang Wai were identified. The cormorants roosts were mainly in exotic trees such as *Eucalyptus* spp. The proposed development is highly unlikely to impose significant impacts on the roost site, which lies approximately 500m away (**Figure 3a**). The Great Cormorant roost is also separated from the Application Site by a section of Kam Tin River Meander and other habitats.

4.1.10 **Kam Tin River Drainage Channel**) – It is located at approximately 200m east of the Application Site. In order to avoid flooding affecting the development at Yuen Long south, the Government implemented

this large river training project along the original Kam Tin River, which included straightening a section of original Kam Tin River lying to the north of Castle Peak Road, breaking and merging fishponds in Nam Sang Wai with Shan Pui River Drainage Channel before entering Inner Deep Bay near the northern tip of the Nam Sang Wai Site. Kam Tin River Drainage Channel meets Shan Pui River Drainage Channel at the northern tip of Nam Sang Wai and eventually drains into the Deep Bay which is about 1km further north. The channel has a trapezoidal cross-section, and the further downstream section has a rubble protected embankment. Many mangroves were planted at the margin and the lower course of Kam Tin River Drainage Channel. The channel now also provides foraging opportunities for waterbirds. Night roosts of ardeids are located about 200m and 300m east of the Application Site at Kam Tin River Drainage Channel **(Figure 2b).**

4.1.11 **Yuen Long Bypass Floodway Mitigation Wetland** – It was created to compensate for the loss of fishponds and agricultural land due to the river training of original Kam Tin River. A piece of compensation wetland was created from three abandoned fishponds to provide wetland habitat to birds, amphibians and dragonflies. A total of about 260 plant, 159 birds, 110 butterflies, 40 odonate, 31 herpetofauna and 16 mammal species were recorded during the monitoring programme of AFCD since 2006 (AFCD, pers. comm.). Breeding of Little Grebe *Tachybaptus ruficollis* and White-breasted Waterhen *Amaurornis phoenicurus* were observed in the mitigation wetland. Most of the Application Site is separated from the Mitigation Wetland by a knoll, but small part of the Application Site is just next to it.

4.1.12 **Firefly Habitat in Nam Sang Wai** Mai Po Bent-winged Firefly *Pteroptyx maipo* was recorded, together with another area in Lut Chau, in Nam Sang Wai during the ecological survey for the Planning Application "Proposed Comprehensive Development with Wetland Enhancement, Public Park and Residential Development, Nam Sang Wai and Lut Chau" (Planning Application No. A/YL-NSW/242). The species was recorded at the mangroves surrounding Lut Chau and along the Kam Tin River Drainage Channel and at the southern end of NSW. Since its first description in 2011, the species is currently known from the Deep Bay area and in Mainland China, and appears to be restricted to intertidal grassland and mangrove habitats. The reported location of this species in the southwestern corner of Nam Sang Wai is to the northwest of the Application Site and lies within the 500m Study Area, near the junction of the Kam Tin River meander and the Shan Pui River Drainage Channel (**Figure 3a**).

4.1.13 Lowland wetland habitats (including isolated meander and fishponds) near Shan Pui Tsuen to the north of the Application Site are zoned as "**Conservation Area**". The zoning is to protect and retain the existing natural landscape, ecological or topographical features of the area for conservation, education and research purposes. According to the planning intention, there is a general presumption against

development in this zone. In general, only developments that are needed to support the conservation of the existing natural landscape or scenic quality of the area or the essential infrastructure project with overriding public interest may be permitted.

4.1.14 **Species of Conservation Importance** - Species of conservation importance reported from literature were reviewed. Among those studies, the EIA "Construction of Cycle Tracks and the associated Supporting Facilities from Sha Po Tsuen to Shek Sheung River" (EIA-159/2008), EcoIA for Planning Application No. A/YL-NSW/275, EcoIA for Planning Application No. Y/YL-NSW/3, EcoIA for Planning Application No. A/YL-NSW/241, EcoIA for Planning Application No. A/YL-NSW/242 (mainly focused on Kam Tin River Drainage Channel), EcoIA for Planning Application No. A/YL-KTN/268 and EcoIA for Planning Application No. A/YL-NSW/274 were considered most relevant as their study areas partially overlapped with the Study Area of the present study, and also relatively updated (EcoIA for No. A/YL-NSW/274 has also incorporated survey data from EcoIA for No. Y/YL NSW/4). The ecological surveys of these previous studies were conducted between November 2016 and March 2017, and January 2011, August 2018 and November 2019 and June 2020 respectively.

4.1.15 Among the relevant studies, 103 species of conservation importance were recorded. The species of conservation importance reported by these EcoIA are presented in **Table 4.2**.

Table 4.2 Species of Conservation Importance Previously Recorded near the Study Area

Common name	Scientific name	Literature								Protection status / Conservation level	Distribution and Rarity
		EIA-159/2008	A/YL-NSW/275	A/YL-NSW/274	A/YL-NSW/242	A/YL-NSW/241	Y/YL-NSW/4	Y/YL-NSW/3	AFCD		
Plant											
Prince's Feather	*Persicaria orientalis*			X						-	Very rare. Found in Sha Po, Yuen Long.
Bird											
Asian Barred Owlet	*Glaucidium cuculoides*			X						Class 2 Protected Animal of China; Appendix 2 of CITES	Uncommon resident. Widely distributed in woodland throughout Hong Kong.
Besra	*Accipiter virgatus*	X								Class 2 Protected Animal of China; Appendix 2 of CITES	Scarce resident. Found in Tai Po Kau, Deep Bay area, Chek Lap Kok, Cheung Chau, Soko Islands.

Common name	Scientific name	Literature								Protection status / Conservation level	Distribution and Rarity
		EIA-159/2008	A/YL-NSW/275	A/YL-NSW/274	A/YL-NSW/242	A/YL-NSW/241	Y/YL-NSW/4	Y/YL-NSW/3	AFCD		
Black Kite	*Milvus migrans*	X	X	X	X	X	X	X	X	Fellowes et al. (2002): (RC); Appendix 2 of CITES	Common resident and winter visitor. Widely distributed in Hong Kong.
Black-crowned Night Heron	*Nycticorax nycticorax*	X	X	X	X	X	X	X	X	Fellowes et al. (2002): (LC)	Common resident and winter visitor. Widely distributed in Hong Kong.
Black-faced Spoonbill	*Platalea minor*	X	X	X	X		X			Class 2 Protected Animal of China; China Red Data Book Status: (Endangered); Fellowes et al. (2002): PGC; IUCN Red List Status: ED; Red List of China's Vertebrates: (Endangered)	Common winter visitor. Found in Deep Bay area.
Black-headed Gull	*Chroicocephalus ridibundus*	X	X	X	X	X		X	X	Fellowes et al. (2002): PRC	Common winter visitor. Found in Deep Bay area, Tolo Harbour, Starling Inlet, Victoria Harbour.
Black-winged Stilt	*Himantopus himantopus*	X	X	X	X	X	X	X	X	Fellowes et al. (2002): RC	Common passage migrant. Found in Deep Bay area, Long Valley, Kam Tin.
Bluethroat	*Luscinia svecica*		X	X						Fellowes et al. (2002): LC	Common passage migrant and winter visitor. Widely distributed in wet agricultural areas throughout Hong Kong.
Bonelli's Eagle	*Aquila fasciata*	X								China Red Data Book Status: (Rare);Fellowes et al. (2002): (RC); Appendix 2 of CITES; Red List of China's Vertebrates: (Vulnerable)	Scarce resident. Found in Deep Bay area, Hong Kong Island, Lamma Island, Lantau Island, Castle Peak, Sha Lo Tung.

Common name	Scientific name	Literature								Protection status / Conservation level	Distribution and Rarity
		EIA-159/2008	A/YL-NSW/275	A/YL-NSW/274	A/YL-NSW/242	A/YL-NSW/241	Y/YL-NSW/4	Y/YL-NSW/3	AFCD		
Chinese Grosbeak	*Eophona migratoria*			X			X			Fellowes et al. (2002): LC	Uncommon winter visitor. Found in Kam Tin, Nam Chung, Shek Kong, Deep Bay area. Ho Chung, Lam Tsuen, Hok Tau, Island House, Kowloon Park.
Chinese Pond Heron	*Ardeola bacchus*	X	X	X	X	X	X	X	X	Fellowes et al. (2002): PRC,(RC)	Common resident. Common resident. Widely distributed in Hong Kong.
Cinnamon Bittern	*Ixobrychus cinnamomeus*					X		X	X	Fellowes et al. (2002): LC	Scarce passage migrant. Found in Deep Bay area, Long Valley, Tai Yuen (Sheung Shui), Pui O.
Collared Crow	*Corvus torquatus*	X	X	X	X	X	X	X	X	Fellowes et al. (2002): LC; IUCN Red List Status: Vulnerable	Uncommon resident. Found in Inner Deep Bay area, Nam Chung, Kei Ling Ha, Tai Mei Tuk, Pok Fu Lam, Chek lap Kok, Shuen Wan, Lam Tsuen.
Common Greenshank	*Tringa nebularia*	X	X	X	X	X		X	X	Fellowes et al. (2002): RC	Abundant passage migrant and winter visitor. Found in Deep Bay area.
Common Kestrel	*Falco tinnunculus*	X		X			X			Class 2 Protected Animal of China; Appendix 2 of CITES	Common autumn migrant and winter visitor. Widely distributed in Hong Kong
Common Redshank	*Tringa totanus*			X	X					Fellowes et al. (2002): RC	Common passage migrant. Found in Deep Bay area.
Crested Serpent Eagle	*Spilornis cheela*		X	X			X			China Red Data Book Status: (Vulnerable);Fellowes et al. (2002): (LC); Appendix 2 of CITES	Uncommon resident. Widely distributed in shrublands on hillsides throughout Hong Kong.
Eastern Buzzard	*Buteo japonicus*	X	X	X			X			Appendix 2 of CITES	Common winter visitor. Widely distributed in Hong Kong.

Common name	Scientific name	Literature								Protection status / Conservation level	Distribution and Rarity
		EIA-159/2008	A/YL-NSW/275	A/YL-NSW/274	A/YL-NSW/242	A/YL-NSW/241	Y/YL-NSW/4	Y/YL-NSW/3	AFCD		
Eastern Cattle Egret	*Bubulcus coromandus*		X	X	X	X	X	X	X	Fellowes et al. (2002): (LC)	Resident and common passage migrant. Widely distributed in Hong Kong.
Eastern Imperial Eagle	*Aquila heliaca*			X						Class 1 Protected Animal of China; China Red Data Book Status: (Vulnerable);Fellowes et al. (2002): GC;IUCN Red List Status: Vulnerable; Appendix 2 of CITES; Red List of China's Vertebrates: (Endangered)	Common winter visitor. Found in Deep Bay area, Ma Tso Lung.
Eastern Marsh Harrier	*Circus spilonotus*	X								Fellowes et al. (2002): LC; Appendix 2 of CITES	Common winter visitor and passage migrant. Found in Deep Bay area, Starling Inlet area, Kadoorie Farm & Botanic Garden, Mount Austin.
Eurasian Hobby	*Falco subbuteo*			X						Class 2 Protected Animal of China; Fellowes et al. (2002): (LC); Appendix 2 of CITES	Uncommon passage migrant. Widely distributed in marshes, agricultural land and lightly wooded hills throughout Hong Kong.
Eurasian Spoonbill	*Platalea leucorodia*	X		X						Class 2 Protected Animal of China; China Red Data Book Status: (Vulnerable),Fellowes et al. (2002): LC; Appendix 2 of CITES	Uncommon passage migrant. Widely distributed in marshes, agricultural land and lightly wooded hills throughout Hong Kong.
Golden-headed Cisticola	*Cisticola exilis*			X		X		X	X	Fellowes et al. (2002): LC	Scarce winter visitor. Widely distributed in grassland throughout Hong Kong.
Great Cormorant	*Phalacrocorax carbo*	X	X	X	X	X	X	X	X	Fellowes et al. (2002): PRC	Common winter visitor. Widely distributed in coastal areas throughout Hong Kong.
Great Egret	*Ardea alba*	X	X	X	X	X	X	X	X	Fellowes et al. (2002): PRC,(RC)	Common resident and winter visitor. Widely distributed in Hong Kong.

Common name	Scientific name	Literature								Protection status / Conservation level	Distribution and Rarity
		EIA-159/2008	A/YL-NSW/275	A/YL-NSW/274	A/YL-NSW/242	A/YL-NSW/241	Y/YL-NSW/4	Y/YL-NSW/3	AFCD		
Greater Coucal	*Centropus sinensis*		X	X			X			Class 2 Protected Animal of China; China Red Data Book Status: (Vulnerable)	Common resident. Widely distributed in Hong Kong.
Greater Spotted Eagle	*Clanga clanga*	X								China Red Data Book Status: (Rare);Fellowes et al. (2002): GC;IUCN Red List Status: Vulnerable; Appendix 2 of CITES; Red List of China's Vertebrates: (Endangered)	Scarce winter visitor. Found in Deep Bay area.
Grey Heron	*Ardea cinerea*	X	X	X	X	X	X	X	X	Fellowes et al. (2002): PRC	Common winter visitor. Found in Deep Bay area, Starling Inlet, Kowloon Park, Cape D'Aguilar.
Grey-headed Lapwing	*Vanellus cinereus*	X	X	X	X		X	X		Fellowes et al. (2002): LC	Scarce winter visitor. Found in Kam Tin, Tsim Bei Tsui, Lo Wu, Tai Long Wan, Shuen Wan, Castle Peak coast, Chek Lap Kok
Heuglin's Gull	*Larus fuscus*				X					Fellowes et al. (2002): LC	Common winter visitor and passage migrant. Found in Deep Bay area, Cape D'Aguilar.
Intermediate Egret	*Egretta intermedia*		X	X	X					Fellowes et al. (2002): RC	Common passage migrant. Found in Deep Bay area, Tai Long Wan, Starling Inlet, Tai O, Cape D'Aguilar.
Japanese Quail	*Coturnix japonica*			X						Fellowes et al. (2002): LC;IUCN Red List Status: NT	Scarce passage migrant and winter visitor. Found in Long Valley, Mai Po, Kam Tin, Lam Tsuen, Tin Shui Wai.
Lesser Coucal	*Centropus bengalensis*			X						Class 2 Protected Animal of China; China Red Data Book Status: (Vulnerable)	Common resident. Widely distributed in Hong Kong.
Little Egret	*Egretta garzetta*	X	X	X	X	X	X	X	X	Fellowes et al. (2002): PRC,(RC)	Common resident. Widely distributed in coastal area throughout Hong Kong.

Common name	Scientific name	Literature								Protection status / Conservation level	Distribution and Rarity
		EIA-159/2008	A/YL-NSW/275	A/YL-NSW/274	A/YL-NSW/242	A/YL-NSW/241	Y/YL-NSW/4	Y/YL-NSW/3	AFCD		
Little Grebe	*Tachybaptus ruficollis*		X	X		X	X	X	X	Fellowes et al. (2002): LC	Common resident. Found in Deep Bay area.
Little Ringed Plover	*Charadrius dubius*	X	X	X	X	X	X	X	X	Fellowes et al. (2002): (LC)	Common winter visitor and passage migrant. Widely distributed in freshwater areas throughout Hong Kong.
Marsh Sandpiper	*Tringa stagnatilis*		X	X	X	X	X	X	X	Fellowes et al. (2002): RC	Common winter visitor and passage migrant. Found in Deep Bay area, Shuen Wan, Long Valley, Kam Tin, Sai Kung.
Pacific Golden Plover	*Pluvialis fulva*				X					Fellowes et al. (2002): LC	Common winter visitor. Found in Deep Bay area, Chek Lap Kok, Long Valley.
Pacific Swift	*Apus pacificus*		X	X						Fellowes et al. (2002): (LC)	Common spring migrant and summer visitor. Widely distributed in Hong Kong.
Pied Avocet	*Recurvirostra avosetta*	X	X	X	X	X	X	X	X	Fellowes et al. (2002): RC	Abundant winter visitor. Found in Deep Bay area.
Pied Kingfisher	*Ceryle rudis*	X	X	X		X	X	X	X	Fellowes et al. (2002): (LC)	Uncommon resident. Widely distributed in lakes and ponds throughout Hong Kong.
Purple Heron	*Ardea purpurea*			X						Fellowes et al. (2002): RC	Uncommon passage migrant. Found in Deep Bay area.
Red-billed Starling	*Spodiopsar sericeus*	X		X		X	X	X	X	Fellowes et al. (2002): GC	Common winter visitor. Widely distributed in Hong Kong
Red-throated Pipit	*Anthus cervinus*					X		X	X	Fellowes et al. (2002): LC	Common passage migrant and winter visitor. Widely distributed in dry agricutural areas throughout Hong Kong.

Common name	Scientific name	Literature								Protection status / Conservation level	Distribution and Rarity
		EIA-159/ 2008	A/YL-NSW/ 275	A/YL-NSW/ 274	A/YL-NSW/ 242	A/YL-NSW/ 241	Y/YL-NSW/ 4	Y/YL-NSW/ 3	AFCD		
Spotted Redshank	*Tringa erythropus*		X	X	X	X		X	X	Fellowes et al. (2002): RC	Abundant in winter and spring. Found in Deep Bay area.
Striated Heron	*Butorides striata*									Fellowes et al. (2002): (LC)	Present all year, locally uncommon in summer and scarce in winter. Widely distributed in Hong Kong.
Swinhoe's Snipe	*Gallinago megala*			X						Fellowes et al. (2002): LC	Uncommon passage migrant. Found in Long Valley.
Temminck's Stint	*Calidris temminckii*				X					Fellowes et al. (2002): LC	Uncommon winter visitor. Widely distributed in Deep Bay area fishponds.
White-cheeked Starling	*Spodiopsar cineraceus*	X		X		X	X	X	X	Fellowes et al. (2002): PRC	Common winter visitor. Found in Deep Bay area, Kam Tin, Long Valley.
White-shouldered Starling	*Sturnia sinensis*	X	X	X		X	X	X	X	Fellowes et al. (2002): (LC)	Common passage migrant. Found in Kam Tin, Deep Bay area, Po Toi Island, Long Valley, Victoria Park, Ho Chung, Ma Tso Lung, Mui Wo, Lam Tsuen Valley.
White-throated Kingfisher	*Halcyon smyrnensis*	X	X	X	X	X	X	X	X	Fellowes et al. (2002): (LC)	Common resident. Widely distributed in coastal areas throughout Hong Kong
Wood Sandpiper	*Tringa glareola*	X	X	X	X	X	X	X	X	Fellowes et al. (2002): LC	Common passage migrant and winter visitor. Widely distributed in wetland area throughout Hong Kong.
Yellow Bittern	*Ixobrychus sinensis*		X	X			X			Fellowes et al. (2002): (LC)	Uncommon summer visitor and passage migrant. Found in Deep Bay area, Chek Keng, Tai Long Wan.

Common name	Scientific name	Literature								Protection status / Conservation level	Distribution and Rarity
		EIA-159/ 2008	A/YL - NSW / 275	A/YL - NSW / 274	A/YL - NSW / 242	A/YL - NSW / 241	Y/YL-NSW/ 4	Y/YL-NSW/ 3	AFCD		
Zitting Cisticola	*Cisticola juncidis*	X	X	X		X		X	X	Fellowes et al. (2002): LC	Common passage migrant and winter visitor. Widely distributed in grassland throughout Hong Kong.
Mammal											
Leopard Cat	*Prionailurus bengalensis*								X	China Red Data Book Status: (Vulnerable); (Cap. 170);Red List of China's Vertebrate: (Vulnerable)	Uncommon. Widely distributed in forested areas throughout Hong Kong, except Lantau Island.
Small Asian Mongoose	*Herpestes javanicus*		X				X		X	(Cap. 170);Red List of China's Vertebrate: (Vulnerable)	Uncommon. Found in N.T. countryside area
East Asian Porcupine	*Hystrix brachyura*								X	Fellowes et al. (2002): PGC; (Cap. 170)	Very Common. Widespread throughout most of Hong Kong, but no record was found on Lantau Island.
Ryukyu Mouse	*Mus caroli*								X	-	Rare. Recent records have been found in Mai Po Nature Reserve and the Hong Kong Wetland Park.
Small-toothed Ferret Badger	*Melogale moschata*								X	(Cap. 170)	Common. Widely distributed in forested areas throughout Hong Kong.
Short-nosed Fruit Bat	*Cynopterus sphinx*		X						X	China Red Data Book Status: (Indeterminate); (Cap. 170)	Very Common. Widely distributed in urban & forested areas throughout Hong Kong.
Chinese Horseshoe Bat	*Rhinolophus sinicus*								X	(Cap. 170)	Very Common. Widely distributed in forested areas throughout Hong Kong.
Lesser Bent-winged Bat	*Miniopterus pusillus*								X	Fellowes et al. (2002): (LC); (Cap. 170)	Uncommon. Widely distributed in forested areas throughout Hong Kong.
Japanese Pipistrelle	*Pipistrellus abramus*		X			X	X	X	X	(Cap. 170)	Very Common. Widely distributed throughout Hong Kong.
Lesser Yellow Bat	*Scotophilus kuhlii*								X	Fellowes et al. (2002): (LC); (Cap. 170)	Uncommon. Widely distributed in forested areas throughout Hong Kong.

Common name	Scientific name	Literature								Protection status / Conservation level	Distribution and Rarity
		EIA-159/ 2008	A/YL-NSW/ 275	A/YL-NSW/ 274	A/YL-NSW/ 242	A/YL-NSW/ 241	Y/YL-NSW/ 4	Y/YL-NSW/ 3	AFCD		
Lesser Bamboo Bat	*Tylonycteris pachypus*								X	China Red Data Book Status: (Rare); Fellowes et al. (2002): (LC); (Cap. 170)	Very Common. Widely distributed in forested areas throughout Hong Kong.
Small Indian Civet	*Viverricula indica*								X	Class 2 Protected Animal of China; (Cap. 170);Red List of China's Vertebrate: (Vulnerable)	Very Common. Widely distributed in forested areas throughout Hong Kong, except Lantau Island.
Butterfly											
Grey Scrub Hopper	*Aeromachus jhora*								X	-	Rare. Yung Shue O, Kuk Po, Tai Lam, Sha Lo Tung
Paintbrush Swift	*Baoris farri farri*								X	-	Rare. Deep Water Bay, Shing Mun, Lam Tsuen, Fung Yuen, Wu Kau Tang, Lai Chi Wo
Colon Swift	*Caltoris bromus*								X	-	Very Rare
Dark Brown Ace	*Halpe porus*								X	Fellowes et al. (2002): LC	Very Rare/Species of Conservation Concern. Lam Tsuen, Tsiu Hang, Lung Kwu Tan, Ho Sheung Heung
Common Awl	*Hasora badra*					X		X	X	Fellowes et al. (2002): LC	Very Rare. Wu Kau Tan, Lai Chi Wo, Hong Kong Wetland Park
Pale Palm Dart	*Telicota colon*					X		X	X	Fellowes et al. (2002): LC	Rare. Widely distributed in grassland and shrubland throughout Hong Kong
Grass Demon	*Udaspes folus*						X		X	-	Rare. Widely distributed in agricultural field throughout Hong Kong
Forget-me-not	*Catochrysops strabo*								X	-	Very Rare/Species of Conservation Concern. Pui O, Tai Po Kau, Fung Yuen, Shing Mun, Sha Lo Wan
Metallic Cerulean	*Jamides alecto*								X	-	Very Rare. Victoria Peak, Fung Yuen, Chuen Lung, Mui Wo
Tiny Grass Blue	*Zizula hylax*								X	-	Very Rare/Species of Conservation Concern. Lung Kwu Tan, Fung Yuen, Sha Lo Wan
Danaid Eggfly	*Hypolimnas misippus*					X		X	X	Fellowes et al. (2002): LC	Uncommon. Ngau Ngak Shan, Lung Kwu Tan, Hong Kong Wetland Park, Mount Parker, Cloudy Hill, Lin Ma Hang

Common name	Scientific name	Literature								Protection status / Conservation level	Distribution and Rarity
		EIA-159/2008	A/YL-NSW/275	A/YL-NSW/274	A/YL-NSW/242	A/YL-NSW/241	Y/YL-NSW/4	Y/YL-NSW/3	AFCD		
Glassy Bluebottle	*Graphium cloanthus*								X	Fellowes et al. (2002): LC	Uncommon. Tai Po Kau, Shing Mun, Cloudy Hill, Kadoorie Farm and Botanic Garden, Lam Tsuen, Lai Chi Hang, Tai Lam Wu
Common Albatross	*Appias albina darada*								X	Fellowes et al. (2002): LC	Rare. Shing Mun, Tai Po Kau, Tai Mo Shan, Lung Kwu Tan, Kat O
Tailed Sulphur	*Dercas verhuelli*								X	-	Rare. Widely distributed throughout Hong Kong
Small Cabbage White	*Pieris rapae*								X	-	Rare. Shek Mun Kap, Fan Lau, Ngong Ping, Kam Tin, Ho Chung, Luk Keng, Tuen Mun Ash Lagoon
Odonate species											
Four-spot Midget	*Mortonagrion hirosei*								X	Fellowes et al. (2002): GC; IUCN Red List Status: NT	Common. Double Island, Luk Keng, Mai Po Marshes, Nam Chung, Sam A Tsuen and Sha Po.
Blue Sprite	*Pseudagrion microcephalum*								X	Fellowes et al. (2002): LC	Common. Kai Kuk Shue Ha, Kau Sai Chau, Lai Chi Wo, Mai Po, Mui Wo, River Jhelum and Tung Ping Chau
Coastal Glider	*Macrodiplax cora*					X		X	X	Fellowes et al. (2002): LC	Common. Hong Kong Wetland Park, Kam Tin, Lai Chi Wo, Nim Wan and Luk Keng
Mangrove Skimmer	*Orthetrum poecilops*								X	Fellowes et al. (2002): GC; IUCN Red List Status: VU	Uncommon. Double Island, Lai Chi Wo, Nam Chung, So Lo Pun, Yim Tso Ha (Starling Inlet), Yung Shue au and Yung Shue O.
Blue Chaser	*Potamarcha congener*		X							Fellowes et al. (2002): LC	Common. Widely distribute in marsh throughout Hong Kong
Ruby Darter	*Rhodothemis rufa*					X		X	X	Fellowes et al. (2002): LC	Common. Widely distribute in ponds and marshes throughout Hong Kong
Sapphire Flutterer	*Rhyothemis triangularis*								X	Fellowes et al. (2002): LC	Common. Widely distribute in weedy ponds, sluggish rivers and marshes
Scarlet Basker	*Urothemis signata*		X			X		X	X	Fellowes et al. (2002): LC	Common. Common in areas containing abandoned fish ponds throughout Hong Kong

Common name	Scientific name	Literature								Protection status / Conservation level	Distribution and Rarity
		EIA-159/ 2008	A/YL - NSW / 275	A/YL - NSW / 274	A/YL - NSW / 242	A/YL - NSW / 241	Y/YL-NSW/ 4	Y/YL-NSW/ 3	AFCD		
Emerald Cascader	*Zygonyx iris*								X	Fellowes et al. (2002): PGC	Abundant. Widely distribute in moderately clean, rapidly flowing forested streams throughout Hong Kong
Reptile											
Reeves' Turtle	*Chinemys reevesii*								X	China Red Data Book Status: (Conservation Dependent); Fellowes et al. (2002): GC;IUCN Red List Status: EN; Appendix 2 of CITES;(Cap. 170)	Widespread in the territory. Used to be a common species but sightings have been rare in recent years. Found in most local reservoirs.
Common Rat Snake	*Ptyas mucosus*		X			X		X	X	China Red Data Book Status: (Endangered); Fellowes et al. (2002): PRC; Appendix 2 of CITES; Red List of China's Vertebrates: (Endangered)	Widely distributed throughout Hong Kong.
Buff-striped Keelback	*Amphiesma stolatum*								X	Fellowes et al. (2002): LC	Distributed in lowland in central and northern New Territories and Lantau Island.
Copperhead Racer	*Coelognathus radiatus*					X				China Red Data Book Status: (Endangered); Fellowes et al. (2002): PRC; Red List of China's Vertebrates: (Endangered)	Widely distributed throughout Hong Kong.
Chinese Water Snake	*Enhydris chinensis*								X	China Red Data Book Status: (Least Concern); Red List of China's Vertebrates: (Vulnerable)	Distributed in freshwater or brackish wetlands in central and northern New Territories
Indo-Chinese Rat Snake	*Ptyas korros*								X	China Red Data Book Status: (Endangered); Fellowes et al. (2002): PRC; Red List of China's Vertebrates: (Vulnerable)	Widely distributed throughout Hong Kong.

Common name	Scientific name	Literature								Protection status / Conservation level	Distribution and Rarity
		EIA-159/2008	A/YL-NSW/275	A/YL-NSW/274	A/YL-NSW/242	A/YL-NSW/241	Y/YL-NSW/4	Y/YL-NSW/3	AFCD		
Many-banded Krait	*Bungarus multicinctus*								X	China Red Data Book Status: (Vulnerable); Fellowes et al. (2002): PRC;Red List of China's Vertebrates: (Endangered)	Widely distributed in New Territories, Hong Kong Island and Lantau Island.
Chinese Cobra	*Naja atra*								X	China Red Data Book Status: (Vulnerable); Fellowes et al. (2002): PRC; Appendix 2 of CITES; Red List of China's Vertebrates: (Vulnerable)	Common and widely distributed in Hong Kong.
Four-clawed Gecko	*Gehyra mutilata*								X	Red List of China's Vertebrates: (Vulnerable)	Widely but thinly distributed throughout Hong Kong.
Chinese Soft-shelled Turtle	*Pelodiscus sinensis*					X				China Red Data Book Status: (Vulnerable); Fellowes et al. (2002): GC; IUCN Red List Status: Vulnerable;(Cap. 170); Red List of China's Vertebrates: (Endangered)	Locally found in reservoirs and fishponds in Deep Bay area.
Amphibian											
Chinese Bullfrog	*Hoplobatrachus chinensis*								X	Class 2 Protected Animal of China; Fellowes et al. (2002): PRC; Red List of China's Vertebrates: (Endangered)	Widely distributed in Lantau Island and New Territories.

4.1.16 Besides the above-listed species of conservation importance, Eurasian Otter *Lutra lutra* is the most significant terrestrial mammal species known to occur in the Deep Bay area. This species occurs in a variety of lowland wetland habitats in the Deep Bay area. However, given the existing human activities in the wetlands and disturbed nature of other habitats in the Study Area, it is likely to be very uncommon in the Application Site or Study Area. The nearest record of the species was at the confluence area of Kam Tin River Drainage Channel and Shan Pui River Drainage Channel (B&V 2021).

4.1.17 Another species of conservation importance which was not recorded in the abovementioned literature, is a fish species of conservation importance, i.e. *Gobiopterus macrolepis*, recorded in the EIA study of Yuen Long Barrage (B&V 2021), which is endemic to China and is restricted to the Pearl River Delta (Cheng 1965). The species was observed in large schools of up to over a thousand individuals, staying near reedbed edges in Nam Sang Wai, and along channel margins at lower section of Yuen Long Nullah (approximately 50-100 individuals sighted), Shan Pui River Drainage Channel, Kam Tin River Drainage Channel and the lower Yuen Long Bypass Floodway. Therefore, it is rather widespread in suitable habitats e.g. channel within the present Study Area. It is listed as Vulnerable in the context of China (Jiang *et al.* 2016). Ecology and distribution of this species in Hong Kong and the wider Pearl River Delta region is however unknown.

4.2 Ecological Survey Results

Habitat and Vegetation

4.2.1 The Study Area covers 14 types of habitat, including abandoned agricultural land, abandoned pond, active agricultural land, channel, developed area, grassland/shrubland, meander, mitigation wetland, plantation, pond, reedbed, tidal marsh, wasteland and woodland **(Figure 4)**. The Application Site comprised five habitats, namely abandoned pond, pond, wasteland, meander, and developed area. The habitats within the Application Site and the Study Area are shown in **Table 4.3** and **Figure 4**. Photos of the habitats are presented in **Figure 5**. Plant species and their relative abundance within each habitat are listed in **Appendix A**.

Table 4.3 Habitats recorded within the Study Area

Habitat	Application Site (ha)	Study Area (incl Application Site) (ha)
Abandoned Agricultural Land	-	0.42
Abandoned Pond	0.23	17.21
Active Agricultural Land	-	0.42
Channel	-	17.68
Developed Area	0.21	46.11
Grassland / Shrubland	-	1.96
Meander	0.16	5.22
Mitigation Wetland	-	8.96
Plantation	-	23.38
Pond	0.46	23.89
Reedbed	-	4.65
Tidal Marsh	-	1.37
Wasteland	4.50	15.59
Woodland	-	4.93
Total	**5.56**	**171.81**

4.2.2 Abandoned Agricultural Land - Small patches of abandoned agricultural land are located to the south of the Application Site. As the agricultural land patches are not actively farmed, they were dominated by naturally colonized weeds and invasive climber *Brachiaria mutica* and *Mikania micrantha*.

4.2.3 Active Agricultural Land - Patches of actively farmed agricultural land were observed in the south and the west of the Application Site. Agricultural crops and fruit trees were planted by villagers.

4.2.4 Abandoned pond - Abandoned ponds were identified within the Study Area as well as the Application Site. These abandoned ponds were of various conditions depending on their duration of abandonment. Drying out of water was observed in the abandoned ponds having longer duration of abandonment. While for those abandoned ponds with shorter duration of abandonment, water was retained but degradation was observed at the pond bund. Both hydrophilic species (such as *Brachiaria mutica* and *Typha angustifolia*) and weedy species (such as *Bidens alba* and *Panicum maximum*) were commonly found in these abandoned ponds.

4.2.5 Notably, there were six aggregated abandoned ponds located to the immediate east to the Application Site. As found during the 12-month survey, these abandoned ponds were of very low water level with some parts of the pond bed exposed. The abandonment of fish farming practice left a wet bare ground which favoring the colonization of weedy species such as *Ageratum conyzoides, Cynodon dactylon* and *Mikania micrantha* and hydrophilic species such as *Brachiaria mutica, Alternanthera philoxeroides* and *Alternanthera sessilis*. Overall, these abandoned ponds were largely dominated by an exotic hydrophilic species *Brachiaria mutica* with a generally low ecological value. All of these abandoned ponds were under a condition with low/without water coverage with vegetation established on pond bed and bunds and were apparently not suitable for fish farming. There was also neither fish farming facilities nor management activities for fishpond operation observed, too. During recent site visits in 2021, it was observed that weedy vegetation were cleared in these ponds and there were shallow water inside. An ecological enhancement study at six ponds to the east of the Application Site is underway and will end in March 2023. Four ponds were served as trials and two as control. Water level management were conducted at the trial ponds to enhance the feeding opportunities of waterbirds. Other management practices include clearance of weedy vegetation as needed.

4.2.6 Channel - Yuen Long Bypass Floodway (YLBF) and Kam Tin River Drainage Channel were the two major channelized watercourses in the Study Area, which were located to the south and east of the Application Site respectively. Both YLBF and Kam Tin River Drainage Channel were widened, straightened and deepened to increase water

flow capacity and alleviate flood risk. The bed and bank of YLBF were lined with grasscrete and a series of in-channel ponds were built along the dry weather flow channel. Water levels in YLBF were maintained by a fabridam at the confluence between YLBF and Kam Tin River Drainage Channel. The regular vegetation management of the channels resulted in low botanical diversity.

4.2.7 Developed area - Within the Study Area, this habitat type is composed of villages, areas of open storage and light industry, along with extensive road infrastructure. These habitats were heavily modified and suffered from high levels of disturbance by anthropogenic factors and a low fauna and flora diversity, containing a large number of exotic plant species.

4.2.8 Grassland/shrubland - Some areas of grassland/shrubland were found on the slopes of the hills to the west of the Application Site, which are also occupied by large numbers of graves. There were high levels of disturbance and anthropogenic clearance. Their floristic structures were relatively simple, species diversity was low. Exotic species were commonly found in these areas.

4.2.9 Meander - Meanders were identified within the Application Site and Study Area. Apart from the east-west running Kam Tin River Meander (located to the north of the Application Site) and the smaller north-south running meander partially falling within the Application Site (which joined Kam Tin River Meander), there were also a small fraction of meander at the eastern bank of Kam Tin River Drainage Channel that was close to the northeastern edge of the Study Area. These meanders were generally subject to the tidal influence of Kam Tin River Drainage Channel or Shan Pui River Drainage Channel. Species tolerant of tidal fluctuation such as *Sonneratia* spp. or native mangrove spp. were found there. The section of Meander within the Application Site was about 8 – 10 m wide. A very low diversity of flora dominated by common and exotic species were recorded.

4.2.10 Mitigation wetland - Several mitigation wetlands were found within and in the vicinity of the Study Area, including YLBF Mitigation Wetland to the north, Sha Po Marsh to the east and Mitigation Wetlands as compensation for Route 3 construction to the south. The former two were actively managed by AFCD and a private developer respectively. Sha Po Marsh was a brackish habitat established mainly to compensate for the habitat loss of the globally threatened odonate species Four-spot Midget *Mortonagrion hirosei*. The Sha Po Marsh also supported other wetland dependent flora and fauna. In addition, two mitigation ponds were created at the entrance of the development for other impacted species.

4.2.11 Plantation - Plantation within the Study Area was mainly found to the south of YLBF and as roadside planting along the Yuen Long Highway, along Kam Tin River Drainage Channel and as small stands to the

west of the Application Site. Plantations were generally low in ecological value due to the domination of exotic species and the location which is primarily selected for screening or aesthetic reasons. Typical species included *Acacia confusa.*

4.2.12 Pond - Ponds were mainly found in the areas to the north, northwest and the south of the Application Site. These ponds were under maintenance for fish farming, aerators could be observed in this habitat for the provision of oxygen to the cultivated fishes. Vegetation could be found at the bunds of the ponds e.g. *Ficus hispida*, *Ludwigia erecta* etc.

4.2.13 Reedbed - Two patches of reedbed were found within the Study Area. One patch was near Shan Pui Village bounded by the northwest boundary of the Study Area, another patch was located immediately to the west of the Application Site. This habitat was generally dominated by reed *Phragmites australis*.

4.2.14 The reedbed at the northwest boundary was largely dominated by reed *Phragmites australis,* with occasional presence of exotic species *Typha angustifolia* and weeds.

4.2.15 The reedbed at the west of the Application Site was of ponds in nature. Due to the abandonment of the pond maintenance, these ponds were dried off leaving a wet ground for the growth of vegetation, weedy species such as *Bidens alba, Brachiaria mutica*, *Ipomoea cairica* and *Leucaena leucocephala* formed an extensive cover in this habitat. However, colonization of reed *Phragmites australis* was noted recently in this habitat, forming a co-dominant population with the weeds. Besides, individuals of mature invasive mangrove *Sonneratia* spp. were also observed in this patch of reedbed. This patch of reedbed was previously reported with Black-faced Spoonbill sightings during the 2013 surveys). However, as mentioned, pond maintenance had been ceased for some years according to the past surveys and aerial photos, degradation and vegetation colonization was noted. It is not a suitable habitat for Black-faced Spoonbill to use anymore.

4.2.16 Tidal Marsh - Small patch of tidal marsh was found along the Kam Tin River Meander. The marshy vegetation in this habitat was periodically influenced by tidal actions, and was dominated by reed *Phragmites australis*, mangrove such as *Kandelia obovata* and mangrove-associate such as *Derris trifoliata*.

4.2.17 Wasteland - Wasteland within the Study Area was mainly situated inside, and immediately to the south and the west of the Application Site. This habitat was dominated by ruderal vegetation. Plant species in this habitat type were typical of primary stages of vegetative succession, and those colonizing areas of bare or disturbed ground. Vegetation species typically found within this degraded habitat were

mostly exotic weed species, including *Brachiaria mutica*, *Bidens alba*, *Wedelia trilobata* and self-sown trees in the form of the weedy exotic *Leucaena leucocephala*.

4.2.18 Woodland - A small stand of woodland was found at the hilltop located to the west of the Application Site bounded by the west boundary of the Study Area. This habitat consisted of trees with an average height of 6 to 10 meters. These trees formed a thin canopy, light gaps can be occasionally found in this habitat. Both native (such as *Macaranga tanarius* var. *tomentosa* and *Tetradium glabrifolium*) and exotic tree species (such as *Acacia auriculiformis* and *Casuarina equisetifolia*) were found at the canopy. While the underestorey was dominated by *Miscanthus sinensis*. Climber such as *Ipomoea cairica* and *Pueraria montana* var. *thomsonii* were also found in this habitat. Graves were observed within the woodland and this indicated the woodland was subjected to anthropogenic disturbance.

4.2.19 Another patch of woodland was also located in a knoll, to the immediate north of the Application Site. Trees in this woodland reached 7 to 12 meters, comprising of species including *Macaranga tanarius* var. *tomentosa* and *Melia azedarach*. Shrubs such as *Litsea rotundifolia* var. *oblongifolia* and *Psychotria asiatica* and climbers such as *Hypserpa nitida* and *Phyllanthus reticulatus* could also be found in the understorey.

4.2.20 The Application Site was largely left vacant and was currently dominated by wasteland habitat. There was an abandoned pond located on the southern boundary of the Application Site. Part of this abandoned pond was within the Application Site, and was abandoned long time ago and no fish-culture operations were observed during the ecological surveys). There was also a pond located at the northwest corner of the Application Site. While the pond to the north of the Application Site is engaged in a Fishpond Management Agreement and was maintained with certain level of activities, it might not be operating for commercial farming based upon on site observations during the ecological surveys over the past years. This pond (only about 0.46ha) is also much smaller than most of other ponds in the area that are still maintaining active fish farming practices. Complete drain down to expose the pond bottom or removal of pond bottom sediment were not observed during the ecological surveys in the past years. It is therefore considered as semi-active with comparatively lower ecological value when compared with ponds fully operated for fish farming in which complete drain down would occur. Along the western boundary, there was a section of tidal meander which was partly inside the Application Site. There were also small areas of developed areas mainly as access road and village houses within the Application Site.

4.2.21 A full list of flora species recorded within the Study Area during survey and their relative abundance within each habitat is provided in

Appendix A. A total of 374 plant species were recorded within the Study Area. 188 nos. of plant species are native and 173 nos. are known to be exotic to Hong Kong, and the remaining 13 species are of uncertain origin. No flora species of conservation importance recorded within the Application Site, while one flora species of conservation importance, *Persicaria orientalis*, was recorded outside the Application Site but within the Study Area. The overall floral diversity was low.

4.2.22 *Araucaria heterophylla, Casuarina equisetifolia, Dimocarpus longan*, *Lagerstroemia speciosa, Litchi chinensis, Michelia* x *alba*, *Mimosa diplotricha, Ocimum basilicum, Phytolacca acinosa, Terminalia catappa* and *Typha angustifolia* are exotic to Hong Kong and not considered of conservation importance, despite being considered rare/ very rare by Corlett et al. (2000), listed as Vulnerable by IUCN (2019), considered as Vulnerable/Endangered in Threatened Species List of China's Higher Plants, considered as Vulnerable in China Plant Red Data Book, listed in Category II in State Protection and/or listed under Cap. 96 Forests and Countryside Ordinance.

4.2.23 *Coccinia grandis* and *Rhododendron* spp. are cultivated, and hence they are not considered as species of conservation importance despite being considered very rare by Corlett *et al*. (2000) or listed under Cap. 96 Forests and Countryside Ordinance.

4.2.24 Individuals of *Persicaria orientalis* were found situated in the wasteland outside the Application Site but within the Study Area during the dry season survey on 20th March 2020, but no *Persicaria orientalis* was found during the wet season survey on 9th June 2020. As the wasteland was heavily grown with weeds during the wet season survey, it is believed that weeds had been overgrown and those individuals of *Persicaria orientalis* were not found anymore. *Persicaria orientalis* is a native herb which is considered as very rare in Hong Kong (Corlett *et al*. 2000).

Mammal

4.2.25 A total of 4 mammal species was recorded within the Study Area (**Appendix B**). Japanese Pipistrelle *Pipistrellus abramus* and Small Asian Mongoose *Herpestes javanicus* are considered as species of conservation importance. Locations of the mammal species of conservation importance are shown in **Figure 6a**. Among the 4 mammal species, only one mammal species Japanese Pipistrelle was recorded flying through the Application Site. Most of the recorded species are common and widespread in Hong Kong.

Bird

4.2.26 A total of 91 bird species was recorded within the Study Area, while 35 bird species were considered as species of conservation importance (**Table 4.4**). Among the recorded species, 43 bird species were recorded within the Application Site, and 9 of them were considered as species of conservation Importance (also see **Table 4.4**). Bird recorded in the Application Site were mostly disturbance tolerant species **(Appendix C)**.

Table 4.4 List of Bird Species of Conservation Importance Recorded during the Survey Period

Species	Conservation and Protection Status[1]	Abundance recorded in:	
		Application Site	Outside Application Site)
Asian Barred Owlet *Glaucidium cuculoides*	CITES(II); CSMPS(II); Cap.586	1	1
Black Kite *Milvus migrans*	(RC); CITES(II); CSMPS(II); Cap.586	5	20
Black-crowned Night Heron *Nycticorax nycticorax*	(LC)	-	9
Black-faced Spoonbill *Platalea minor*	PGC; RLCV(EN); IUCN(EN); CSMPS(II)	-	1
Black-winged Kite *Elanus caeruleus*	RLCV(NT); CITES(II); (LC)	-	1
Black-winged Stilt *Himantopus himantopus*	RC	-	149
Bluethroat *Luscinia svecica*	LC	-	1
Chinese Pond Heron *Ardeola bacchus*	PRC (RC)	8	103
Collared Crow *Corvus torquatus*	LC; RLCV(NT); IUCN(VU)	-	9
Collared Scops Owl *Otus lettia*	CITES(II); CSMPS(II); Cap.586	-	1
Common Greenshank *Tringa nebularia*	RC	-	35
Common Redshank *Tringa totanus*	RC	-	16
Crested Serpent Eagle *Spilornis cheela*	(LC); RLCV(NT); CITES(II); CSMPS(II); Cap.586	-	1
Eastern Buzzard *Buteo japonicus*	CSMPS(II); CITES(II); Cap.586	1	2
Eurasian Teal *Anas crecca*	RC	-	19
Great Cormorant *Phalacrocorax carbo*	PRC	11	240
Great Egret *Ardea alba*	PRC (RC)	-	41
Greater Coucal *Centropus sinensis*	CSMPS(II)	-	9
Grey Heron *Ardea cinerea*	PRC	2	104
Grey-headed Lapwing *Vanellus cinereus*	LC	-	13

Species	Conservation and Protection Status[1]	Abundance recorded in:	
		Application Site	Outside Application Site)
Intermediate Egret *Ardea intermedia*	RC	-	1
Little Egret *Egretta garzetta*	PRC (RC)	8	177
Little Grebe *Tachybaptus ruficollis*	LC	-	13
Little Ringed Plover *Charadrius dubius*	(LC)	-	4
Marsh Sandpiper *Tringa stagnatilis*	RC	-	25
Northern Shoveler *Spatula clypeata*	RC	-	333
Pied Avocet *Recurvirostra avosetta*	RC	-	199
Pied Kingfisher *Ceryle rudis*	(LC)	-	4
Purple Heron *Ardea purpurea*	RC	-	2
Spotted Redshank *Tringa erythropus*	RC	-	6
White-shouldered Starling *Sturnia sinensis*	(LC)	10	12
White-throated Kingfisher *Halcyon smyrnensis*	(LC)	-	5
Wood Sandpiper *Tringa glareola*	LC	-	65
Yellow Bittern *Ixobrychus sinensis*	(LC)	2	2
Zitting Cisticola *Cisticola juncidis*	LC	-	1

Notes:

1. Conservation and protection status refers to Fellowes *et al.* (2002), Red List of China's Vertebrates (Jiang *et al.* 2016), IUCN (2020), China State Major Protection Status, CITES (2020), Cap. 170 and Cap. 586.
   a. Conservation status by Fellowes *et al.* (2002): LC = Local Concern; PRC = Potential Regional Concern; RC = Regional Concern; PGC = Potential Global Concern; GC = Global 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.
   b. Conservation status by Red List of China's Vertebrates (RLCV) (Jiang *et al.* 2016): NT = Near Threatened; EN = Endangered.
   c. Conservation status by IUCN (2002): NT = Near Threatened; EN = Endangered.
   d. Protection status by China State Major Protection Status (CSMPS): II = Class II Protected Species in China.
   e. Protection status by CITES (2020): II = Listed in CITES Appendix II.
   f. All wild birds in Hong Kong are protected under Cap. 170 Wild Animals Protection Ordinance.
   Cap. 586 = Protection of Endangered Species of Animals and Plants Ordinance.

4.2.27 No breeding and nesting behavior were observed in the Application Site. Two active nests of White-shouldered Starling were found in

developed area habitat near Shan Pin Tsuen. White-shouldered Starling were observed flew to and return from northeast direction. There was no observation that White-shouldered Starling flew to and return from the Application Site.

4.2.28 Two ardeid night roosts were found within the 500m Study Area and surveyed during the survey period between 2019 and 2020 (**Figure 2b**). The maximum counts of the two ardeid night roosts were both less than 30 individuals of ardeids. Most of the roosting ardeids were Little Egret. However, it was observed that no egrets roosted at the one to the western side of Kam Tin River Drainage Channel in 2021.

4.2.29 A winter roost of Great Cormorant was present in plantations about 500m to 800m to the northwest of the Application Site. Around 4,560 individuals (maximum count) of Great Cormorant were found roosting there (**Figure 6b**).

Flight Path Survey

4.2.30 The survey confirmed that Tung Shing Lane egretry was still active in 2019 and 2020, a total of 306 and 288 flight observations was made in 2019 and 2020, respectively. The observed flight directions of ardeid took off from Tung Shing Lane Egretry were similar in both 2019 and 2020, with the majority flying a general northward direction (flying across Yuen Long Highway and the Yuen Long Bypass Floodway) with much smaller number flying eastward to Kam Tin River Drainage Channel and westward to Yuen Long Town directions, with occasional individuals landing at the ponds in front of the egretry (**Figures 6c** and **6d**). These observations were consistent with those reported from the literature reviewed.

4.2.31 For the breeding ardeid towards northern direction, after passing Yuen Long Highway, their flying directions had some variations. **Figures 6e** and **6f** present the numbers and percentages of the flying directions of the breeding ardeid (**Zones A** to **I**) . These zones covered all recorded flight directions. One of the zones (Zone D) covered the knoll to the north of the Application Site, which most ardeid avoided, and the remaining directions were approximately evenly divided into three zones (to the west of the knoll) and 5 zones (to the east of the knoll). Those breeding ardeid showed a strong tendency flying towards the direction of Kam Tin River Drainage Channel while would avoid the knoll to the north of the Application Site. As shown on **Figures 6e** and **6f**, after passing Yuen Long Highway, the largest proportion of flight directions was in the most eastern direction (i.e. Zone I) in both 2019 and 2020 (120 and 168 individuals respectively, or 39.22% and 58.33% respectively), and it was observed that most of the ardeids flew along Kam Tin River Drainage Channel after leaving Zone I. Only very low percentage of flight observation was recorded toward the knoll to the north of the Application Site (i.e. Zone D, with 2 individuals in both 2019 and 2020).

4.2.32 For the remaining zones, the percentages showed variations between the results of 2019 and 2020. In 2019, more individuals utilized Zones A, E, F and G and much less used Zones B, C, H. In 2020, however, no ardeid was recorded in the direction of Zone A, and the variations of percentages of ardeid among Zones B, C, E, F, G and H were much smaller.

4.2.33 However, no breeding of ardeids in Tung Shing Lane Egretry was found in 2021. On the other hand, a new egretry was recorded in Kam Po Road in 2021, which is over 2km from the Application Site. Flight-line surveys were hence conducted between May and August 2021 to determine if the proposed development would affect the breeding ardeids in the new egretry. The results showed that the breeding ardeids in Kam Po Road egretry mainly flew towards northwest direction along Kam Tin River Drainage Channel for foraging, and some minor flight observations were recorded flying eastern, western and southern directions (**Figure 6g**). Decreasing number of ardeids from the new egretry along Kam Tin River Drainage Channel was observed, likely because some ardeids landed in the wetlands in the vicinity of Kam Tin River Drainage Channel. There was no record of breeding ardeids which took off from the new egretry and flew through the Application Site.

4.2.34 Regarding the winter flight path survey, a total of 167 flight observation was recorded between December 2019 and February 2020, which are summarized as 6 flight-lines (**Figure 6h**). Most of the flight lines were observed along the Kam Tin River Drainage Channel (about 52 %) and along Kam Tin River Drainage Channel first then turned to northwest directions (about 34% from three minor flight lines), while only a minor (about 12%) and an occasional (about 2 %) flight lines were observed flying through the Application Site at its western side and eastern side respectively (**Figure 6h**). Given the location of the Application Site is at the edge of the major Deep Bay wetland area, the paucity of wetland habitat to the south and presence of a knoll to north of the site, there was no major bird flight path over the Application Site as expected.

Herpetofauna

4.2.35 Six species of reptile and six species of amphibian were recorded within the Study Area (**Appendix D & E**). Among the amphibian and reptile, no species were of conservation importance.

Odonate

4.2.36 Twenty-nine species of odonate were recorded within the Study Area, of which seventeen species were recorded within the Application Site (**Appendix G**). Among all of the twenty-nine species, only three species were of conservation importance, including Blue Chaser, Ruby Darter and Scarlet Basker, and none of them was found within

the Application Site.

Butterfly

4.2.37 Forty-five species of butterfly were recorded within the Study Area, of which ten species were recorded within the Application Site (**Appendix F**). Among all forty-five species, four species are of conservation importance, including Common Awl, Danaid Eggfly, Metallic Cerulean and Swallowtail, none of them were recorded within the Application Site.

Firefly

4.2.38 Firefly surveys were conducted monthly between April and October 2020 within and beyond the 500m Study Area. Two species of firefly were recorded i.e. Mai Po Bent-winged Firefly and *Pyrocoelia* sp. (**Appendix H**). Only *Pyrocoelia* sp. was recorded within the Application Site (**Figure 6i**). The firefly species of conservation importance i.e. Bent-winged Firefly was recorded northwest of the Application Site near Kam Tin River Meander south of Nam Sang Wai (**Figure 6i**). Only the firefly within the 500m Study Area is shown in **Appendix H** and **Figure 6i**.

4.2.39 The overall range of background light intensity recorded during the firefly survey was 0.03 – 0.65 lux. The range of the ambient light intensity when Mai Po Bent-winged Firefly was recorded is between about 0.04 lux to 0.47 lux, where at least a single individual was recorded. A total of 13 individuals were recorded during a single occasion during the entire survey period with the ambient light intensity of 0.28 lux.

Aquatic Fauna

4.2.40 A total of 9 aquatic species was recorded within the Study Area (**Appendix I**). Large numbers of Nile Tilapia were observed in Kam Tin River Drainage Channel and were found in all 6 sampling locations. All species were common in Hong Kong and no species of conservation importance were recorded within the Study Area.

4.2.41 Locations of the non-bird species of conservation importance recorded within the Study Area are shown in **Figure 6a**. Details of observations, protection status, distribution and commonness of the species of conservation importance are shown in **Table 4.16.**

4.3 Evaluation of Habitats and Species of Conservation Importance

4.3.1 The ecological importance of habitats within the Study Area are evaluated in accordance with the criteria stipulated in Annex 8 of TM-EIAO (**Tables 4.6 to 4.15**).

4.3.2 In accordance with Table 3, Annex 8 of the TM-EIAO, the ecological value of species recorded within the Study Area was assessed in terms of protection status (e.g. fauna protected under WAPO (except birds), and flora and fauna protected under regional/global legislation/conventions), species distribution (e.g. endemic), and rarity (e.g. rare or restricted).

4.3.3 Flora or fauna species protected by the following laws/regulations, listed under the following conventions and/or endemic to Hong Kong were considered to be species of conservation importance and are shown in **Table 4.16**. However, this excludes exotic weeds, escaped cultivars or captive species, vagrants and introduced species which have lower ecological value. Species which are classified by IUCN as Near Threatened (NT), Least Concern (LC), Data Deficient (DD), or Not Evaluated (NE), and not covered by any other laws/regulations/conventions are not considered of conservation importance in the present EcoIA.

- The International Union for Conservation of Nature and Natural Resources (IUCN) Red List of Threatened Species;
- China Plant Red Data Book;
- China Species Red List;
- China Red Data Book of Endangered Animals;
- Category I or II protected species in mainland China;
- Threatened Species List of China's Higher Plants (Qin *et al*. 2017);
- The Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES);
- Forestry Regulations (Cap. 96A) which are subsidiary legislation of the Forests and Countryside Ordinance (Cap. 96);
- Wild Animals Protection Ordinance (Cap. 170) (except birds as all wild birds are protected under the ordinance but their conservation importance is not equal);
- Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586);
- PRC Wild Animal Protection Law;
- Plant species considered 'Rare' or 'Very Rare' listed by Corlett *et al*. (2000) or Yip *et al*. (2010) where applicable; and
- Fauna species considered of concern in Fellowes *et al*. (2002).

Table 4.6 Evaluation of Abandoned and Active Agricultural Land within the Study Area

Criterion	Description
Naturalness	Man-made
Size	Small in Study Area. Not present in the Application Site.
Diversity	Very low species diversity and structural complexity
Rarity	2 bird species of conservation importance
Re-creatability	Readily re-created
Fragmentation	Fragmented within the Study Area
Ecological linkage	Limited linkages with habitats of ecological significance
Potential value	Limited due to high levels of human influence
Nursery/breeding ground	No known significant nursery or breeding ground
Age	Unknown
Abundance/richness of wildlife	Low abundance and diversity of wildlife.
Overall ecological value	Low

Table 4.7 Evaluation of Abandoned Pond, Pond and Mitigation Wetland within the Study Area

Criterion	Description		
	Abandoned Pond	Pond	Mitigation Wetland
Naturalness	Man-made origin, Some might be semi-natural, dependent on the duration of abandonment	Man-made	Semi-natural. Most are man-made origin
Size	Relatively large within the Study Area but small in Hong Kong context. Very small within the Application Site	Relatively large within the Study Area but small in Hong Kong context. Small within the Application Site.	Small within the Study Area and in Hong Kong context. Not present in the Application Site.
Diversity	Low plant species diversity and structural complexity. Low to moderate faunal diversity	Low plant species diversity and structural complexity. Moderate faunal diversity	Supports low plant diversity and moderate fauna diversity
Rarity	10 bird species of conservation importance (among them, only 3 species i.e., Black Kite, Chinese Pond Heron, and Little Egret, were found within Application Site), Scarlet Basker, Ruby Darter, Japanese Pipistrelle and Small Asian Mongoose	10 bird species of conservation importance (among them, only Black Kite, Chinese Pond Heron, Great Cormorant, Grey Heron, Little Egret, Yellow Bittern were found within Application Site)	10 bird species of conservation importance
Re-creatability	Recreation feasible	Readily re-created	Readily re-created
Fragmentation	Some fragmentation,	Some fragmentation, both	Fragmented from other

Criterion	Description		
	Abandoned Pond	**Pond**	**Mitigation Wetland**
	both within Study Area and from other areas of pond/abandoned pond	within Study Area and from other areas of pond	mitigation wetlands
Ecological linkage	Linkages with other high-value habitats in Deep Bay area for those remaining active and closer to WCA, but not significant for those dry/overgrown, or outside WBA and isolated by developed area such as highways.		
Potential value	Value would be improved if fish farming is resumed or protected and managed for wildlife, especially if linkage with other ponds /habitat in the area established. Those adjacent to mitigation wetlands have higher potential value.	Value would be improved if protected and managed for wildlife, especially if linkage with other ponds/ habitat in the area established. Ponds at the northernmost of Study Area have higher potential value given location and size. Ponds isolated by wasteland and urban area have lower potential value.	Some potential for enhancement with habitat management for wildlife.
Nursery/breeding ground	No significant nursery or breeding ground known	No significant nursery or breeding ground known. Tung Shing Lane Egretry is located at several trees on pond bunds and near village houses in Tung Shing Lane village.	No significant nursery or breeding ground known
Age	Unknown Aerial photo review revealed that in the last decade all the abandoned ponds within Application Site and to the east of the Application Site maintained in a condition with low/without water coverage	Unknown	At least a decade
Abundance/ richness of wildlife	Low to moderate	Moderate to high	The YLBF Mitigation Wetland is known to support moderate abundance of wetland fauna
Overall ecological value	Low to Moderate value for those retaining normal pond size, given the conditions of these abandoned ponds, which have either dry up or overgrown by vegetation, and their lower ecological values for waterbirds when compared with traditional fishponds with drain down practices and their potential value if properly managed. Lower value if small in size i.e., Low for the	Moderate value for those actively operated for commercial fish farming. Lower value if the operation effort is lower i.e., Low – Moderate for the one at the northwest corner of the Application Site).	Moderate value

Criterion	Description		
	Abandoned Pond	Pond	Mitigation Wetland
	one partially within the Application Site at southern boundary) and/or isolated from other wetlands.		

Table 4.8 Evaluation of Channel and Meander within the Study Area

Criterion	Description	
	Channel	Meander
Naturalness	Entirely man-made habitat, Kam Tin River Drainage Channel and the outer section of YLBF under influence of natural tidal flow.	Originated from streams, subject to human modifications and/or under influence of natural tidal flow.
Size	Moderate for YLBF and Kam Tin River Drainage Channel, small for other channels. Not present in the Application Site.	Varied. Kam Tin River Meander relatively large while others for irrigation of crops or modified stream generally small. Few sections of a small tidal meander are within the Application Site.
Diversity	Floral diversity low. Faunal diversity low to moderate	Floral and faunal diversity low
Rarity	21 bird species of conservation importance, Scarlet Basker, Blue Chaser and Japanese Pipistrelle	8 bird species of conservation importance (among these only one species, i.e. Chinese Pond Heron, was found within the Application Site), Scarlet Basker and Ruby Darter
Re-creatability	Easily recreated	Readily re-created
Fragmentation	Not fragmented for YLBF and Kam Tin River Drainage Channel	Limited fragmentation
Ecological linkage	For YLBF, high linkage with Kam Tin River Drainage Channel, less so with Inner Deep Bay	Directly or indirectly connected with Kam Tin River Drainage Channel or Shan Pui River Drainage Channel. Minor ecological linkage with the adjacent habitats
Potential value	Limited potential for further increase in value due to constraints imposed by artificial/concrete bank structures and management regime	Very little potential without re-engineering
Nursery/breeding ground	Not a significant nursery or breeding ground but these major channels are presumed to be a foraging area for breeding ardeids and common smaller waterbirds	Not known
Age	Varied. About 10 to 20 years	Mostly less than 20 years
Abundance/richness of wildlife	Low to moderate diversity and low abundance of wetland-associated fauna	Low abundance and diversity of wildlife
Overall ecological value	Moderate for YLBF and Kam Tin River Drainage Channel, Low for other channels inside Study Area	Low to moderate for Kam Tin River Meander Low for other meander including the small tidal meander with few sections within the Application Site

Table 4.9 Evaluation of Developed Area within the Study Area

Criterion	Description
Naturalness	Entirely man-made
Size	Large within the Study Area but small in Application Site
Diversity	Very low habitat complexity. Poor species diversity and structural complexity.
Rarity	8 bird species of conservation importance (among them, only one species, i.e. White-shouldered Starling, was found within Application Site), Japanese Pipistrelle, and Danaid Eggfly
Re-creatability	Readily re-created
Fragmentation	N/A
Ecological linkage	No significant linkages with other habitats of ecological importance
Potential value	Low
Nursery/breeding ground	No known as significant nursery or breeding ground
Age	N/A
Abundance/richness of wildlife	Low abundance and diversity of wildlife
Overall ecological value	Very low (for both areas beyond and within the Application Site)

Table 4.10 Evaluation of Grassland/Shrubland within the Study Area

Criterion	Description
Naturalness	Natural but maintained by human influences
Size	Small in Study Area. Not present in the Application Site.
Diversity	Very low species diversity and structural complexity
Rarity	4 bird species of conservation importance
Re-creatability	Readily re-created
Fragmentation	Fragmented from other areas of grassland/shrubland
Ecological linkage	Limited linkages with habitats of ecological significance
Potential value	Limited due to high levels of human influence
Nursery/breeding ground	No known as significant nursery or breeding ground
Age	Unknown
Abundance/richness of wildlife	Low abundance and diversity of wildlife
Overall ecological value	Low

Table 4.11 Evaluation of Plantation within the Study Area

Criterion	Description
Naturalness	Planted for amenity and visual purposes. Dominated by exotic species.
Size	Small in Study Area. Not present in the Application Site.
Diversity	Low flora and fauna diversity
Rarity	6 bird species of conservation importance, Common Awl and Blue Chaser
Re-creatability	Readily re-created
Fragmentation	Highly fragmented by developed area and roads
Ecological linkage	No significant linkages with habitats of ecological significance
Potential value	Limited potential due to disturbance and high proportion of exotic species
Nursery/breeding ground	Not a nursery or breeding ground of significance

Criterion	Description
Age	Unknown. Likely to have been planted following infrastructure works
Abundance/richness of wildlife	Low abundance and diversity of species, comprise mainly widespread and disturbance tolerant species
Overall ecological value	Low

Table 4.12 Evaluation of Reedbed and Tidal Marsh within the Study Area

Criterion	Description	
	Reedbed	Tidal Marsh
Naturalness	Semi-natural	Natural habitat established by wetland plants at channel margins
Size	Small in Study Area, limited between the Application Site and villages to the west. Not present in the Application Site	Small in Study Area, Not a common habitat in Hong Kong's context. Not present in the Application Site.
Diversity	Very low species diversity and structural complexity	Low to moderate
Rarity	9 bird species of conservation importance	5 bird species of conservation importance
Re-creatability	Readily re-created	Difficult to recreate
Fragmentation	No fragmentation observed within the Study Area	Not severely fragmented but rather small in size; might imply a high edge effect
Ecological linkage	Potentially linked to adjacent active fishponds, Kam Tin River Meander, and the reedbed in Nam Sang Wai.	Hydrologically and functionally linked with adjacent channels (Shan Pui River Drainage Channel) and some linkages to the reedbed and ponds nearby
Potential value	Limited due to high levels of human influence	Moderate to high if human disturbances nearby (primarily artificial light) could be minimized for the survival of Mai Po Bent-winged Firefly
Nursery/breeding ground	No known significant nursery or breeding ground	Breeding ground of Mai Po Bent-winged Firefly
Age	Unknown	At least over 30 to 50 years judging from previous aerial photographs
Abundance/richness of wildlife	Low abundance and diversity of wildlife	Low to moderate
Overall ecological value	Low to moderate	Moderate

Table 4.13 Evaluation of Wasteland within the Study Area

Criterion	Description
Naturalness	Colonising habitat on areas of bare ground or former agricultural land. Land has previously been adapted by anthropogenic changes and is now subject to very early stage vegetative succession.
Size	Occupies the majority of the Application Site and moderate size within the Study Area
Diversity	Low faunal and floral diversity
Rarity	1 plant species of conservation importance *Persicaria orientalis,* 7 bird species of conservation importance (all found both within and outside Application Site), Swallowtail and Japanese Pipistrelle

Criterion	Description
Re-creatability	Readily re-created
Fragmentation	Limited fragmentation
Ecological linkage	No significant functional or ecological linkage with other habitats.
Potential value	Low
Nursery/breeding ground	Not known as significant nursery or breeding ground
Age	Unknown
Abundance/richness of wildlife	Low floral and faunal diversity and abundance
Overall ecological value	Low (for both areas beyond and within the Application Site)

Table 4.14 Evaluation of Woodland within the Study Area

Criterion	Description
Naturalness	Semi-natural habitat dominated by self-sown exotic tree species, with human disturbance
Size	Small size in Study Area. Not present in the Application Site
Diversity	Low to moderate floral diversity but low faunal diversity
Rarity	2 bird species of conservation importance and Metallic Cerulean
Re-creatability	Readily re-created but trees need time to mature
Fragmentation	Highly fragmented by developed areas and roads
Ecological linkage	No significant linkages with habitats of ecological significance
Potential value	Limited potential for direct increase in habitat value unless more diverse vegetative community can develop
Nursery/breeding ground	No significant nursery/ breeding record
Age	Formed within the last few decades
Abundance/richness of wildlife	Low abundance and diversity of species, comprise mainly widespread and disturbance tolerant species
Overall ecological value	Low

Table 4.15 Evaluation of the Application Site

Criterion	Description
Naturalness	Habitats inside were either man-made (pond), man-made origin (abandoned pond), modified (meander), or highly disturbed (developed area and wasteland) habitats
Size	Total 5.56 ha. Dominated by wasteland (4.50 ha), and included a small pond (0.46ha, which is smaller than most of active fishponds), fractions of an abandoned pond (0.23 ha) and meander (0.16ha), and small area of developed area (0.21 ha)
Diversity	Low species diversity inside the Application Site. Dominated by wasteland habitat, of low structural complexity.
Rarity	9 bird species of conservation importance and Japanese Pipistrelle
Re-creatability	All habitats inside are readily re-created
Fragmentation	Limited fragmentation within the Application Site.
Ecological linkage	Currently no significant functional or ecological linkage with other habitats.
Potential value	Limited due to high levels of human influence
Nursery/breeding ground	No known significant nursery or breeding ground
Age	Varied

Criterion	Description
Abundance/richness of wildlife	Low abundance of wildlife
Overall ecological value	**Low** as dominated by wasteland habitat (which is of low ecological value). Other habitats present are all small in size and not of special ecological value. Abandoned pond within Application Site is considered as of **low ecological value** which is lower than other abandoned ponds in the Study Area due to the small size. Pond, due to its smaller size and lower level of management when compared with those operated for fully active fish farming, would be of **low to moderate ecological value** (lower than other ponds in the Study Area). The small tidal meander partially falls within the Application Site is also of **low ecological value**. The developed area is also small in size and of **very low ecological value**.

Table 4.16 Evaluation of Species of Conservation Importance Recorded in the Study Area

Number	Species / species groups	Location	Protection Status / Level of concern [1 2,3]	Distribution in HK [1]	Rarity [1]
Flora					
1	*Persicaria orientalis*	Outside Application Site: Wasteland	-	-	Very Rare
Fauna					
2	Japanese Pipistrelle *Pipistrellus abramus*	Outside Application Site: Abandoned Pond, Channel, Developed Area, Wasteland Inside Application Site: Wasteland	WAPO	Widely distributed throughout Hong Kong	Very common
3	Small Asian Mongoose *Herpestes javanicus*	Outside Application Site: Abandoned Pond	WAPO; Red List of China's Vertebrate: (Vulnerable)	Found in N.T. countryside area	Uncommon
4	Northern Shoveler *Anas clypeata*	Outside Application Site: Channel	WAPO; Level of Concern: RC	Mainly found in Deep Bay area	Common winter visitor
5	Little Grebe *Tachybaptus ruficollis*	Outside Application Site: Abandoned Pond, Channel, Pond	WAPO; Level of Concern: LC	Found in Deep Bay area	Common resident
6	Yellow Bittern *Ixobrychus sinensis*	Outside Application Site: Meander, Pond Inside Application Site: Abandoned Pond	WAPO; Level of Concern: (LC)	Found in Deep Bay area, Chek Keng, Tai Long Wan	Uncommon summer visitor and passage migrant
7	Black-crowned Night Heron *Nycticorax nycticorax*	Outside Application Site: Abandoned Ponds, Meander, Mitigation Wetland	WAPO; Level of Concern: LC	Widely distributed in Hong Kong	Common resident and winter visitor
8	Chinese Pond Heron *Ardeola bacchus*	Outside Application Site: Abandoned Agricultural Land, Abandoned Pond, Channel, Developed Area, Meander, Plantation, Pond, Reedbed, Tidal Marsh, Wasteland Inside Application Site: Abandoned Pond, Meander, Wasteland	WAPO; Level of Concern: PRC, (RC)	Widely distributed in Hong Kong	Common resident
9	Purple Heron *Ardea purpurea*	Outside Application Site: Abandoned Pond, Mitigation Wetland	WAPO; Level of Concern: RC	Found in Deep Bay area	Uncommon passage migrant

Number	Species / species groups	Location	Protection Status / Level of concern [1 2,3]	Distribution in HK [1]	Rarity [1]
10	Grey Heron *Ardea cinerea*	Outside Application Site: Channel, Developed Area, Mitigation Wetland, Pond, Reedbed, Wasteland Inside Application Site: Abandoned Pond, Wasteland	WAPO; Level of Concern: PRC	Main found in Deep Bay area	Common winter visitor, uncommon in summer;
11	Great Egret *Ardea alba*	Outside Application Site: Abandoned Pond, Channel, Meander, Mitigation Wetland, Pond, Reedbed, Tidal Marsh	WAPO; Level of Concern: PRC	Widely distributed in Hong Kong	Common resident and winter visitor
12	Little Egret *Egretta garzetta*	Outside Application Site: Abandoned Agricultural Land, Abandoned Pond, Active Agricultural Land, Channel, Developed Area, Meander, Mitigation Wetland, Plantation, Pond, Reedbed, Tidal Marsh, Wasteland Inside Application Area: Abandoned Pond, Wasteland	WAPO; Level of Concern: PRC, (RC)	Widely distributed in coastal area throughout Hong Kon	Common resident
13	Intermediate Egret *Egretta intermedia*	Outside Application Site: Reedbed	WAPO; Level of Concern: RC	Found in Deep Bay area, Tai Long Wan, Starling Inlet, Tai O, Cape D'Aguilar	Common passage migrant
14	Black-faced Spoonbill *Platalea minor*	Outside Application Site: Channel	WAPO; Class 2 Protected Animal of PRC; China Red Data Book: Endangered IUCN: Endangered Level of Concern: PGC	Mainly found in Deep Bay area	Common winter visitor
15	Great Cormorant *Phalacrocorax carbo*	Outside Application Site: Abandoned Pond, Channel, Mitigation Wetland, Pond, Reedbed	WAPO; Level of Concern: PRC	Widely distributed in coastal areas throughout Hong Kong	Common winter visitor
16	Crested Serpent Eagle *Spilornis cheela*	Outside Application Site: Grassland/Shrubland	WAPO; Appendix 2 of CITES; Class 2 Protected Animal of PRC; Level of Concern: LC	Widely distributed in shrublands on hillsides throughout Hong Kong	Uncommon resident
17	Black Kite *Milvus migrans*	Outside Application Site: Channel, Developed Area, Grassland/Shrubland, Mitigation Wetland, Plantation, Pond, Wasteland, Woodland Inside Application Site: Abandoned Pond, Wasteland,	WAPO; Appendix 2 of CITES; Class 2 Protected Animal of PRC; Level of Concern: (RC)	Widely distributed in Hong Kong	Common in Hong Kong;
18	Collared Scops Owl	Outside Application Site:	WAPO;	Widely	Common

Number	Species / species groups	Location	Protection Status / Level of concern [1 2,3]	Distribution in HK [1]	Rarity [1]
	Otus lettia	Woodland	Class 2 Protected Animal of China; Appendix 2 of CITES	distributed in shrubland throughout Hong Kong.	resident
19	Asian Barred Owlet *Glaucidium cuculoides*	Outside Application Site: Wasteland Inside Application Site: Wasteland	WAPO; Class 2 Protected Animal of China; Appendix 2 of CITES	Widely distributed in woodland throughout Hong Kong.	Uncommon resident.
20	Black-winged Stilt *Himantopus himantopus*	Outside Application Site: Abandoned Pond, Channel	WAPO; Level of Concern: RC	Mainly found in Deep Bay area	Common winter visitor
21	Pied Avocet *Recurvirostra avosetta*	Outside Application Site: Channel	WAPO; Level of Concern: RC	Mainly found in Deep Bay area	Common winter visitor
22	Grey-headed Lapwing *Vanellus cinereus*	Outside Application Site: Channel	WAPO; Level of Concern: LC	Found in Kam Tin, Tsim Bei Tsui, Lo Wu, Tai Long Wan, Shuen Wan, Castle Peak coast, Chek Lap Kok	Scarce winter visitor
23	Little Ringed Plover *Charadrius dubius*	Outside Application Site: Channel	WAPO; Level of Concern: (LC)	Widely distributed in freshwater areas throughout Hong Kong	Common winter visitor and passage migrant;
24	Marsh Sandpiper *Tringa stagnatilis*	Outside Application Site: Channel	WAPO; Level of Concern: RC	Found in Deep Bay area, Shuen Wan, Long Valley, Kam Tin, Sai Kung	Common winter visitor and passage migrant
25	Common Redshank *Tringa totanus*	Outside Application Site: Channel	WAPO; Level of Concern: RC	Found in Deep Bay area	Common passage migrant
26	Common Greenshank *Tringa nebularia*	Outside Application Site: Channel	WAPO; Level of Concern: RC	Found in Deep Bay area, Shuen Wan, Long Valley, Kam Tin, Sai Kung	Common winter visitor and passage migrant
27	Wood Sandpiper *Tringa glareola*	Outside Application Site: Channel	WAPO; Level of Concern: LC	Widely distributed in wetland area throughout Hong Kong	Common passage migrant and winter visitor
28	Spotted Redshank *Tringa erythropus*	Outside Application Site: Channel	WAPO; Level of Concern: RC	Found in Deep Bay area.	Abundant in winter and spring.
29	White-throated kingfisher *Halcyon smyrnensis*	Outside Application Site: Channel, Developed Area, Grassland/Shrubland, Meander,	WAPO; Level of Concern: LC	Widely distributed in coastal	Common resident

Number	Species / species groups	Location	Protection Status / Level of concern [1 2,3]	Distribution in HK [1]	Rarity [1]
		Reedbed		areas throughout Hong Kong	
30	Pied Kingfisher *Ceryle rudis*	Outside Application Site: Channel, Mitigation Wetland, Pond	WAPO; Level of Concern: LC	Widely distributed in lakes and ponds throughout Hong Kong	Uncommon resident
31	Greater Coucal *Centropus sinensis*	Outside Application Site: Abandoned Pond, Developed Area, Meander, Mitigation Wetland, Plantation, Reedbed, Tidal Marsh	WAPO; Class 2 Protected Animal of China; China Red Data Book Status: (Vulnerable)	Widely distributed in Hong Kong.	Common resident.
32	Collared Crow *Corvus torquatus*	Outside Application Site: Developed Area, Plantation, Reedbed, Tidal Marsh	WAPO; IUCN: Vulnerable; Level of Concern: LC	Found in Inner Deep Bay area, Nam Chung, Kei Ling Ha, Tai Mei Tuk, Pok Fu Lam, Chek lap Kok, Shuen Wan, Lam Tsuen	Uncommon resident
33	Zitting Cisticola *Cisticola juncidis*	Outside Application Site: Abandoned Pond	WAPO; Level of Concern: LC	Widely distributed in grassland throughout Hong Kong	Common passage migrant and winter visitor
34	White–shouldered Starling *Sturnia sinensis*	Outside Application Site: Developed Area, Shrubland/Grassland, Wasteland Inside Application Site: Developed Area, Wasteland	WAPO; Level of Concern: LC	Found in Kam Tin, Deep Bay area, Po Toi Island, Long Valley, Victoria Park, Ho Chung, Ma Tso Lung, Mui Wo, Lam Tsuen Valley	Common passage migrant
35	Bluethroat *Luscinia svecica*	Outside Application Site: Plantation	WAPO; Level of Concern: LC	Widely distributed in wet agricultural areas throughout Hong Kong.	Common passage migrant and winter visitor.
36	Black-winged Kite *Elanus caeruleus*	Outside Application Site: Pond	WAPO; RLCV(NT); CITES(II); (LC)	Found in Ha Tsuen, Deep Bay area.	Occasional visitor.
37	Eurasian Teal *Anas crecca*	Outside Application Site: Channel, Meander	WAPO; RC	Found in Deep Bay area, Shuen Wan, Tai Lam Chung Reservoir, Victoria Harbour, Urban Park.	Common winter visitor.
38	Eastern Buzzard *Buteo japonicus*	Outside Application Site: Mitigation Wetland, Wasteland	WAPO; CSMPS(II); CITES(II);	Widely distributed in Hong Kong.	Common winter visitor.

Number	Species / species groups	Location	Protection Status / Level of concern [1 2,3]	Distribution in HK [1]	Rarity [1]
		Inside Application Site: Wasteland	Cap.586		
39	Scarlet Basker *Urothemis signata signata*	Outside Application Site: Abandoned Pond, Channel, Meander	Level of Concern: LC	Common in areas containing abandoned fishponds throughout Hong Kong	Common
40	Ruby Darter *Rhodothemis rufa*	Outside Application Site: Meander	Level of Concern: LC	Widely distribute in ponds and marshes throughout Hong Kong	Common
41	Blue Chaser *Potamarcha congener*	Outside Application Site: Channel, Plantation	Level of Concern: LC	Widely distribute in marsh throughout Hong Kong	Common.
42	Metallic Cerulean *Jamides alecto*	Outside Application Site: Woodland	Nil	Victoria Peak, Fung Yuen, Chuen Lung, Mui Wo	Very Rare.
43	Swallowtail *Papilio xuthus*	Outside Application Site: Wasteland	Nil	Kap Lung, Ma On Shan, Tai Tam, Sha Lo Wan, Kat O, Lung Kwu Tan, Wu Kau Tang, Lung Kwu Chau	Rare.
44	Common Awl *Hasora badra*	Outside Application Site: Plantation	Level of Concern: LC	Wu Kau Tan, Lai Chi Wo, Hong Kong Wetland Park	Very Rare
45	Danaid Eggfly *Hypolimnas misippus*	Outside Application Site: Developed Area	Level of Concern: LC	Ngau Ngak Shan, Lung Kwu Tan, Hong Kong Wetland Park, Mount Parker, Cloudy Hill, Lin Ma Hang	Uncommon

1: AFCD website (2020), 2: Wang (1998)

3. Level of Concern follows Fellowes *et al.* 2002: LC = local concern; RC = regional concern; PRC = potential regional concern; GC = global concern. Letters in parentheses indicate that the assessment is based on restrictedness in breeding and/or roosting sites rather than in general occurrence

5. IMPACT IDENTIFICATION AND PREDICTION

5.1 General

5.1.1 The Application Site is divided into two portions i.e. the northern portion is for public housing development, while the southern portion is for private development (refer to the Planning Statement). The proposed development is thus a residential project with the following project elements:

- 7 residential buildings with 23 to 24 domestic storeys;

- Non-domestic block consists of transport terminus, retail, G/IC facilities and residential carpark at basement;
- Other associated landscape areas;
- necessary accesses and EVA;
- A sewage pumping station

5.1.2 The potential impacts associated with the proposed development include:

- Direct habitat loss, either permanent or temporary, which may occur on-site and/or off-site, due to site formation and construction works within the Application Site or in off-site works areas;
- Direct impacts to flora and fauna species, in particular those of conservation importance, arising from mortality;
- Disturbance impacts to surrounding habitats and fauna during construction;
- Water quality impact due to construction site runoff;
- Disturbance impacts to surrounding fauna, habitats and recognized sites of conservation importance during operation;
- Potential disturbance to flight paths of ardeids and other large-sized birds;
- Potential bird collision or road-kill; and
- Night-time light impacts.

5.2 Impact Evaluation Criteria

5.2.1 The significance of ecological impacts has been evaluated based primarily on the criteria set out in Table 1 of Annex 8 of the TM-EIAO:

- Habitat quality;
- Species affected;
- Size/abundance of habitats/species affected;
- Duration of impacts;
- Reversibility of impacts; and
- Magnitude of environmental changes.

5.2.2 This assessment is based on the **Indicative Block Plan** submitted under the current Application. Estimates of habitat loss and identification of areas to be affected by development have been made as accurate as practicable.

5.3 Construction Phase

Direct Impact – Temporary Habitat Loss During Construction Phase

5.3.1 There will be direct impact on wasteland, abandoned pond, pond and developed area within the Application Site during the construction phase. The latest design has avoided any impacts on the meander. According to the latest layout plan, there would be neither channelization nor modification of the sections of meander within the Application Site, and construction works will not encroach onto the meander. Therefore, direct impact on the meander is not anticipated. A sewage pumping station (SPS) is proposed at the western edge of the Application Site within the existing wasteland habitat. The SPS is relatively small in size and elongated in shape with no encroachment upon the meander. A short section of maintenance access would be provided to span over the meander to link up the SPS and the Public Access Road within the Application Site. The temporary works area for this maintenance access would also be decking over the meander. No foreseeable major temporary works and no modification on the meander is required. As there would be no construction works encroaching upon the meander, no temporary or permanent loss of the meander or any wetland habitat is anticipated due to the project.

5.3.2 The ecological values of wasteland and developed area are considered as low and very low respectively. Although the abandoned pond and pond within the Application Site will be encroached during construction, those wetlands are of low bird usage and low or low to moderate ecological value as they are either without drain-down and/or with observed degradation (such as overgrown at the bottom or pond bund). Based on results from ecological surveys, the Application Site would be of limited value as a foraging ground for either breeding ardeids at Tung Shing Lane Egretry or wintering waterbirds. Hence, the ecological values of abandoned pond and pond within the Application Site are considered lower than similar habitats in the area. The estimated area of each habitat type within the Application Site is summarized in **Table 5.1**.

Table 5.1 Estimated Habitat Loss for the Proposed Development

Habitat	Approx. Size within Application Site (ha)	Ecological value
Abandoned pond	0.23*	Low
Developed area	0.21	Very low
Pond	0.46*	Low to moderate
Wasteland	4.50	Low
Total	**5.54#**	

* compensation wetlands with the same area will be provided during operation phase
# meander of 0.16 ha will not be encroached

5.3.3 Due to the low or very low ecological values of wasteland and developed area, the potential impact due to loss of these two types of habitats within the Application Site during construction phase is

considered **negligible**. Mitigation for the loss of wasteland habitat and developed area during the construction phase is not required.

5.3.4 The ecological values for both the abandoned pond and the pond are lower than other similar habitats in the Study Area (i.e. low for the abandoned pond and low to moderate for the pond) due to their smaller sizes and/or lower management level. They are also of low waterbird usage (i.e. only 8 species of waterbirds, total 26 individuals) due to lack of complete pond drain down practice and/or overgrown of vegetation inside or along the bunds.

5.3.5 The tentative construction period envisioned at this stage is approximately 7.5 years. While the construction programme will be developed during the detailed design stage, there will be a duration of temporary loss of the abandoned pond partially within the Application Site before the completion of the new compensation wetland areas which would mitigate the loss of the wetland habitats. Besides, as the affected abandoned pond is partly within the site boundary, it will also potentially cause temporary habitat loss for the remaining portion outside the site boundary if the entire abandoned pond is drained for construction works. According to the tentative construction methodology envisioned at this stage, this abandoned pond would be temporarily drained, followed by construction of fence wall, and the portion outside of the Application Site would be filled up after completion of the fence wall. The temporary abandoned pond loss area would be about 0.05 ha which is minor and will be reinstated upon completion of construction. The portion of the abandoned pond within the site boundary and the pond would be in dry condition during the construction phase (i.e., before the compensation wetlands are provided). Nevertheless, these two on-site pond and abandoned pond are of low to moderate and low ecological value with low bird usage. Given the low usage of waterbird and the small area sizes, the habitat loss of abandoned pond and pond during construction phase is considered **minor** and mitigation is not required (For the impact of permanent habitat loss and associated mitigation, it is discussed in the operation phase impact in below sections).

5.3.6 According to the current construction planning, there will be neither off-site works area nor temporary access for the construction works. Besides, there are no high value habitats immediately adjacent to the Application Site. Temporary diversion of the meander or temporary habitat loss in the meander is not expected at this stage.

Fragmentation (habitats)

5.3.7 Fragmentation is the appearance of discontinuities in habitat that render it lowered attractiveness to flora or fauna or isolate populations of a species, potentially leading to reduced viability of a population. This is most easily seen in infrastructural links, where roads and rail lines break up habitat into smaller units, but also arises from

disturbance impacts, where organisms avoid certain areas due to secondary impacts from nearby development. Where these prevent mobility of organisms, fragmentation has occurred.

5.3.8 Fragmentation of habitats may occur during construction phase, resulting in the loss of ecological linkages between patches of habitats or habitats assemblages, especially in the cases where construction of the development cuts through one habitat or between two areas of similar habitat with significant migration of fauna. With regard to the current Project however, there is little potential for habitat fragmentation. Currently the Application Site is dominated by low value wasteland, besides the differences on habitat types with adjacent areas, movement of non-volant fauna (e.g. mammal, herpetofauna) through the Application Site is also limited under the existing condition due to the low value habitat, the fence along the site boundary, as well as roads along to the south of the site.

5.3.9 For birds, in particular waterbirds, due to the lack of sizable wetland habitat within the Application Site suitable for species that normally occur in significant numbers in Inner Deep Bay (larger ardeids, ducks, waders, Black-faced Spoonbill), the waterbird usage of the Application Site was low as described above. In addition, the location of the Application Site is at the fringe of the Deep Bay wetland area, with limited areas of low value wetlands to the south and west, and not likely to have considerable ecological linkages with the Inner Deep Bay wetland area.

5.3.10 Hence, the potential impact due to habitat fragmentation is ranked as **insignificant**, while It is considered that potential impacts (loss of ecological linkage) on the Inner Deep Bay wetland ecosystem as a result of this development would be **negligible**.

Fragmentation (flight-lines)

5.3.11 Typical flight-lines involve routes followed between feeding and roosting areas or between feeding and breeding areas. Development located on a flight-line may result in a decrease in the suitability of a foraging, breeding or roosting site by preventing movement between sites. In an extreme case, this may lead to the total abandonment of one or both sites. There may also be an increased risk of mortality by collision with structures constructed on or close to a flight-line. The proposed development might potentially have fragmentation impact on flight-lines of breeding ardeids at egretries or other waterbirds (e.g. Great Cormorant).

5.3.12 In fact, no breeding ardeid was recorded in Tung Shing Lane Egretry in 2021. A decreasing trend of the breeding ardeid at Tung Shing Lane Egretry was observed over the past years (the nests number has

decreased from 84 to 36 from 2018 to 2020, and the percentage in Hong Kong has also decreased from 7.8% to 1.9%, see **Table 4.1**), and it was abandoned in 2021. The possibility of recolonization of abandoned egretry is generally low according to the history of other abandoned egretries in Hong Kong.

5.3.13 Among the flight directions recorded during the ardeid breeding season, around 12% passed through the area with tower buildings on the proposed layout in both 2019 and 2020 (**Figure 8a** and **8b**). The majority of flight directions were towards Kam Tin River Drainage Channel direction i.e. about 58.82% in 2019 and 64.93% in 2020 (**Figure 8a** and **8b**), respectively. Other studies also reported ardeids have the tendency to follow waterways to reach their feeding grounds (see AEIAR-175/2013 & AEIAR-215/2017).

5.3.14 Annual variations on the flight directions and respective percentages of ardeids were observed in other egretry flight studies (e.g. Tai Tong egretry from AEIAR-215/2017, in which flight-line surveys were conducted at the same egretry for more than one breeding season). This indicated the flight directions of breeding ardeids from egretry are not fixed. As observed from the present flight-line survey, the egrets detoured to avoid the knoll to the north of the Application Site. Both indicated that breeding ardeids are able to adjust their flight directions.

5.3.15 Indeed, the proportion of breeding ardeids from Tung Shing Lane Egretry passing through the Application Site was relatively small (i.e. ~12% of the ardeids took off from the egretry). With the existing knoll to the north of the Application Site, observations revealed that the ardeids would avoid the knoll already. For the proposed development layout of the residential towers, only a relatively small proportion of breeding ardeids would need to slightly adjust their departure direction from the egretry even in the conservative scenario that the egretry will resume. There is sufficient space between the egretry and the buildings for the ardeids to make minor adjustments at their flight directions, and then continue to reach their foraging grounds outside the Application Site with minimal influence. For the scenario that the Tung Shing Lane Egretry would not resume, there would be no impacts on the ardeids.

5.3.16 While the major flight-line of wintering birds was along Kam Tin River, only one minor flight line was recorded at the western side of the Application Site where landscape areas, preserved meander and created wetlands ponds are located under the current proposed layout. Besides, one occasional flight line was recorded at the eastern side of the Application Site. The proposed development within the Application Site is hence not posing a threat to the flight-line of wintering birds.

5.3.17 Hence, the potential fragmentation impacts to breeding ardeids at Tung Shing Lane egretry and other waterbirds from the proposed development are considered **minor**.

5.3.18 Potential impacts to the breeding ardeids from the new egretry at Kam Po Road are not expected, as the observed flight-lines towards northwest direction (i.e. Application Site) were mostly along Kam Tin River Drainage Channel, no ardeids taking off from the new egretry were observed flying through the Application Site. In addition, as the new egretry is over 2 km from the Application Site and there are abundant suitable wetland habitats near the egretry, the potential impacts to the flight-line of breeding ardeids are not expected.

Indirect Impacts – Construction Noise

5.3.19 The potential response of waterbirds to noise disturbance varies from minor responses like head turning scanning to behavioural changes like taking flight, reducing feeding/roosting time or increasing agonistic behaviour, depending on the sensitivity of the waterbirds and the level of disturbance. In general, high level of disturbance could cause deterioration of habitat quality and decrease of bird usage as well as subsequent decrease in wildlife density of the sensitive wetland habitats in the vicinity of the noise sources of high intensity. Hence, the birds might move away to areas which are less disturbed and within their noise tolerances or reduce the foraging efficiency of birds that remain in the affected area. While the sensitivity of waterbirds to the same level of noise disturbance varies among different species, resident species are typically more tolerant of disturbance than migrant birds (Klein *et al*. 1995). As such, the noise disturbance from construction activities of this Project on waterbirds that are present all year round (e.g. resident ardeids) are expected to be less significant than the disturbance impacts on migratory/overwintering waterbirds given the generally higher tolerance of residents to disturbance.

While in many instances higher level of stimuli from construction works, e.g. construction noise, would cause greater level of disturbance, waterbirds were found to be especially prone to the intrusion of human activities into the wetland habitats and high level of irregular construction noise (Cutts *et al*. 2008 & 2013). In general, construction noise of above background noise level is likely to cause low to moderate level of disturbance that would trigger some degree of responses for waterbirds (Cutts *et al*. 2008 & 2013). While intrusion of workers into the nearby wetland outside the Application Site is not expected, the traditional piling works for the proposed development may pose more disturbance when comparing with other quieter construction procedures, including site clearance/formation, superstructure or other quieter demolition/foundation methods.

5.3.20 Habitats potentially impacted by the Project involve open wetland habitats which include the abandoned ponds to the east and south of the Application Site, the tidal meander, reedbed and ponds to the northwest, and potentially Nam Sang Wai area to the north, Kam Tin River Drainage Channel to the east and the YLBF to the south. In addition, the YLBF Mitigation Wetland lies to the northeast of the Application Site.

5.3.21 The abandoned ponds to the east and south are not separated by any physical barriers from the Application Site. Though these ponds were found to support very low numbers of waterbirds due to the abandoned conditions (either filled without draining down or in dry and overgrown condition). However, given appropriate management, these ponds have the potential to support a higher diversity and abundance of wetland birds. Given the above, potential disturbance impacts due to construction works with higher noise disturbance (such as piling) to these ponds are assessed on a precautionary basis (i.e. assuming with proper management), and is considered to be **minor to moderate** if unmitigated.

5.3.22 Though isolated from the Application Site by other habitats, given the relatively higher diversity and abundance of overwintering waterbirds recorded in the Kam Tin River Drainage Channel or the wetland habitats with higher waterbird diversity in the vicinity, the impact from construction works with higher noise disturbance (such as piling) is considered **minor to moderate** for migratory/overwintering waterbirds and **minor** for the more tolerant waterbirds that are present all year if unmitigated.

5.3.23 The YLBF is near to the Application Site, and could provide a foraging habitat for low numbers of waterbirds when the water level is low. It should however be noted that YLBF was designed for drainage purposes and would often be in high water level during wet season, and the waterbird usage inside the channel would be limited. The small section of tidal meander, though has potential for low densities of wetland-dependent birds, had no significant records of waterbird usage and is of low ecological value. Hence, indirect impacts from construction phase are considered to be **minor**.

5.3.24 The majority of the YLBF mitigation wetland to the northeast of the Application Site is separated from the Application Site by the abandoned ponds and the existing knoll, and hence would not be subject to significant indirect disturbance impact. The only exception is the western most pond within the mitigation wetland, which is near the northwestern end of the Application Site and therefore near Tower T8 of the proposed development (refer to **Figure 10**). Likewise, there are a small meander, some existing houses, and existing ponds to the further northwest of Tower T8 outside the Application Site. In addition, there are reedbeds and a strip of wasteland sitting outside the Application Site on the western bank of the small meander, opposite

to Tower T7. While the small meander and the strip of wasteland are of low ecological value and could act as a buffer, the reedbed, ponds, and the pond inside mitigation wetland are of low to moderate or moderate ecological value and might be subject to potential disturbance from the Project. Hence, indirect disturbance impact is ranked as **minor to moderate** for the most western pond inside the mitigation wetland, and the ponds and reedbeds to the northwest and west of the Application Site. Considerations should be given to minimize disturbance caused by construction works.

For potential disturbance to Tung Shing Lane egretry due to piling works, the egretry has been abandoned in 2021 and is located about 0.5 km to the southeast of the Application Site. Within this separating distance, there are some existing closer sources of disturbance to this egretry in between including the highways, railways, village houses and other existing development e.g. Pok Oi Hospital and Long Shin Estate. It is therefore considered that the potential piling activities would not be the major source of disturbance comparing to these existing disturbance sources regardless of which piling methods to be employed. Besides, it should be noted that there was no ardeid observed at Tung Shing Lane Egretry. The potential disturbance impact to the egretry would be **minor** with the proposed measures recommended in the following sections.

While the indirect disturbance impacts of other general construction activities, due to the low noise level and the distance from the Application Site to the other wetlands (such as Nam Sang Wai, Kam Tin River Drainage Channel as well as Deep Bay area), potential impacts to the waterbirds roosting and/ or feeding to that area are not expected.

Indirect Impacts – Dust

5.3.25 Dust will increase during construction phase, and might temporarily reduce the abundance and distribution of fauna in habitats adjacent to the works area.

5.3.26 Unmitigated construction works create significant levels of dust under certain weather conditions due to the construction vehicles and the phenomenon of wind-blown dust from works areas. This dust would be deposited on nearby habitats, which can cause vegetation damage and, as a secondary effect, have an impact on fauna such as insects and birds. Impacts from dust deposition of these types will, however, be temporary and reversible, and standard construction best practices as mitigation measures can be implemented to negate harmful impacts. Dust deposition impacts arising from the Project, therefore, considered **insignificant**.

Indirect Impacts – Light Glare

5.3.27 If the construction site has strong lightings or flood light, there may be light glare impacts to nocturnal wildlife in the vicinity during any night time construction. However, according to the current construction methodology, no night time construction works for the Project is planned. The construction site would only have limited lighting for security purpose. The impacts due to increased night-time light during construction will therefore be **insignificant**. Implementation of good site practices would still be recommended to further minimise the potential of artificial lighting/glare impacts as much as possible.

5.3.28 While there are no planned night-time works under this Project and the impacts of construction lighting/glare disturbance are considered insignificant for fauna species of conservation importance in the vicinity of the Application Site, ardeids habitually return to the night roost at every evening at around an hour before sunset and the construction activities (mainly construction noise and lighting for security) would potentially briefly interfere with the night roosts. However, the night roosts of the ardeids at Kam Tim River are located more than 200m from the Application Site **(Figure 2b).** Moreover, existing street lights and constant traffic on both Yuen Long Highway and Castle Peak Road are already existing light sources much closer to these night roosts. The cormorant night roosts in Nam Sang Wai are of longer separation distances from the Application Site, and similarly the cormorants mainly return to their night roost near sunset. Hence, the potential impact due to light on the night roosts for ardeids and cormorants is considered **insignificant**.

Indirect Impacts – Water Quality and Site Run-off

5.3.29 Construction activities during the construction phase could generate surface run-off containing lubricants, chemicals and pollutants. The water bodies of the most concern include abandoned ponds, ponds, mitigation wetlands, channels and meanders and, ultimately, the Inner Deep Bay area into which they flow into. Construction runoff is potentially destructive to aquatic communities, which could be adversely affected should there be negative impacts on prey species.

5.3.30 Sediments may enter waterbodies via run-off, particularly during periods of heavy rain. This can lead to high turbidity from soil particles (which can block the gills of aquatic organisms) and eutrophication as a result of nutrient enrichment. Aquatic macrophytes may be reduced as a result of reduced light penetration or increased free-floating algae populations following eutrophication. Severe eutrophication can lead to oxygen depletion and the impoverishment of aquatic communities, as well as animals that prey on them (e.g. waterbirds). Such effects appeared in the construction phase of a project, though can also occur in the operation phase.

5.3.31 Construction site run-off, inappropriate stock piling of construction materials, and incorrect handling of construction chemicals may lead to indirect impact on water quality in the surrounding aquatic habitats (e.g. the meander within the Application Site and YLBF) and associated fauna. Site run-off may carry sediments and lead to temporary increases in local suspended solids for a short period of time. Chemical pollution (especially oil) would have higher impact to aquatic species subject to the quantity. The potential impact is ranked as **minor to moderate** if unmitigated. Potential impact due to site run-off will be minimized and controlled by routine construction site water quality control measures such as implementation of good site practice.

Impacts on recognized sites and species of conservation importance

Recognized sites of conservation importance

5.3.32 The Application Site falls within the WBA. The Application Site is also adjacent to WCA (where some areas also zoned as "Conservation Area" ("CA")). Other recognized sites of conservation importance (e.g. Mai Po Inner Deep Bay Ramsar Site, Mai Po Nature Reserve, SSSI, Shan Pui River egretry, and Tung Shing Lane egretry) are all far away and will not be affected.

5.3.33 However, the wetland habitats in Deep Bay area in particular those inside WCA (some also zoned as "Conservation Area" ("CA")) serve as important feeding/roosting ground for migratory and overwintering waterbirds. The indirect disturbance in particular noise could cause the deterioration of habitat quality and decrease of bird usage as well as subsequent decrease in wildlife density of the sensitive wetland habitats within the recognized sites of conservation importance in the vicinity of the works area. The sensitivity of the wetland habitats would generally be considered higher during the peak visiting period of the migratory and overwintering birds i.e. dry season given the greater number of species of conservation importance affected.

5.3.34 Amongst the wetland habitats within the Study Area, of particular note is the Kam Tin River Drainage Channel and WCA located within the Study Area but separated from the Application Site by other habitats. The wetland habitats in these two areas supported a relatively greater diversity and abundance of migratory and overwintering waterbirds observed within the Study Area. The impacts of construction disturbance on the two areas are considered **minor to moderate** during dry season and **minor** during wet season if unmitigated. Mitigation measures are detailed in **Sections 6.3.1** to **6.3.5** below.

Species of conservation importance

5.3.35 As the plant species of conservation importance i.e. *Persicaria orientalis* was recorded away from the Application Site, no direct impacts to this plant species are expected.

5.3.36 Bird species of conservation importance found within the Application Site included Yellow Bittern, Chinese Pond Heron, Grey Heron, Little Egret, Great Cormorant, Black Kite, Eastern Buzzard, Asian Barred Owlet and White-shouldered Starling. As birds are very mobile and there are more suitable habitats for the recorded bird species of conservation importance in the vicinity as well as the Deep Bay area, the ecological impacts are considered **minor**, taken consideration of the habitat size and quality (i.e. low ecological value) as well as disturbance when compared with the Deep Bay area.

5.3.37 The Nam Sang Wai area is an important roosting site for Great Cormorants. In winter, large roosting aggregations of Great Cormorants on the gum trees in the Nam Sang Wai fishpond area were often seen after feeding at Inner Deep Bay. However, no roosting Great Cormorant was recorded within the Application Site, so that no direct impacts to roosting habitat of Great Cormorant are expected. Potential indirect impacts on the roosting site have been addressed in the sections above.

5.3.38 Besides the bird species of conservation importance recorded within the Application Site, only Japanese Pipistrelle were recorded flying through the Application Site, no breeding bats or sign of breeding were recorded within the Application Site. Due to their mobility and commonness in Hong Kong, potential impacts to this species is not expected. Another mammal species of conservation importance i.e. Small Asian Mongoose was recorded outside the Application Site and potential impacts to this species are also not expected. Eurasian Otter were not recorded within the Study Area. It is a semi-aquatic mammal which forages in water and nest on land. Recent records have only been found in the Mai Po Inner Deep Bay Ramsar Site and nearby region. Wandering individual might be possible but the chance entering the Application Site would be very low due to the condition and disturbance of the Application Site. Hence, potential impacts from habitat loss and fragmentation on Eurasian Otter are considered **minor**.

5.3.39 As there will be no night works during construction phase, potential impacts of construction lighting/glare disturbance to the light-sensitive fauna including the endemic Bent-winged Firefly, the ardeid night roost next to Kam Tin River Drainage Channel, the Great Cormorant roosting in Nam Sang Wai and the mammal species of conservation importance in the vicinity of the Application Site have been addressed in the sections on night-time light above.

5.3.40 The other species of conservation importance including the butterfly and dragonfly, were recorded away from the Application Site, will not be affected significantly.

5.4 Operational Phase

Direct Impacts – Permanent Habitat Loss During Operation

5.4.1 Operational phase direct impacts would be the habitats lost permanently after the completion of construction. Under the proposed development, about 0.69ha of area (mostly currently as wasteland and a fraction of existing abandoned pond) will be used for creating compensation wetlands to mitigate the permanent loss of abandoned pond and pond. Other than the loss of abandoned pond and pond, there will be no other habitat loss during operational phase. In fact, the current design has avoided any loss of the meander. Therefore in terms of area size, the total area occupied by project elements (i.e. buildings, infrastructures, etc.) during operation phase will be smaller than the works area during construction phase.

5.4.2 Among the habitats permanently lost, the ecological value of wasteland and developed area are considered as low and very low respectively. Due to the low or very low ecological values of wasteland and developed area, the potential impact due to loss of these two types habitats within the Application Site is considered **minor**. Mitigation for the loss of wasteland habitat or developed area is not required. In addition, some areas of wasteland habitat will be converted to compensation wetlands (see below).

5.4.3 For the loss of abandoned pond and pond, both the ecological values of the abandoned pond and the pond are lower than other similar habitats in the Study Area (i.e., low for the abandoned pond and low to moderate for the pond) due to their smaller sizes and/or lower management level. They are also of low waterbird usage (i.e., only 8 species of waterbirds, total 26 individuals all in the pond habitat; none in the abandoned pond habitat) due to lack of complete pond drain down practice and/or overgrown of vegetation inside or along the bunds. The impact of abandoned pond loss is ranked as **minor** and the impact of pond loss is ranked as **minor to moderate** given their location within WBA. Mitigation is therefore recommended to compensate for the loss of wetland. Ponds of similar total size to those loss abandoned ponds within Application Site will be provided during the operational phase.

Fragmentation to wetland habitats

5.4.4 The Application Site is located within WBA and dominated by wasteland habitat, and the proposed development will only affect limited wetlands (pond and fraction of abandoned pond which are small in individual sizes). Linkages between the existing wetlands of Inner Deep Bay, which are mostly continuous and to the north or northeast, will not be significantly affected by the proposed development due to its location, the lack of wetland habitat and suitability for species that normally occur in significant numbers in Inner Deep Bay. It is considered that the impacts from fragmentation

to the Inner Deep Bay wetland ecosystem as a result of this development would be **minor**.

Fragmentation to flight-line of waterbirds

5.4.5 As discussed in the construction phase impact, Tung Shing Lane egretry was abandoned in 2021, chance of recolonization to this egretry is considered low. In fact, according to the flight-line surveys conducted in the breeding season of 2019 and 2020, the breeding ardeids passed through the Application Site was low and due to the manoeuvrability of waterbirds, the potential fragmentation impacts to breeding ardeids from Tung Shing Lane egretry and other waterbirds from the proposed development are considered **minor**. Besides, potential impacts to breeding ardeids from the new egretry at Kam Po Road over 2 km away are not anticipated.

Indirect Impacts – Human Disturbance

5.4.6 During the operational phase, there may be indirect disturbance impacts to wildlife in the surrounding habitats due to an increased in human activity caused by residents inside the Application Site. The proposed residential development will provide 3,129 units to serve a population of about 8,384. The proposed development is however a residential project which is of low disturbance nature. Although, the reedbed and mitigation wetland were located to west and north of the Application Site, respectively, the reedbed will be separated by wasteland and meander from the proposed layout, while the mitigation wetland is separated by an existing knoll. Moreover, human activities will mainly be indoors and noise from residential houses will be screened by landscape area of the Application Site. The latest design of the development would not have any dedicated paths/roads leading the residents to the nearby sensitive habitats (e.g. reedbed and mitigation wetland (the mitigation wetlands indeed are not open to general public without prior arrangement/approval)) directly. Also, residential development by nature has much lower disturbance impacts than other undesired uses to be encouraged to be replaced as listed in the TPB PG 12-C. Hence, it is anticipated that any impacts of increased disturbance to these sites will be **minor**.

5.4.7 Landscape area will be established at the periphery of the Application Site. The landscape area will be composed of planting of trees or vegetation at the fringe forming a buffer which is anticipated to screen out any potential noise, traffic and other human disturbance. The landscape area will help to act as a buffer between the proposed development and adjacent land uses.

5.4.8 Although the YLBF is located close to the Application Site, it only provides foraging habitat for low numbers of waterbirds during periods of low water level. Indirect impacts from operational phase are

considered to be low, especially given the vehicular traffic would be limited on the vehicle road and there is a level difference between the road and YLBF; and the width of YLBF i.e., about 50m wide.

Indirect Impacts – Water Quality

5.4.9 There could be potential indirect impacts to the water quality of the surrounding waterbodies from surface run-off and pollution events from the development and their associated infrastructure. This nonpoint pollution, such as stormwater washed off from areas of hardstanding, roads and landscape area may have various impacts to the local aquatic environment. Magnitude of impacts would be dependent upon the pollution type and quantity of pollutant. Increased stormwater runoff may also lead to increased siltation if there are areas with bare soils.

5.4.10 The proposed development however is a residential development and pollutants on road surface would be very limited, and significant bare grounds will be unlikely. The built-in structures of the drain system within the Application Site such as sand trap could also help isolate and collect sediment and pollutants. Point pollution would not be an issue for the proposed development as the sewerage will collect all domestic effluent and organic load. It is anticipated that any impacts of water quality changes will be **insignificant**.

Indirect Impacts – Light Glare

5.4.11 There are potential concerns on potential light impact on the Cormorant night roost in Nam Sang Wai, the Mai Po Bent-winged Firefly habitat at Shan Pui River and Kam Tin River Meander, and night roost of ardeids at Kam Tin River Drainage Channel.

5.4.12 The habitats of Cormorant night roost and Mai Po Bent-winged Firefly are located at Nam Sang Wai, about 500m from the Application Site, the potential of such an impact would be remote given the long separation distances.

5.4.13 In fact, an existing driving school which provides night time training course is located in the vicinity of the firefly habitat, which indicated that the existing tree rows along Kam Tin River Meander provided shielding effect for the firefly habitat. The firefly habitat is also partially shielded from the residential blocks of the Application Site by the existing tree rows along Kam Tin River Meander and a knoll to the north of the Application Site. The light assessment also indicates that there would be no significant changes of the light intensity due to the proposed development (see **Appendix J**). Given the long distance from the Application Site, the lower heights of the mangrove trees, and the shielding, the potential of being influenced by lighting is considered **minor**.

5.4.14 For the Cormorant night roost, in addition to the long distance and the existing overnight light level caused by the developed area, there are also many known examples of bird night roost/nesting locations located much closer to existing light sources, including the ardeids night roost at Kam Tin River Drainage Channel adjacent to highways, the egretries at Mai Po Village and Tai Po, and also the Collared Crow in Shuen Wan Restored Landfill. The potential of light impact on the cormorant night roost in Nam Sang Wai is considered **minor**.

5.4.15 Nevertheless, a night-time light impact assessment has been conducted to assess whether the habitats for Firefly and Great Cormorant night-roost would be significantly affected by the light intensity generated by the Project during night-time. The night-time light impact assessment consists of night-time ambient light intensity measurements and light modelling. The details are presented in **Appendix J**.

5.4.16 The measurement results revealed that the majority of existing areas that are further away from local light sources i.e. lamp posts, the measured ambient light intensity was in the range of 0.04 – 0.47 lux when Maipo Bent-winged Firefly was recorded. This finding is in line with those surveys in other similar studies such as A/YL-NSW/242 in which 0.01 – 0.49 Lux light intensity was recorded in firefly habitat (AEC, 2016). Similar approach was also conducted in the study A/YL-NSW/274. The measured light intensity was in the range of 0.00 – 0.70 Lux in A/YL-NSW/274. As reported in A/YL-NSW/274, under different sky or weather conditions, the ambient light intensity at the firefly habitat and cormorant night roost could vary by about 0.3 Lux.

5.4.17 The predicted increase in night-time light contributed by the Project was based on a reasonable worst-case scenario (details refer to **Appendix J**). From the simulation results, the simulation predicted a minor increase in light intensity of 0.00 – 0.03 lux generated by the proposed development which is far below the natural variation measured during the field measurement. The predicted increase in light intensity contributed by the Project is the highest (0.03 lux) at two points which only occupied a tiny portion (~2%) of the total area of the firefly habitat. For the rest of the eastern portion, the increase is ranged from 0.01 to 0.02 lux which occupied about 50% of the firefly habitat. For the further west side of the firefly habitat (about 50% of the total area), the predicted increase in light intensity due to the Project is about 0.00 lux. **Appendix J** presents the details of the light simulation.

5.4.18 It can be seen that the natural variation on the ambient light intensity due to different sky conditions is larger than the predicted increase in light intensity contributed by the Project. It is therefore considered that the Project would not cause adverse impacts on the Mai Po Bent-

winged Firefly and Great Cormorant night roost in term of night-time artificial light.

5.4.19 There is an existing highway viaduct with overnight traffic lighting near the Application Site and the wildlife in the surrounding areas would be tolerant with night-time light. For the night roost of the ardeids at Kam Tin River Drainage Channel, is located at a position slightly below the Yuen Long Highway viaduct and about 200m away from the Application Site. Since the Yuen Long Highway viaduct is located between this night roost and the Application Site and very close to the night roost, the night roost is largely within the shadow zone of the viaduct such that the viaduct could block most light to this night roost from the Application Site. Moreover, there are already existing street lights on both the viaduct and Castle Peak Road and constant traffic which are much closer existing light sources to this night roost. The potential light impact on the night roost of the ardeids at Kam Tin River Drainage Channel is considered **minor**.

Indirect Impacts – Bird Collision

5.4.20 Bird collision risk would be more prominent when the building consists of extensive reflective glass façade such that the birds flying nearby are confused by the reflected image inside the glass which is normally the image of the sky and/or nearby environment. Considering that the current residential development would not have extensive glass façade, the potential bird collision impact is considered **minor**.

Impacts on recognized sites and species of conservation importance

Recognized sites of conservation importance

5.4.21 The Application Site is located within WBA and is adjacent to the WCA. However, the proposed development will not affect the ecological integrity of the wetlands within WCA or cause direct habitat loss in WCA, only small area within WBA will be lost permanently and is considered insignificant. While the habitats in WCA will be separated by landscape area from the Application Site. The potential impacts to the recognized sites of conservation importance are considered insignificant as the operational phase disturbance (e.g. noise, human disturbance) will be very limited.

Species of conservation importance

5.4.22 The Study Area already subjected to human disturbance, the fauna within the Study Area are habituated to human disturbance. No additional ecological impacts are expected further to the evaluation as in construction phase.

6. MITIGATION OF ECOLOGICAL IMPACTS

6.1 General

6.1.1 According to the principles in the TM-EIAO Annex 16 and EIAO Guidance Note 3/2010, ecological impacts on important habitats and the associated wildlife caused by the proposed Project should be avoided, minimized and mitigated where practicable.

6.1.2 The potential impacts arising from the construction and operation of the Project have been assessed. Since most of the potential ecological impacts are of low or insignificant levels (except for the disturbance arised from piling), specific ecological mitigation measures are not required for most impacts.

6.2 Avoidance

6.2.1 The Application Site is located inside the boundary of WBA and is near WCA (**Figure 2a**). The Project also has avoided habitats of higher ecological values, or other natural habitats. Only man-made/disturbed habitats of very low and low ecological value, including developed area, wasteland, pond and abandoned pond will be affected.

6.3 Minimization

Piling Methods and Programme

The exact construction methodology for foundation works would be subject to detailed GI in the later stage of the Project. Quieter piling methods would be considered. While the technology of percussive pilling has advanced and the noise generated has significantly reduced, further at-source mitigation measures could be explored in the detailed design stage. For example, a custom-made capsule / enclosure could be installed close to the pilling rig to reduce the impulsive noise.

6.3.1 Nevertheless, further details on the methodology and programme of the construction works will be provided in the detailed design stage. The objectives are to propose and formulate construction methods/procedures and programme which could minimize the potential noise disturbance impacts to the sensitive wetland areas within the Study Area to an acceptable level. The ecological considerations would include working hours, piling methods, types of screening and the efficiency of noise reduction, etc.

6.3.2 **Working hours:** The methodology of construction works will consider the disturbance to sensitive large waterbirds and assess the noise levels of different construction works e.g., piling and excavation. The suitable hours for relatively noisy operations would be identified with reference to the observable level of bird activities which is often higher in the early morning and near sunset.

6.3.3 **Piling methods:** Traditional steel hammer percussive piling would be avoided. Quieter piling methods e.g., hydraulic hammer, which would emit moderate level of noise would be assessed. Low noise piling method e.g., bored piling would be considered but it would depend on whether the ground condition is suitable for this type of piling.

6.3.4 **Types of screening:** Various types of noise screening could be used to reduce the noise at source. For example, noise reduction capsule applicable at the piling head, U-shape noise shield surrounding the piling rig, movable temporary noise barrier around the piling locations etc.

6.3.5 This report will be separately submitted to relevant authorities (e.g. AFCD) for agreement prior to the commencement of any piling works.

Site Hoarding and Good Site Practices

6.3.6 Site hoarding would be erected along the construction site boundary. Together with general good site practices which would be undertaken during the construction phase, potential disturbance to the wildlife inhabiting nearby areas could be minimized.

6.3.7 To minimise the contamination of wastewater discharge, accidental chemical spillage and construction site run-off, the below general good practices should be adopted:

- The good site practices outlined in ProPECC PN 1/94 "Construction Site Drainage" should be followed to minimize surface runoff;
- Surface run-off from construction sites should be discharged into storm drains via adequately designed sand / silt removal facilities such as sand traps, silt traps and sedimentation basins;
- Open stockpiles of construction materials (e.g. aggregates, sand and fill material) on sites should be covered with tarpaulin or similar fabric during rainstorms;
- Good construction and site management practices should be observed to ensure that litter, fuels and solvents do no enter the storm water drains;
- Chemical toilets should be provided within the construction site and properly maintained. All effluent discharged from the construction site should comply with the standards stipulated in the "Technical Memorandum on Standards for Effluents Discharged into Drainage and Sewerage Systems, Inland and Coastal Waters" (TM-DSS)

Landscape Area within the Application Site

6.3.8 The proposed landscape area at the periphery of the Application Site is a building set back from the Wetland Conservation Area. This proposed landscape area would also serve as a buffer to shield

potential noise, traffic and other human disturbance from the Application Site to the surrounding environment during the operational phase.

6.4 Compensation

6.4.1 A total of about 0.23 ha of abandoned pond and about 0.46 ha of pond (i.e., total of 0.69ha) within the Application Site will be lost due to the proposed development. Although the affected pond and abandoned pond are of lower ecological value than other similar habitats in the area, compensation should be provided to achieve the no net loss principle requirement under TPB PG No. 12C. In order to compensate for the wetland loss, three wetland areas (in the form as ponds) would be recreated within the Application Site during the operational phase (**Figure 9**). The total pond areas to be recreated (i.e., about 0.69 ha) would be not less than the loss. The purposes of the compensation wetlands would consider beneficial functions including but not limited to e.g., provision for wildlife, educational demonstration and/or water polishing etc.

6.4.2 Examples for nature-educational demonstration may be information kiosks to provide useful information such as plant species, ecological functions etc.

6.4.3 Wetland areas for compensation will be provided mainly at the edge of the Application Site, which can also together with the landscape planting (refer to **Figure 10** and the landscape plan) provide a wetland and visual buffer to the WCA to comply with the TPB PG-No. 12C. There are three zones of compensation wetlands including the following which are further discussed in subsequent paragraphs. All of these created wetlands are proposed with soft substrate in order to have better ecological function. The ecological considerations and conceptual design of the three proposed ponds are shown in **Appendix K** and **L** for reference respectively.

- Compensation Wetland C at the southwest near the main entrance of the Site (approx. 0.40ha)
- Compensation Wetland D at the south (approx. 0.17 ha); and
- Compensation Wetland E at the southeast (approx. 0.12 ha)

Table 6.1 Areas of the Affect Abandoned Pond/Pond vs Compensation Wetlands

Habitat/ Compensation Wetland	Area (ha)	Ecological value/ Habitat types
Abandoned pond	0.23	Low
Pond	0.46	Low to moderate
TOTAL	**0.69**	
Compensation Wetland C	0.40	Pond with floating plants
Compensation Wetland D	0.17	Pond with emergent plants

Habitat/ Compensation Wetland	Area (ha)	Ecological value/ Habitat types
Compensation Wetland E	0.12	Reedbed
TOTAL	**0.69**	

6.4.4 ***Compensation Wetland C*** – It is noted that a landscape area with natural habitat and water feature has been proposed to the eastern portion of the application site under the approved planning application A/YL-NSW/274. This landscape area with natural habitat and water feature is aimed to respect the flightpath of breeding ardeids from Tung Shing Lane Egretry. In order to achieve a better ecological synergy with this landscape area, it is proposed to provide compensation wetland adjoining this landscape area.

6.4.5 The compensation wetland would be designed to receive part of the surface runoff from the Application Site. Water depth of the compensation wetland would be in the order of about 1m. Native vegetation species (mainly floating plants such as *Nymphaea* spp., and/or other native species e.g., *Adina pilulifera*, *Commelina diffusa* and *Impatiens chinensis*) would be considered to be planted within this compensation wetland, and could benefit fauna inhabiting waterbodies of moderate depth. Perching structures for small sized birds would also be provided. This compensation wetland would be designed to ensure that the runoff would be retained to allow the particulates to settle before discharge. By achieving this, the surface runoff would be suitably polished before reusing for irrigation. Suitable landscape planting would also be implemented around this compensation wetland to discourage access by residents so as to minimize disturbance. However, maintenance staff would be allowed to enter into this compensation wetland to conduct necessary maintenance work.

6.4.6 ***Compensation Wetland D*** – the southern site boundary adjoins the WCA. The habitats adjoining the southern site boundary include a few small abandoned ponds (including the outside portion of the abandoned pond lying on Application Site boundary), and wasteland as shown in the habitat map.

6.4.7 It is proposed to recreate compensation wetland in this area to achieve a better synergy with the neighboring habitats. The compensation wetland would be designed to receive part of the surface runoff from the development within the Application Site. Water depth of the compensation wetland would range from about 1m to about 0.5m, and would provide habitats for typical freshwater associated fauna such as odonates. Typical marsh / pond species such as *Cyperus* spp. and other emergent freshwater plants suitable for perching by odonates would be considered to be planted within this compensation wetland. Similar to Compensation Wetland C, this compensation wetland would be designed to ensure that the runoff

would be retained and suitable landscape planting would also be implemented around this compensation wetland.

6.4.8 ***Compensation Wetland E*** – the southeastern corner of the Application Site is surrounded by a patch of larger abandoned ponds. Hence, it is proposed to recreate a compensation wetland in this area to achieve a better synergy with the neighboring habitats. The compensation wetland would be designed to receive part of the surface runoff from the development within the Application Site. Water depth of the compensation wetland would be about 0.5m and reeds would be planted. By providing a reedbed in this location, cryptic reed-associated species could be benefited.

6.4.9 The total area of these three compensation wetlands is about 0.69 ha which is not less than the total area size of the pond and abandoned pond to be affected. The three compensation wetlands can provide different habitat types including pond with floating aquatic plants, pond with emergent plants, and reedbed, and could enhance the habitat diversity in the Application Site and have synergy effects with surrounding habitats and landscape area under other project (i.e. the landscape area with natural habitat and water feature under the approved planning application A/YL-NSW/274). These ponds are strategically located along the western and southeast sides of the Application Site boundary, serving as ecological corridors and could offer ecological linkage with neighboring habitats adjoining the site (see **Figure 10**). With the better ecological functions provided by these ponds, the impact from the loss of the small areas of pond and abandoned pond could be fully mitigated. Depending on their locations, these compensation wetlands could be implemented in tandem with the construction programme for respective portions of the Application Site namely the access road, private housing site and public housing site. The compensation wetlands will be implemented as soon as the land is available upon approval. Details of the construction programme will be provided in the detailed design stage.

6.4.10 In order to maintain the ecological functions of the proposed compensation wetlands in the long run, a Habitat Creation and Management Plan (HCMP) for the compensation wetlands will need to be developed during the detailed design stage. A tentative coverage of the HCMP is given below for reference.

Table 6.2 Outlines of Key Items of HCMP

Key Sections in HCMP	Outline Content to be Further Developed
Objectives	• Presents the keys objectives of the HCMP • Describes site conditions such as location, boundary, topography, hydrology etc.

Key Sections in HCMP	Outline Content to be Further Developed
	• Summarises / updates habitat evaluation, species of conservation importance, impact evaluation
Mitigation Objectives	• Proposes management goals and objectives of the compensation wetlands, for both construction and operational phases • Recommends suitable targets (e.g. habitat condition targets) for the compensation wetlands • Measures to minimize disturbance
Detailed Design and Construction Methods	• Design for water sources • Design for hydrology and water level • Recommend vegetation species • Construction programme
Management Strategy	• Interface with the other areas of the development • Review the feasibility for nature-educational demonstration activities and propose where appropriate. All nature-educational demonstration activities will be organised and controlled to minimise interfering the functions of the wetlands. • Management and funding arrangement
Monitoring	• Monitoring of water level and water quality • Monitoring of the habitat quality • Monitoring of wildlife use including bird, dragonfly and amphibians (no specific monitoring target would be proposed)

6.5 Precautionary Measures

Standard Construction Best Practices

6.5.1 It is suggested to follow standard construction site good practices for site runoff, dust and noise e.g., covering temporarily exposed soil surfaces or stockpiles with tarpaulin, preparation of site drainage management plan, vehicle wheel washing facilities etc.

Good Practice for Light Glare

6.5.2 Although mitigation measures would not be required for the potential light glare impact, it is recommended to avoid orientating any external flood light, if any, towards the firefly habitat and Great Cormorant night roost in Nam Sang Wai during both construction and operational phases as a precautionary measure.

6.6 Residual Impacts

6.6.1 After the implementation of mitigation measures, the identified impacts (mainly compensation for loss of small areas of abandoned pond and pond, and construction noise disturbance) would be mitigated to an acceptable level. No significant residual impact is identified.

Table 6.3 Summary of Construction Phase and Operational Phase Impacts and Mitigation

Impact	Sources	Receivers	Nature of impacts						Significance of ecological impact	Mitigation required
			Habitat quality	Species affected	Size / abundance	Duration	Reversibility	Magnitude		
Construction Phase – Direct Impacts										
Habitat loss during construction	Works areas within the Application Site	Habitats inside the works areas: Wasteland, Pond, Abandoned pond, Developed area	Ecological value of developed area: very low; Abandoned pond, and wasteland: low; Pond: low to moderate	Low abundance and diversity of wildlife	Abandoned pond: 0.23 ha; pond: 0.46 ha; developed area: 0.21 ha; wasteland: 4.50 ha	During construction	Not reversible	Low	Negligible for wasteland and developed area; Minor for abandoned pond and pond	Not required for construction phase (*compensation wetlands of the same area as the affected wetlands will be provided during operation phase*)
	Construction works of the proposed development	Meander within the Application Site, Portion of the affected abandoned pond outside Application Site	Ecological value of Abandoned pond and meander: low	Low abundance and diversity of wildlife	Portion of abandoned pond outside the site: 0.05 ha Meander: 0.16ha	During construction	Reversible for the remaining pond outside the site or any meander to be diverted	Low	Not identified (as no diversion of meander is needed) Minor temporary loss for the abandoned pond	No
Fragmentation (habitats)	The proposed development	Adjacent habitats; Wetland of Deep Bay area	Ecological value of Abandoned pond: low	Low abundance and diversity of wildlife	Abandoned pond: 0.23 ha	Permanent	Not reversible	Low	Insignificant for adjacent habitats; negligible for Deep Bay wetland	No

Impact	Sources	Receivers	Nature of impacts						Significance of ecological impact	Mitigation required
			Habitat quality	Species affected	Size / abundance	Duration	Reversibility	Magnitude		
Fragmentation (flight-lines of waterbirds)	Construction of high-rise buildings	Waterbirds in particular breeding ardeids	Vary with habitat types	Waterbirds in particular breeding ardeids	Around 12% ardeids from TSL egretry passed through the tower buildings of the proposed layout in 2019 and 2020, but TSL egretry was abandoned in 2021	Permanent	Not reversible	Low	Minor	No
Impacts on Species of conservation importance	Construction works	Bird species of conservation importance found within the Application Site	Vary	Yellow Bittern, Chinese Pond Heron, Grey Heron, Little Egret, Great Cormorant, Black Kite, Eastern Buzzard, Asian Barred Owlet and White-shouldered Starling	9 species and 48 individuals	Temporary	Reversible	Low	Minor	No
	Construction works	Other fauna species of conservation importance in the Application Site	Low	Japanese Pipistrelle	5 individuals were recorded flying within the Application Site	Temporary	Reversible	Low	Minor	No
Construction Phase – Indirect Impacts										
Construction noise	Construction works	Sensitive habitats near the works area	Vary with habitat types	Mainly waterbirds	Vary	Temporary	Reversible	Moderate	Abandoned ponds to the east and south, reedbeds to the west, ponds to the northwest, &	Consider using quieter piling methods during detailed design stage, and/or construction programme to have the superstructure of some towers

Impact	Sources	Receivers	Nature of impacts						Significance of ecological impact	Mitigation required
			Habitat quality	Species affected	Size / abundance	Duration	Reversibility	Magnitude		
									the westernmost pond in mitigation wetland : minor to moderate; Tidal meander: minor Kam Tin River Drainage Channel: Minor to Moderate for migratory/over wintering waterbirds, minor for resident waterbirds; Tung Shing Lane Egretry: minor	completed first. Details of methodology and programme of construction works should be submitted to relevant authorities (e.g. AFCD) for agreement prior any piling works.
Dust	Construction works	Sensitive habitats near the works area	Vary with habitat types	Fauna in habitats adjacent to the works area	Vary	Temporary	Reversible	Low	Insignificant	No (Standard construction best practices will still be implemented)
Light glare	Works area	Sensitive habitats near the works area	Vary	Nocturnal fauna including firefly, night roost of ardeids and Great Cormorant	Vary	Temporary	Reversible	Insignificant	Insignificant	No (precautionarily avoiding orientating any external flood light, if any, towards the firefly habitat and Great Cormorant night roost)

Impact	Sources	Receivers	Nature of impacts						Significance of ecological impact	Mitigation required
			Habitat quality	Species affected	Size / abundance	Duration	Reversibility	Magnitude		
Water quality and site run-off	Construction works	Wetland habitats (e.g. meander and channel)	Vary	Aquatic fauna and wetland dependent species	Vary	Temporary	Reversible	Moderate	Minor to moderate	Follow routine water quality mitigation measures; standard good site practices
Impacts on recognized sites of conservation importance	Construction works	WCA, mitigation wetland	Vary	Wetland species	Vary	Temporary	Reversible	Low	Minor to moderate during dry season and minor during wet season if unmitigated.	Addressed in the above measures including construction noise mitigation.
	Construction works	Roosting site for Great Cormorants.	Vary	Great Cormorant roost	4560 individuals (maximum count) of Great Cormorants that roosting there	Temporary	Reversible	Low	No impact anticipated	No
Impacts on Species of conservation importance	Construction works	Plant species of conservation importance found within the Study Area	Low	*Persicaria orientalis*	Scarce	Temporary	Reversible	Low	No impact anticipated	No
	Construction works	Bird species of conservation importance	Vary	35 Species of Conservation Importance recorded	35 species and 1624 individuals	Temporary	Reversible	Low	Minor	No

Impact	Sources	Receivers	Nature of impacts						Significance of ecological impact	Mitigation required
			Habitat quality	Species affected	Size / abundance	Duration	Reversibility	Magnitude		
		found within the Study Area		within the Study Area						
	Construction works	Other fauna species of conservation importance in the Study Area	Vary	9 species of conservation importance including Japanese pipistrelle, Small Asian Mongoose, Blue Chaser, Ruby Darter, Scarlet Basker, Common Awl, Danaid Eggfly, Metallic Cerulean and Swallowtail	Vary	Temporary	Reversible	Low	Minor	No
Operational Phase – Direct Impacts										
Permanent habitat loss during operation	Potential development	Area occupied by project elements (No additional habitat loss during operational phase)	Ecological value of developed area: very low; Abandoned pond, meander and wasteland: low; Pond: low to moderate	Low abundance and diversity of wildlife	Abandoned pond: 0.23 ha; Pond: 0.46 ha developed area: 0.21 ha; wasteland: 4.50 ha (within the Application Site, 0.69 ha will be used for on-site compensation wetlands)	Permanent	Not reversible	Low	Minor for waste land and developed area; minor for abandoned pond; minor to moderate for pond.	Not required for wasteland and developed area, and compensation wetlands of the same size as the affected wetlands will be provided for the loss of abandoned pond and pond
Fragmentation (habitats)	The proposed development	Wetland within Deep Bay	Ecological value of Abandoned pond: low	Low abundance and diversity of wildlife	Abandoned pond: 0.69 ha	Permanent	Not reversible	Insignificant	Minor	No

Impact	Sources	Receivers	Nature of impacts						Significance of ecological impact	Mitigation required
			Habitat quality	Species affected	Size / abundance	Duration	Reversibility	Magnitude		
Fragmentation (flight path of waterbirds)	Construction of high-rise buildings	Waterbirds	Vary with habitat types	Waterbirds	Around 12% ardeids from TSL egretry passed through the tower buildings of the proposed layout in 2019 and 2020, but TSL egretry was abandoned in 2021	Permanent	Not reversible	Low	Minor	No
Operational Phase – Indirect Impacts										
Human disturbance	The proposed development	Sensitive habitats near the residential area	Vary with habitat types	Terrestrial fauna including those species of conservation importance	Vary	Temporary	Reversible	Low	Minor	No
Water quality	The proposed development	Wetland habitats (e.g. meander, channel)	Vary	Aquatic fauna and wetland dependent species	Vary	Temporary	Reversible	Insignificant	Insignificant	No
Light glare	The proposed development	Sensitive habitats near the potential development area	Vary	Nocturnal fauna including firefly and night roosting sites of ardeids and Great Cormorant	Vary	Temporary	Reversible	Low	Minor for firefly habitat Minor for cormorant night roost Minor for ardeids night roost	No (precautionarily avoiding orientating any external flood light, if any, towards the firefly habitat and Great Cormorant night roost)
Bird collision	The proposed development	N/A	N/A	Birds	Vary	Permanent	Not reversible	Low	Minor	No
Impacts on recognized sites of	The proposed	Small area within WBA	Vary	Wetland species	Vary	Permanent	Not reversible	Low	Insignificant	No

Impact	Sources	Receivers	Nature of impacts						Significance of ecological impact	Mitigation required
			Habitat quality	Species affected	Size / abundance	Duration	Reversibility	Magnitude		
conservation importance	development									
Impacts on species of conservation importance	The proposed development	Fauna species of conservation importance found within the Application Site	Vary	Wetland species	Vary	Permanent	Not reversible	Low	No impact anticipated	No

7. CUMULATIVE IMPACT

7.1.1 The Application Site will cause loss of pond and abandoned pond of about 0.69 ha which could be fully compensated. The current Project would not contribute to cumulative wetland loss within the WBA.

7.1.2 It is the general practice for EcoIA to consider confirmed (i.e. approved) concurrent projects that are within the 500m Assessment Area. For those planning projects which were within the 500m Assessment Area but withdrawn or no approval status, it is considered not appropriate to include those projects as concurrent projects for the purpose of this cumulative impact assessment.

7.1.3 The combination of various concurrent developments (other planned and committed development projects) in the area may potentially lead to cumulative impacts, particularly on habitat loss, increased road use and disturbance impacts. For planning projects which were within the 500m Assessment Area, the approved projects will be included for the purpose of assessing the cumulative impacts. The concurrent projects in the area identified in accordance with the best available information include the following:

Residential Development – Approved Planning Application A/YL-NSW/274

7.1.4 This project is located adjacent to the current Project. It is a residential development with 5 nos. of 19 storeys tower and 2 nos. of 6 storeys tower. This proposed development would not cause any wetland loss as it is currently wasteland habitat only. A landscape area with natural habitat and water feature is proposed on the northeast corner of this development mainly to retain flight lines for ardeids from Tung Shing Lane Egretry. A light assessment conducted for this project showed that the predicted increase in light intensity by this project would be +0.01 Lux at the nearest point of the known Mai Po Bent-winged Firefly habitat is Nam Sang Wai and there would be no significant increase (i.e., +0.00 Lux) in light level for the majority of the firefly habitat extent. In view of the minor increase contributed by this project, no significant cumulative night time light impact to the firefly habitat is anticipated.

Shopping mall cum hotel at Lot 1743 S.C RP (Part) in D.D. 107 to the South of Wing Kei Tsuen, Yuen Long (Rezoning Application No. Y/YL-NSW/3)

7.1.5 Y/YL-NSW/3 is located about 450m to the northeast of the Application Site and isolated by landmass as well as the Kam Tin River Drainage Channel. No habitat with significant ecological value will be impacted or lost in this project. Disturbance from this project will also be limited

as human activities would be mainly indoors (shopping mall and hotel) and contained by the buildings.

Proposed Comprehensive Development of an Outlet Mall with Commercial Uses (Including "Shop and Services" and "Eating Place"). "Agricultural Uses" (Commercial Fish Ponds), "Excavation of Land" and "Filing of Land" in "Other Specified Uses" annotated "Comprehensive Development in include Wetland Restoration Area", Lots 8 PR (Part), 14 S.B RP (Part), 45 and 1740 S.A RP in D.D. 107 and Adjoining Government Land, to the South of Pok Wai and Wing Kei Tsuen, Yuen Ling (Planning Application No. A/YL-NSW/241)

7.1.6 A/YL-NSW/241 is also located far away to the northeast of the Application Site outside of the Study Area and isolated by landmass as well as the Kam Tin River Drainage Channel. No habitat with significant ecological value will be impacted or lost in this project, but wetlands (as commercial fishponds) will be created from the existing dry land area within the Application Site of A/YL-NSW/241, and therefore the wetland area inside WBA will be increased after the implementation of this project. Disturbance from this project will also be limited as human activities would be mainly indoors (shopping mall) and contained by the buildings.

Existing and Planned Developments in Kam Tin North

7.1.7 An approved comprehensive residential development of approx. 28 ha in total lies to the south/southeast of the current Project outside the WBA and also outside the Study Area (Application No. A/YL-KTN/118-2). One of the potential ecological impacts from the approved project relate to the globally threatened dragonfly Four-spot Midget *Mortonagrion hirosei*, the loss of a large area of fish ponds and some loss of grassland/shrubland, and resultant impacts on a number of wetland-dependent fauna and flora of conservation importance. To mitigate for these, Sha Po Marsh, which is of importance to the dragonfly, had been proposed and successfully implemented. In addition, ponds had been provided at the Marsh, at the entrance of the development and at the Mitigation Meander east of Kam Tin Drainage Channel for other impacted species. In total, the mitigation wetland area under the approved scheme is approx. 12 ha of permanent wetland and approx. 1.3 ha of temporary wetland. In addition, building heights have been carefully considered to minimize potential impact on bird flight lines.

An approved residential development project lies west of the Kam Tin River Drainage Channel (Application No. A/YL-KTN/319-2). This project (now completed as The Riva) involves buildings of up to 23 storeys and is sandwiched between Ko Po Road to the north and Kam Tin Road to the south outside of the Study Area. Habitats impacted

comprise largely open storage and patches of waste ground or grassland/shrubland.

7.1.8 No wetland was lost as a result of the Project and no particular ecological mitigation measures are proposed.

Disturbance

The proposed development under Approved Application No. A/YL-NSW/274 involves the development of 5 blocks of 19-storey tower and 2 blocks of 6-storey tower. A/YL-NSW/274 is located closer to the present Application and has a higher potential on cumulative disturbance impacts. The implementation time frame of A/YL-NSW/274 is not certain, but alternative quieter piling methods would be employed. Concurrent piling works of two developments would be unlikely. Other construction disturbance caused by the development works of A/YL-NSW/274 would be low in magnitude and will be resolved by the mitigation measures recommended under its EcoIA study. Impacts during the construction phase of the Project will also be mitigated by measures recommended in Section 6 of this report. Hence the cumulative impact from these is not anticipated to be significant.

For the potential cumulative impacts from the operational phase, noise, dust and human activities will not be significant as both applications are residential development and most activities of residents will be indoors. The firefly habitat and Great Cormorant night roost in Nam Sang Wai is situated to the north of the Application Site outside of the 500m Study Area. The night-time lighting from the approved application No. A/YL-NSW/274 will mainly be the domestic indoor lighting, hence, any spillover light would not be considered significant. There would not be external and directional night time light source pointing toward the firefly habitat. Hence, cumulative night-time lighting from two developments is not anticipated to be significant.

7.1.9 The proposed low-density development under Approved Application No. A/YL-NSW/274 is situated about 500m to the north of the Tung Shing Lane Egretry. A/YL-NSW/274 would not cause any loss of wetland. Although the current development would cause loss of abandoned ponds, the loss could be compensated within the current development site, no net loss of wetland is anticipated. Currently, both sites are mainly covered by wasteland and to some extent disturbed by human activities. The flight lines of breeding ardeids from Tung Shing Lane Egretry would be minimized and mitigated by provision of landscape area at the northeast corner of the Application Site and reduction of building height of A/YL-NSW/274. Hence it is not anticipated to have significant cumulative impacts.

Fragmentation

7.1.10 The potential of cumulative fragmentation caused by the above mentioned concurrent proposed developments on habitats is remote, as these concurrent projects, while outside and far away from the Application Site, are mostly located at existing developed areas or separated from each other. The residential development of the present Project would isolate a small, abandoned pond within an enclave area of the Application Site. Under the current landscape master plan, the surrounding area of this remnant pond within the Application Site would be landscape planting area which could provide ecological linkage to wildlife using this remnant pond. Cumulative fragmentation impact is thus considered to be minor.

Water quality

7.1.11 During the operational phase, the surface water run-off of the above mentioned concurrent proposed developments will pass into respective stormwater drainage systems which will prevent most run-off from entering and affecting nearby streams and ultimately Inner Deep Bay similar to other normally operating stormwater drainage systems in the area. Ecological impact would be minor.

7.1.12 In summary, these concurrent projects are either over 500m distance from the Application Site, or the separation from the site afforded by the Yuen Long Highway and Kam Tin River Drainage Channel, the potential of cumulative impacts are mostly low. There will be no wetland loss from all these concurrent projects (and wetlands are even created in some projects). For the nearest concurrent project, quieter piling method would be employed for A/YL-NSW/274, and thus unlikely to have cumulative impact. Other impacts from these concurrent projects will be respectively mitigated and reduced to low levels. Cumulative impacts are not predicted.

8. CONCLUSIONS

8.1.1 Information on the ecological baseline conditions of the Application Site was collected through literature review and surveys, and they were integrated into the present EcoIA to support the application.

8.1.2 Within the Application Site, the abandoned pond, pond, wasteland and developed area will be lost directly, but the meander will not be impacted. Due to the domination by wasteland of low ecological values, and small sizes of other habitats (developed area of 0.21 ha, abandoned pond of 0.23 ha, and pond of 0.46 ha) the potential impact due to loss of those habitats within the Application Site is considered minor or minor to moderate. However, compensation wetlands with the same size to those lost abandoned pond and pond within Application Site will be provided during the operational phase.

8.1.3 Tung Shing Lane egretry was abandoned in 2021, and chance of recolonization to this egretry is considered low. In fact, the breeding ardeids previously passed through the Application Site was also low due to avoidance of the existing knoll and preference over the Kam Tin River, given the manoeuvrability of waterbirds, the potential fragmentation impacts to waterbirds including breeding ardeids from Tung Shing Lane Egretry from the proposed development are considered minor.

8.1.4 This application would satisfy the requirements listed in Town Planning Board Guidelines No. 12C (TPB PG-No. 12C). First, since compensation wetlands including three fed by rainwater will be provided to mitigate the loss of abandoned pond and pond within the Application Site, the proposed development will not incur any net loss in wetland area or function at any scale and therefore will comply with the "no net loss in wetland" guideline stipulated in TPB PG-No. 12C. Second, this EcolA demonstrates that the proposed development would not have significant disturbance impacts to the surroundings including wetlands inside WCA, and will provide wetland and visual buffer from the WCA, and is thus in line with the intention of WBA.

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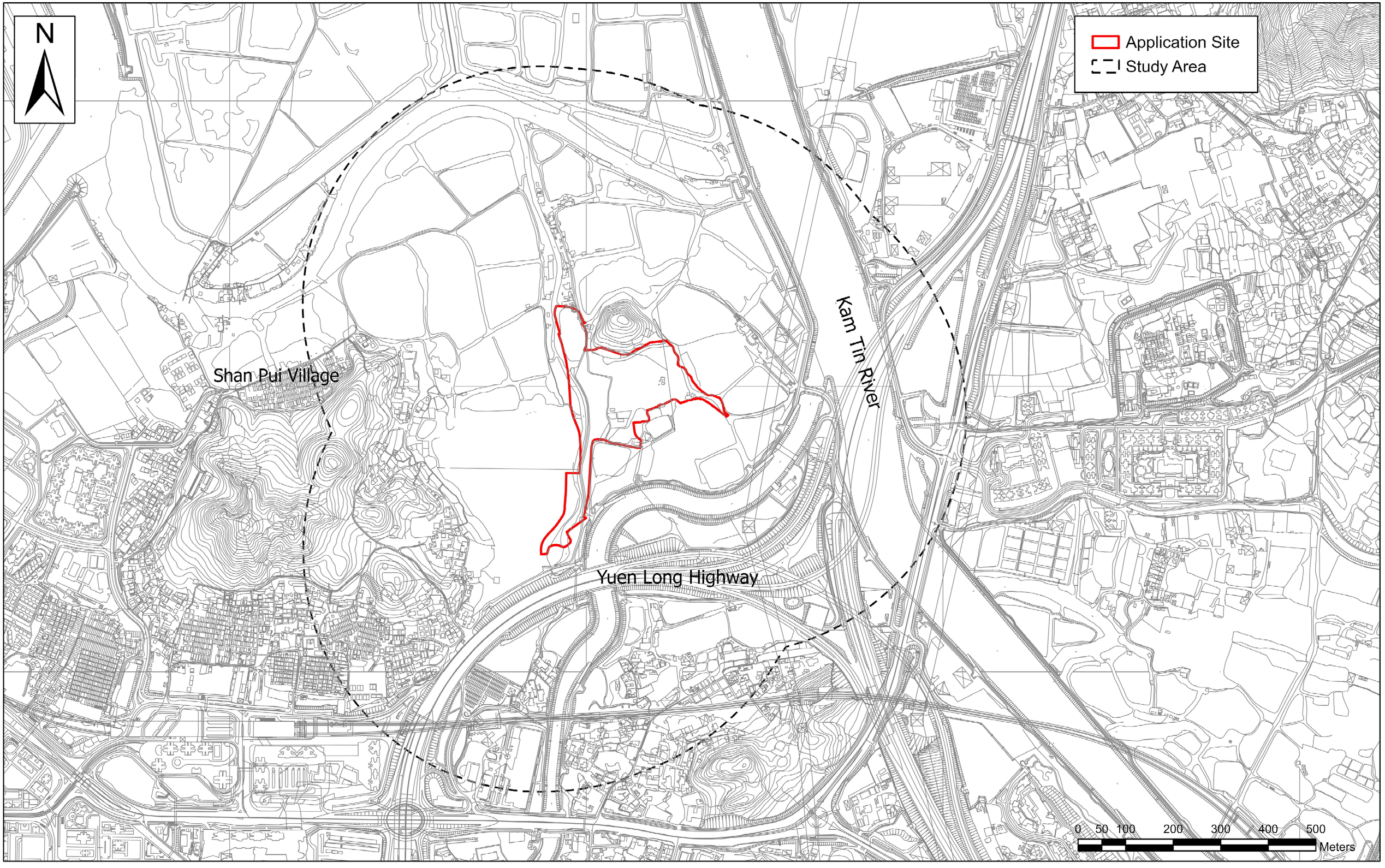

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Figure 1 Application Site and Study Area

N

Application Site
Study Area
Wetland Buffer Area
Wetland Conservation Area
Conservation Area
Deep Bay Wetland outside Ramsar Site
Priority Site for Enhanced Conservation
Terrestrial Transect
Aquatic Sampling Location
Firefly Boat Transect

A
B
C
D
E
F

0 50 100 200 300 400 500
Meters

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Figure 2a Recognized Sites of Conservation Importance and Survey Transects and Sampling Points
(Locations of Egretries and Flightline Vantage Point are Excluded)

N

Application Site
Study Area
Flight-line Vantage Point
Location of Egretry
Egret Night Roost

Shan Pui Village

Kam Tin River

Yuen Long Highway

0 50 100 200 300 400 500
Meters

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Figure 2b Location of Tung Shing Lane Egretry and Flight-line Vantage Point

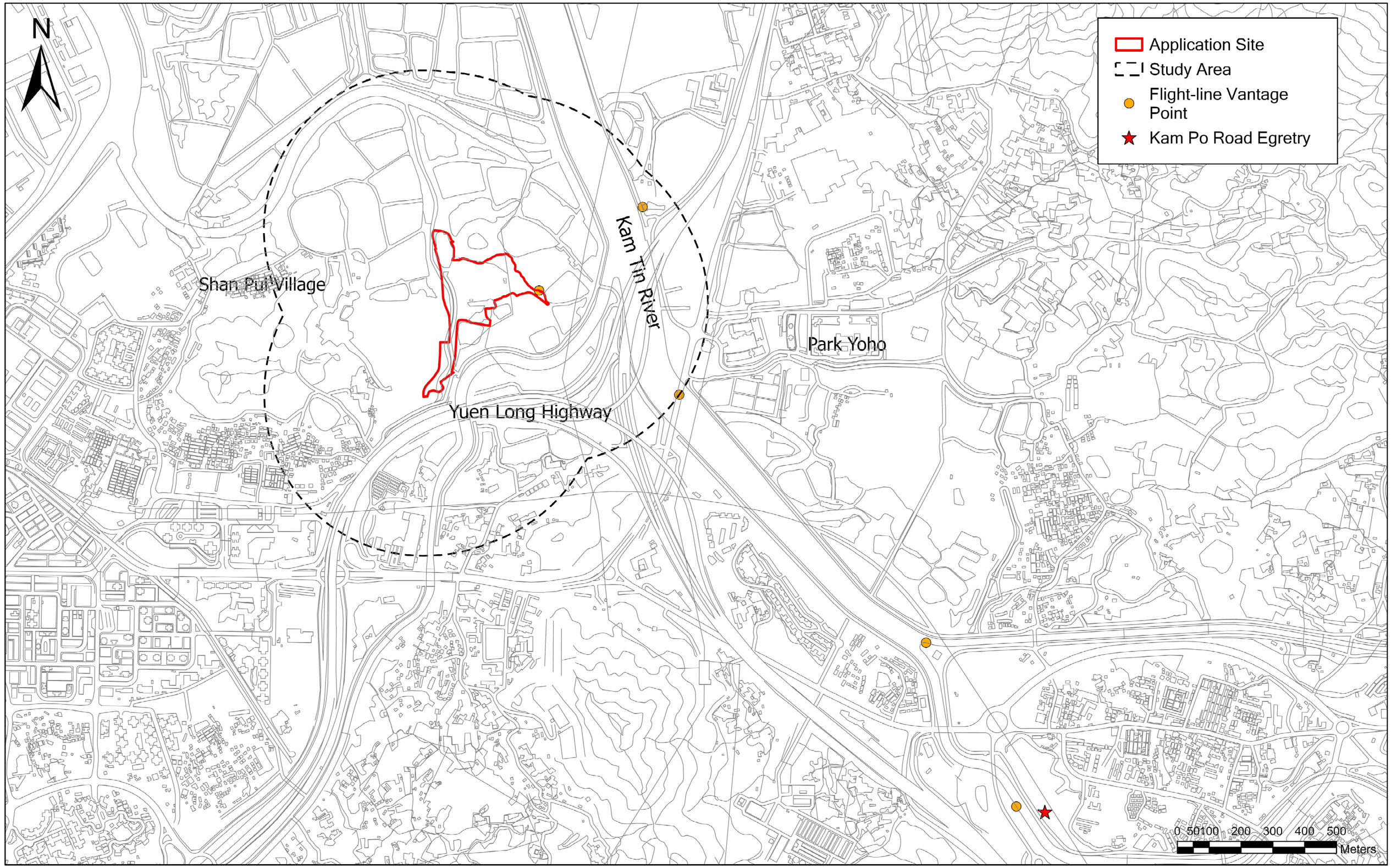

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Figure 2c Location of Kam Po Road Egretry and Flight-line Vantage Point

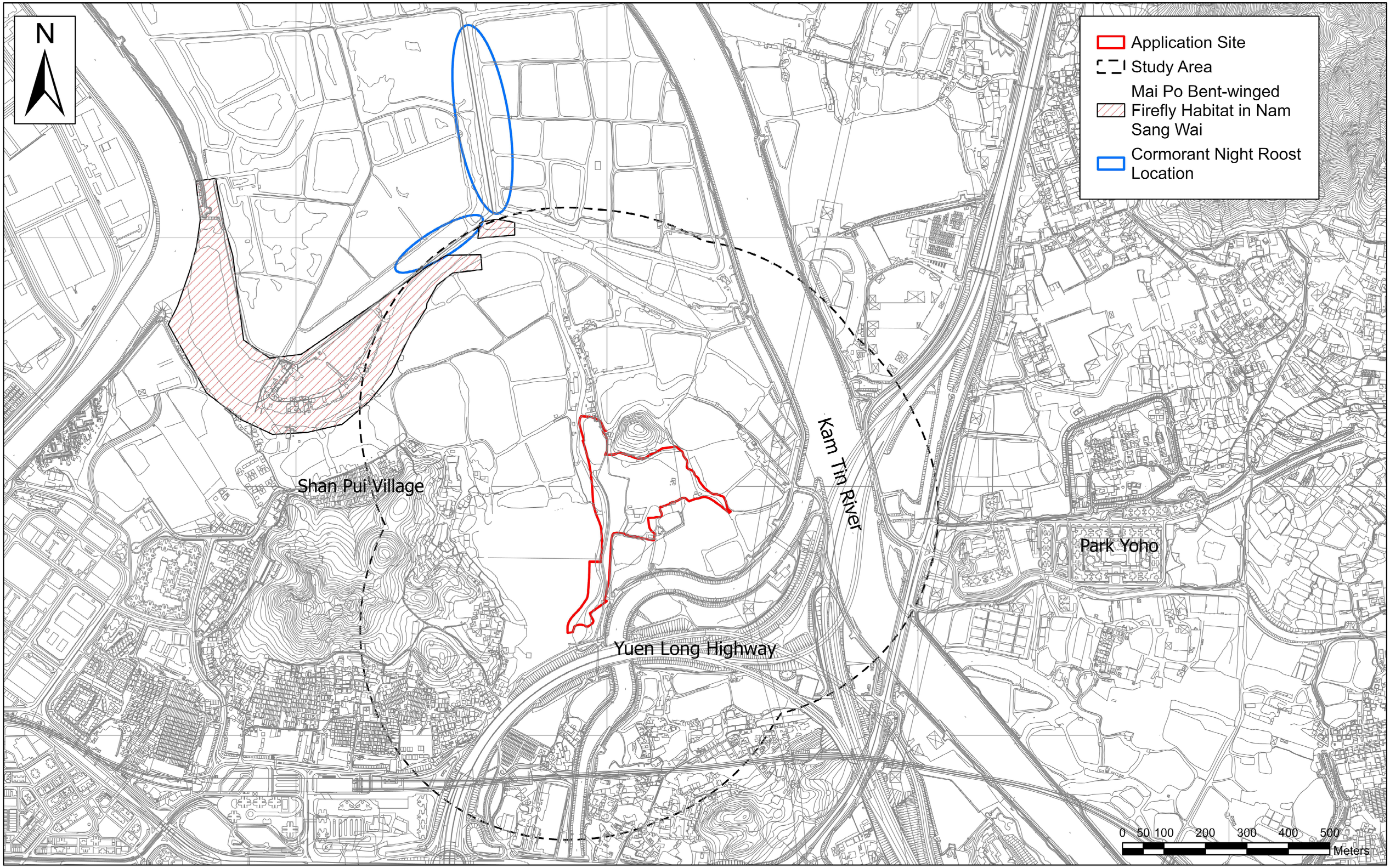

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Figure 3 Location of Cormorant Roost and Firefly Habitat in Nam Sang Wai (from reviewed literature)

N

Application Site
Study Area
Habitats
Abandoned Agricultural Land
Abandoned Pond
Active Agricultural Land
Channel
Developed Area
Grassland / Shrubland
Meander
Mitigation Wetland
Plantation
Pond
Reedbed
Tidal Marsh
Wasteland
Woodland

0 50 100 200 300 400 500
Meters

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Figure 4 Habitat Map

N

Application Site
Study Area
Habitats
Abandoned Agricultural Land
Abandoned Pond
Active Agricultural Land
Channel
Developed Area
Grassland / Shrubland
Meander
Mitigation Wetland
Plantation
Pond
Reedbed
Tidal Marsh
Wasteland
Woodland
Species of Conservation Importance
Persicaria orientalis
Small Asian Mongoose
Japanese Pipistrelle
Blue Chaser
Ruby Darter
Scarlet Basker
Common Awl
Danaid Eggfly
Metallic Cerulean
Swallowtail

0 50 100 200 300 400 500
Meters

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Figure 6a Locations of Non-avifauna Species of Conservation Importance

N

Application Site
Study Area
Cormorant Night Roost

0 50 100 200 300 400 500
Meters

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Figure 6b Locations of Great Cormorant Night Roost

N

Application Site
Study Area
Location of Egretry
General Flight Direction 2019

251 ind.
(82.03%)

17 ind.
(5.56%)

36 ind.
(11.76%)

2 ind.
(0.65%)

0 50 100 200 300 400 500
Meters

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Figure 6c General Ardeid Flight Direction from Tung Shing Lane Egretry in 2019

N

Application Site
Study Area
Location of Egretry
General Flight Direction 2020

227 ind.
(78.82%)

12 ind.
(4.17%)

49 ind.
(17.01%)

0 50 100 200 300 400 500
Meters

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Figure 6d General Ardeid Flight Direction from Tung Shing Lane Egretry in 2020

N

Application Site
Study Area
Location of Egretry
Flight Zone 2019

11 ind. (3.59%)
2 ind. (0.65%)
22 ind. (7.19%)
32 ind. 10.46%
28 ind. (9.15%)
9 ind. (2.94%)
120 ind. 39.22%
1 ind. (0.33%)
26 ind. (8.50%)

A
B
C
D
E
F
G
H
I

0 50 100 200 300 400 500
Meters

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Figure 6e Flight Zone Analysis in 2019

N

Application Site
Study Area
Location of Egretry
Flight Zone 2020

0 ind. (0%)
4 ind. (1.39%)
17 ind. (5.90%)
2 ind. (0.69%)
9 ind. (3.13%)
9 ind. (3.13%)
14 ind. (4.86%)
4 ind. (1.39%)
168 ind. 58.33%

A
B
C
D
E
F
G
H
I

0 50 100 200 300 400 500
Meters

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Figure 6f Flight Zone Analysis in 2020

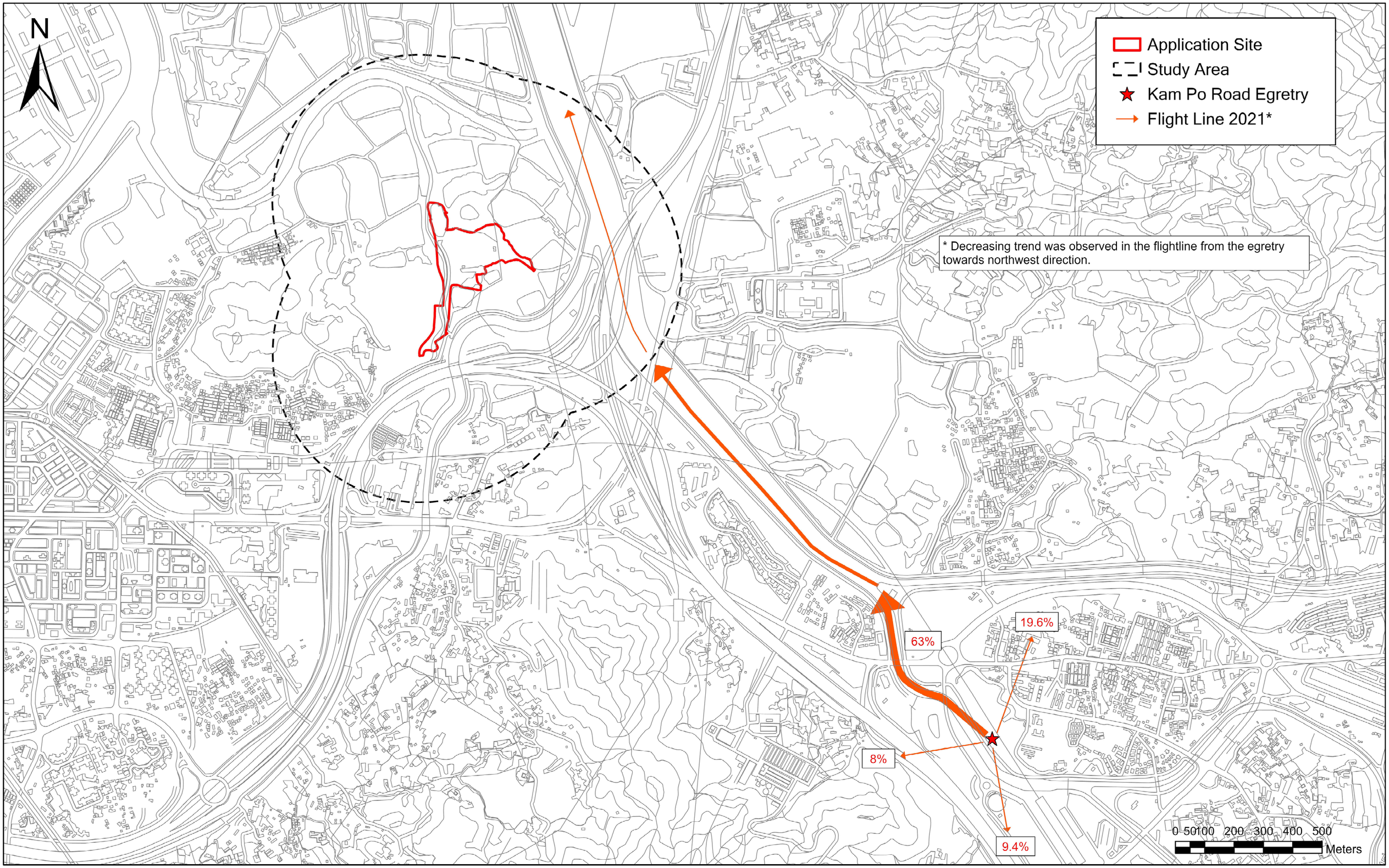

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Figure 6g Flight Observation from Kam Po Road Egretry in 2021

N

Application Site
Study Area
Winter Flight-line
Major
Minor
Occasional

0 50 100 200 300 400 500
Meters

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Figure 6h Winter Flight-line

N

Application Site
Study Area
Habitats
Abandoned Agricultural Land
Abandoned Pond
Active Agricultural Land
Channel
Developed Area
Grassland / Shrubland
Meander
Mitigation Wetland
Plantation
Pond
Reedbed
Tidal Marsh
Wasteland
Woodland
Firefly Species
Bent-winged Firefly
Pyrocoelia sp

0 50 100 200 300 400 500
Meters

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Figure 6i Locations of Firefly within the Study Area

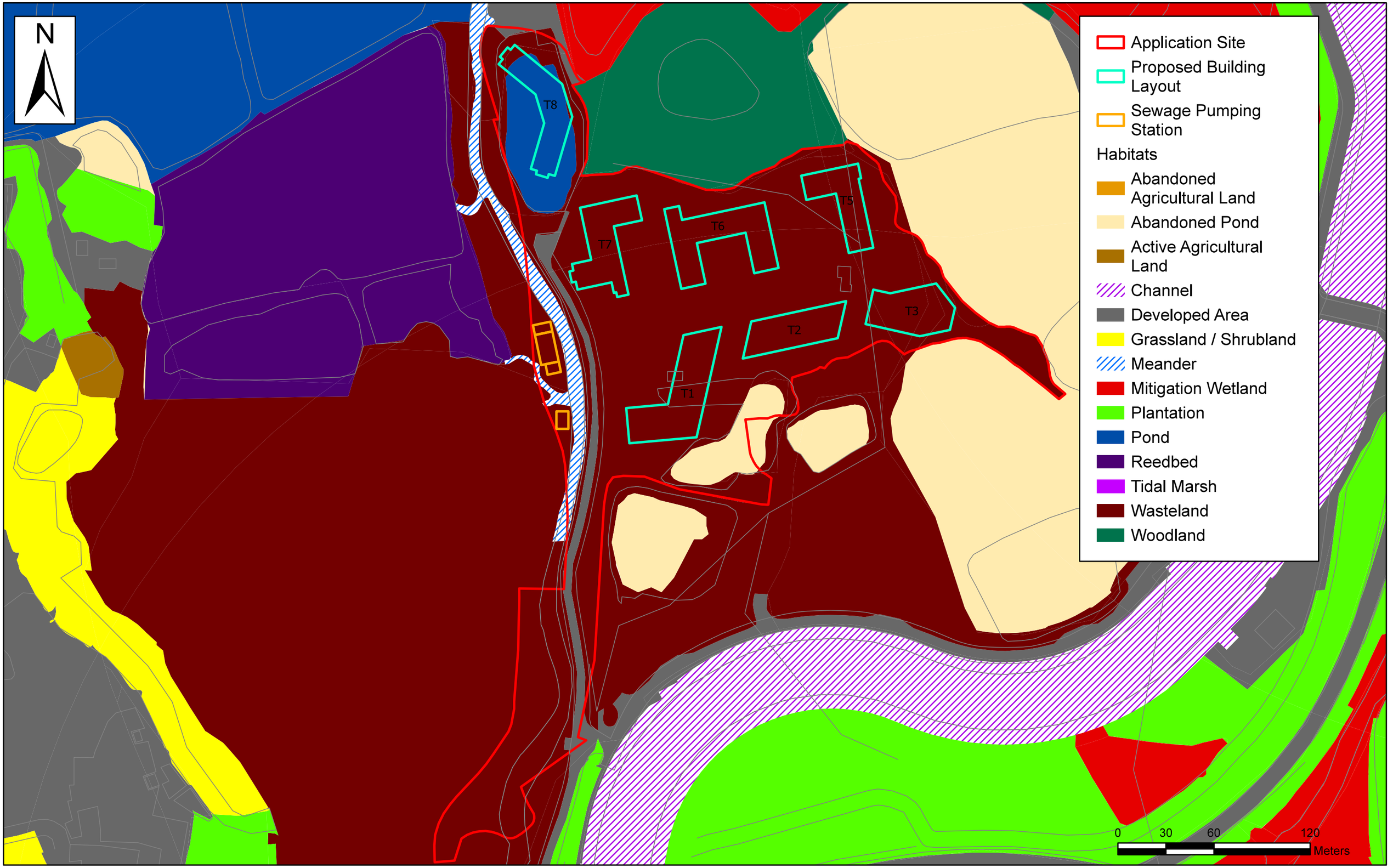

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Figure 7 Proposed Building Layout Overlaid with Habitat Map

N

Application Site
Study Area
Proposed Building Layout
Flight Zone 2019
I
II
III
IV

26 ind.
(8.50%)

37 ind.
(12.09%)

8 ind.
(2.61%)

180 ind.
(58.82%)

T1
T2
T3
T5
T6
T7
T8

0 20 40 80 120 160 200
Meters

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Figure 8a Flight Zone Analysis with Proposed Building Layout 2019

N

2 ind.
(0.69%)

31 ind.
(10.76%)

7 ind.
(2.43%)

183 ind.
(64.93%)

T8
T5
T6
T7
T3
T2
T1

Application Site
Study Area
Proposed Building Layout
Flight Zone 2020
I
II
III
IV

0 20 40 80 120 160 200
Meters

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Figure 8b Flight Zone Analysis with Proposed Building Layout 2020

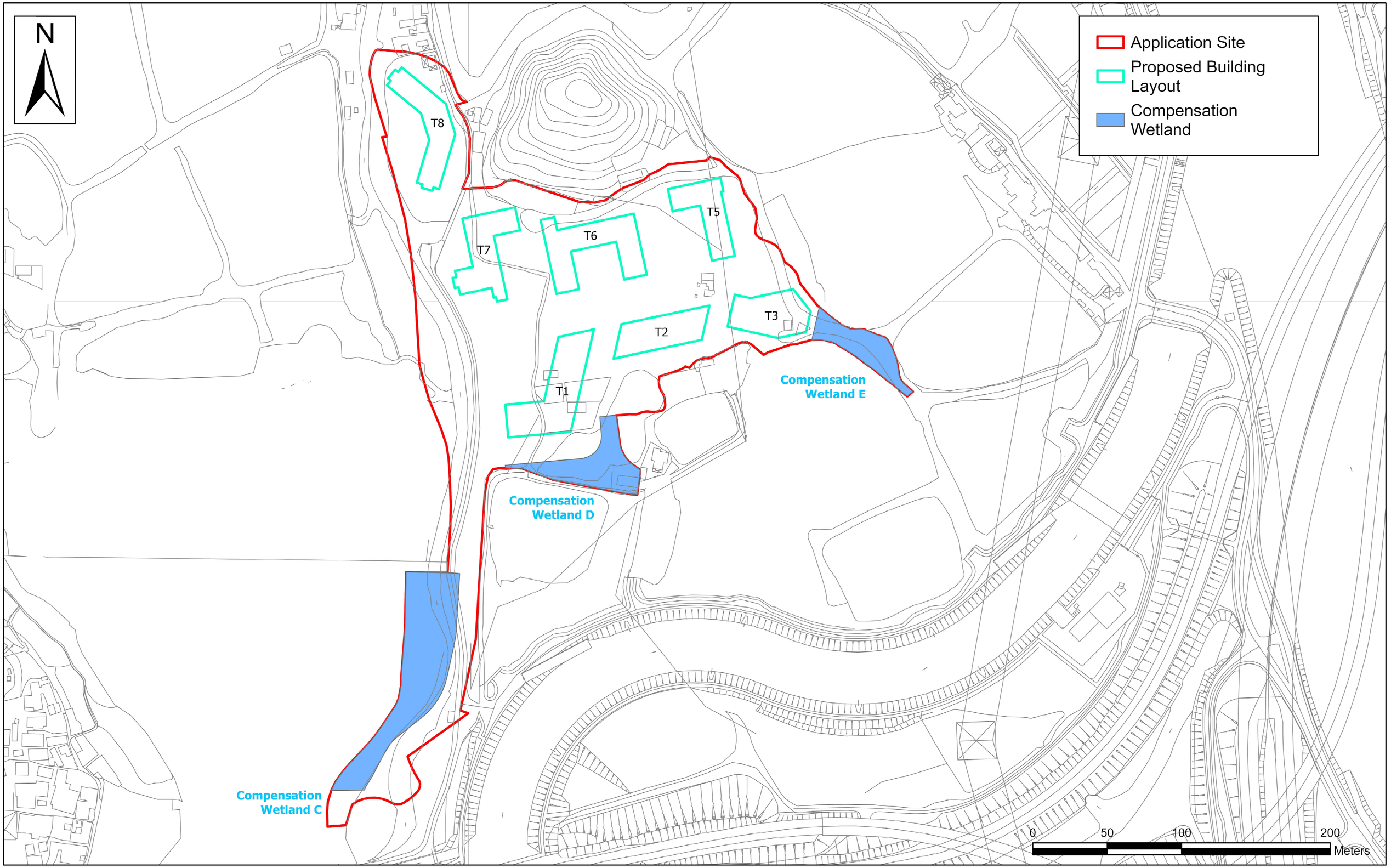

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Figure 9 Proposed Building Layout and Compensation Wetland

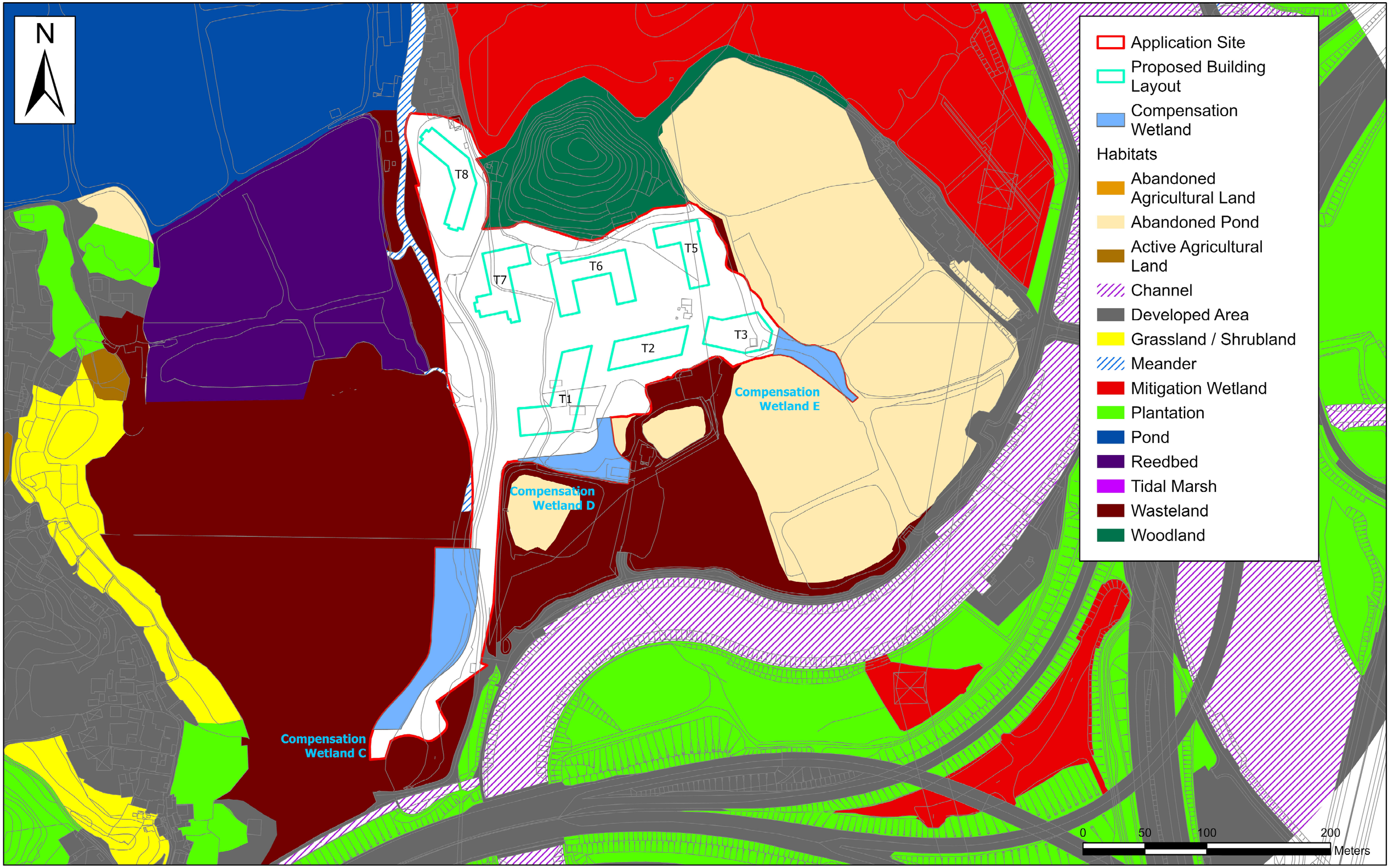

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Figure 10 Proposed Building Layout, Compensation Wetland and Habitats outside Application Site

Appendix A Plant Species recorded within the Study Area

Scientific name	Chinese name	Growth form	Origin	Rarity in HK [1]	Protection/Conservation status [2 3 4 5 6]	Application Site					Study Area													
						AP	Po	DA	Me	WI	AbAl	AcAl	AP	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	WO
Abelmoschus esculentus	咖啡黃葵	Herb	Exotic	-	-										S									
Acacia auriculiformis	耳果相思	Tree	Exotic	-	-									S	O	O			C					O
Acacia confusa	台灣相思	Tree	Exotic	-	-										O	O			S					
Acacia mangium	大葉相思	Tree	Exotic	-	-									S										
Acanthus ilicifolius	老鼠簕	Shrub	Native	Common	-								S	O			S							
Acanthus ilicifolius var. *xiamenensis*	廈門老鼠簕	Shrub	Native	-	-								S											
Achyranthes aspera	土牛膝	Herb	Native	Common	-													S						
Acmella uliginosa	沼生金鈕扣	Herb	Unknown	-	-			S		O			O		S	C			C	C			O	
Acrostichum aureum	鹵蕨	Herb	Native	Restricted	-													S						
Agave americana	龍舌蘭	Herb	Exotic	-	-							S			S					S				
Ageratum conyzoides	藿香薊	Herb	Exotic	Common	-					C		C	O		C	C			C	C			C	
Ageratum houstonianum	熊耳草	Herb	Exotic	Common	-					C	S	S			O	O			S				O	
Aglaia odorata var. *microphyllina*	小葉米仔蘭	Shrub	Exotic	-	-										S			S						
Alangium chinense	八角楓	Tree	Native	Common	-																			C
Aleurites moluccana	石栗	Tree	Exotic	-	-										S				S					
Allamanda schottii	黃蟬	Shrub	Exotic	-	-							S												
Alocasia macrorrhizos	海芋	Herb	native	Very common	-		S			S	S	O	O	S	C	S		S	S	S	S		S	O
Alpinia galanga	紅豆蔻	Herb	native	Restricted	-										S									
Alpinia zerumbet	豔山薑	Herb	native	Very common	-													S						

Scientific name	Chinese name	Growth form	Origin	Rarity in HK [1]	Protection/Conservation status [2 3 4 5 6]	Application Site					Study Area												
						AP	Po	DA	Me	WI	AbAl	AcAl	AP	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	WO
Alternanthera philoxeroides	空心莧	Herb	Exotic	Common	-								O					O					O	
Alternanthera sessilis	蝦鉗菜	Herb	native	Common	-			S		O		S	C	C	O	S			S				O	
Alysicarpus vaginalis	鏈莢豆	Herb	native	Very common	-								O											
Amaranthus blitum	凹頭莧	Herb	native	-	-											O			O					
Amaranthus viridis	綠莧	Herb	native	Very common	-					O		S	S		S	O			O				O	
Ampelopsis heterophylla var. *kulingensis*	牯嶺蛇葡萄	Climber	native	Common	-														S					O
Ananas comosus	鳳梨	Herb	Exotic	-	-																			O
Aporusa dioica	銀柴	Tree	Native	Very common	-																			O
Araucaria heterophylla	異葉南洋杉	Tree	Exotic	-	IUCN Red List: Vulnerable [2]										S				S					
Artemisia indica	五月艾	Herb	Native	-	-							C				O			O					
Artocarpus heterophyllus	菠蘿蜜	Tree	Exotic	-	-		S				S				O	S								O
Asystasia micrantha	小花十萬錯	Herb	Exotic	-	-										O			S	O	S			S	
Atalantia buxifolia	酒餅簕	Shrub	Native	Common	-																			O
Averrhoa carambola	楊桃	Tree	Exotic	-	-							S												
Axonopus compressus	地毯草	Herb	Exotic	Common	-																			
Bambusa sp.	竹屬	Herb	-	-	-										S									O
Bauhinia purpurea	紅花羊蹄甲	Tree	Exotic	-	-									S	S									
Bauhinia variegata	宮粉羊蹄甲	Tree	Exotic	-	-										O				C					
Bauhinia x *blakeana*	洋紫荊	Tree	Native	-	-										S									
Begonia cucullata var. *hookeri*	四季秋海棠	Herb	Exotic	-	-														O					
Benincasa hispida var. chieh-qua	節瓜	Climber	Exotic	-	-							S			S									

Scientific name	Chinese name	Growth form	Origin	Rarity in HK [1]	Protection/Conservation status [2 3 4 5 6]	Application Site					Study Area													
						AP	Po	DA	Me	WI	AbAl	AcAl	AP	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	WO
Bidens alba	白花鬼針草	Herb	Exotic	Very common	-	O	O	C	C	C	C	S	C	C	C	S	S	S	C	S	O		C	O
Bidens pilosa	鬼針草	Herb	Exotic	Very common	-										O	S			S				S	
Bischofia javanica	秋楓	Tree	Native	Common	-								S		C	S	S		S					C
Blechnum orientale	烏毛蕨	Herb	Native	Very common	-							S							S					O
Blumea megacephala	東風草	Herb	Native	Common	-																		S	
Boehmeria nivea	苧麻	Shrub	Exotic	Restricted	-						S	O		S					S	O				O
Bombax ceiba	木棉	Tree	Exotic	-	-										S	S			S					
Bothriochloa bladhii	臭根子草	Herb	Native	Very common	-			O		C		S	O	S	S	S							C	
Brachiaria mutica	巴拉草	Herb	Exotic	Common	-	C	C		C	C	C	S	C	O	O	C	C	O	C	O	O		C	
Bridelia tomentosa	土蜜樹	Shrub	Native	Very common	-					S	S		S	S	O	O		S	S				S	O
Broussonetia papyrifera	構樹	Tree	Native	Very common	-										O	O							O	
Caesalpinia pulcherrima	洋金鳳	Shrub	Exotic	-	-													S						
Calliandra haematocephala	朱纓花	Shrub	Exotic	-	-							O			O	S			O					
Callistemon rigidus	紅千層	Tree	Exotic	-	-										S				S					
Cardamine flexuosa	彎曲碎米薺	Herb	Native	Common	-							S												
Carica papaya	番木瓜	Tree	Exotic	-	-						S	S			S	S			S					
Caryota mitis	短穗魚尾葵	Tree	Exotic	-	-							S			S									
Casuarina equisetifolia	木麻黃	Tree	Exotic	Rare	-											O			O					S
Catharanthus roseus	長春花	Shrub	Exotic	-	-							S			O								S	
Celosia argentea	青葙	Herb	Native	Very common	-					S			S										O	
Celtis sinensis	朴樹	Tree	Native	Common	-					S				S	S			S	S				O	S

Scientific name	Chinese name	Growth form	Origin	Rarity in HK [1]	Protection/Conservation status [2 3 4 5 6]	Application Site					Study Area													
						AP	Po	DA	Me	WI	AbAl	AcAl	AP	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	WO
Celtis timorensis	假玉桂	Tree	Native	Restricted	-										S	O			O					
Cenchrus echinatus	蒺藜草	Herb	Exotic	Common	-					O		S			S									
Centotheca lappacea	假淡竹葉	Herb	Native	Common	-														S					S
Chamaecrista mimosoides	含羞草决明	Herb	Native	Common	-															S				
Chenopodium ficifolium	小藜	Herb	Native	Restricted	-					S			S										O	
Chloris barbata	孟仁草	Herb	Native	Very common	-										S				O					
Chloris gayana	非洲虎尾草	Herb	Exotic	-	-											S			C					
Cinnamomum burmannii	陰香	Tree	Native	-	-							S			C			S	C					
Cinnamomum camphora	樟	Tree	Native	Common	-										S									S
Citrus limonia	黎檬	Tree	Exotic	-	-										S	S							S	
Citrus reticulata	柑橘	Tree	Exotic	-	-										S									
Citrus reticulata Blanco	四季桔	Shrub	Exotic	-								S												
Citrus sinensis	甜橙	Tree	Exotic	-	-							S			S									
Clausena lansium	黃皮	Tree	Exotic	-	-							S			S			S	S					O
Cleistocalyx nervosum	水翁	Tree	Native	Common	-										S									
Cleome rutidosperma	皺子白花菜	Herb	Exotic	Restricted	-							S	S		S				S	S			S	
Clerodendrum chinense	重瓣臭茉莉	Shrub	Native	Common	-										S									

Scientific name	Chinese name	Growth form	Origin	Rarity in HK [1]	Protection/Conservation status [2 3 4 5 6]	Application Site					Study Area												
						AP	Po	DA	Me	WI	AbAl	AcAl	AP	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	WO
Clerodendrum cyrtophyllum	大青	Shrub	Native	Common	-																		S
Clerodendrum sp.	大青屬	Shrub	-	-	-										S								
Clerodendrum splendens	紅龍吐珠，龍吐珠藤	Shrub	Exotic	-	-							O			C				S				
Clerodendrum thomsonae	龍吐珠	Shrub	Exotic	-	-										S				O				
Coccinia grandis	紅瓜	Climber	Native	Very rare	-										S				O				
Cocculus orbiculatus	木防己	Climber	Native	Common	-					S				S	S			O	C			S	
Codiaeum variegatum	變葉木	Shrub	Exotic	-	-							S			S								
Coleus scutellarioides	五彩蘇	Herb	Exotic	-	-							S											
Colocasia esculenta	芋	Herb	Exotic	-	-						S				S								
Commelina diffusa	節節草	Herb	Native	Common	-					O		C	C	O	C		O			S			O	
Conyza canadensis	小蓬草，小白酒草	Herb	Exotic	Very common	-								S										
Cordyline fruticosa	朱蕉	Shrub	Exotic	-	-							S											
Crassocephalum crepidioides	野茼蒿	Herb	Exotic	Common	-					S													
Cratoxylum cochinchinense	黃牛木	Tree	native	Very common	-										S								C
Cuphea hyssopifolia	細葉萼距花	Shrub	Exotic	-	-							S			S								
Cuscuta campestris	田野菟絲子	Herb	Native	-	-	S	O			O	S		S	S	S	O			S	S			O	S
Cuscuta chinensis	菟絲子	Herb	Native	Common	-						C	C			C								
Cyclosorus acuminatus	漸尖毛蕨	Herb	Native	Very common	-						S								S				
Cyclosorus interruptus	間斷毛蕨	Herb	Native	Common	-						O		O					S					
Cyclosorus parasiticus	華南毛蕨	Herb	Native	Very common	-							S			S				S				O

Scientific name	Chinese name	Growth form	Origin	Rarity in HK [1]	Protection/Conservation status [2 3 4 5 6]	Application Site					Study Area												
						AP	Po	DA	Me	WI	AbAl	AcAl	AP	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	WO
Cynodon dactylon	狗牙根	Herb	native	Very common	-					C	O	O	C		S			O					C	
Cyperus difformis	異型莎草	Herb	native	Very common	-								C										O	
Cyperus distans	疏穗莎草	Herb	native	Common	-								O											
Cyperus haspan	畦畔莎草	Herb	native	Common	-								S											
Cyperus imbricatus	疊穗莎草	Herb	Native	Common	-					S			C											
Cyperus involucratus	風車草	Herb	Exotic	Restricted	-						O		O	O					S					
Cyperus iria	碎米莎草	Herb	Native	Common	-								C											
Cyperus malaccensis	茳芏	Herb	Native	Common	-									C			O							
Cyperus rotundus	香附子	Herb	Native	Very common	-					S			C		S								O	
Cyperus surinamensis	蘇里南莎草	Herb	Exotic	-	-					O														
Dactyloctenium aegyptium	龍爪茅	Herb	Native	Common	-										S								S	
Dalbergia benthamii	兩廣黃檀	Climber	Native	Common	-																			C
Delonix regia	鳳凰木	Tree	Exotic	-	-										S				S					
Derris trifoliata	魚藤	Climber	Native	Common	-								S	C				O				S		
Desmodium heterocarpon	假地豆	Shrub	Native	Very common	-					S														
Desmodium tortuosum	南美山螞蝗	Herb	Exotic	Common	-					C													C	
Desmodium triflorum	三點金	Herb	Native	Very common	-					O														
Desmos chinensis	假鷹爪	Shrub	Native	Common	-										S									C
Digitaria spp.	馬唐屬	Herb	-	-				S		C			O		S					S			O	

Scientific name	Chinese name	Growth form	Origin	Rarity in HK [1]	Protection/Conservation status [2 3 4 5 6]	Application Site					Study Area												
						AP	Po	DA	Me	WI	AbAl	AcAl	AP	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	WO
Dimocarpus longan	龍眼	Tree	Exotic	Restricted	Threatened Species List of China's Higher Plants: Vulnerable [3] China Plant Red Data Book: Vulnerable [4] State Protection (Category II) [5]		S				S	S			C	O			O				O
Dioscorea bulbifera	黃獨	Climber	Native	Common	-										S				O				
Dracaena fragrans	巴西鐵樹	Shrub	Exotic	-	-										S			S	O				
Dracaena sanderiana	辛氏龍樹	Shrub	Exotic	-	-										S							S	
Duranta erecta	假連翹	Climber	Exotic	-	-													S					
Duranta repens `Variegata`	花葉假連翹	Shrub	Exotic	-	-										S								
Dypsis lutescens	散尾葵	Shrub	Exotic	-	-										S				S				
Echinochloa crusgalli var. austrojaponensis	小果稗	Herb	native	-	-					O			S		S				S			O	
Echinochloa glabrescens	硬稃稗	Herb	native	-	-								O										
Eclipta prostrata	鱧腸	Herb	Native	Common	-					S			S					O					S	
Eichhornia crassipes	鳳眼藍	Herb	Exotic	Common	-									S						S			
Elephantopus tomentosus	白花地膽草	Herb	Native	Common	-																	S	
Eleusine indica	牛筋草	Herb	Native	Very common	-					O	S		S		S								
Eleutherococcus trifoliatus	白簕	Climber	Native	Restricted	-										S				S				O
Embelia laeta	酸藤子	Climber	Native	Very common	-																		O
Emilia sonchifolia	一點紅	Herb	Native	Very common	-					S		S			S							S	
Epipremnum aureum	綠蘿	Climber	Exotic	-	-								S										

Scientific name	Chinese name	Growth form	Origin	Rarity in HK [1]	Protection/Conservation status [2 3 4 5 6]	Application Site					Study Area												
						AP	Po	DA	Me	WI	AbAl	AcAl	AP	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	WO
Eragrostis tenella	鯽魚草	Herb	Native	Very common	-										S								
Eriobotrya japonica	枇杷	Tree	Exotic	-	-										S				O				
Eucalyptus citriodora	檸檬桉	Tree	Exotic	-	-										S				O				
Eucalyptus robusta	大葉桉	Tree	Exotic	-	-										C				C				
Eucalyptus sp.	桉屬	Tree	Exotic	-	-														O				
Eucalyptus urophylla	尾葉桉	Tree	Exotic	-	-																		S
Euphorbia bifida	細齒大戟	Herb	Native	Common	-										S				S				
Euphorbia heterophylla	白苞猩猩草	Herb	Exotic	Restricted	-					C												S	
Euphorbia hirta	飛揚草	Herb	Exotic	Very common	-					S	O	O	S		S							O	
Euphorbia hypericifolia	通奶草	Herb	Native	Common	-					O			C									C	
Euphorbia thymifolia	千根草	Herb	Native	Very common	-					O					S	S						C	
Eurya nitida	細齒葉柃	Shrub	Native	Very common	-																		S
Fagraea ceilanica	灰莉	Shrub	Exotic	-	-													S					
Fallopia multiflora	何首烏	Herb	Native	Restricted	-										S								
Ficus benjamina	垂葉榕	Tree	Exotic	-	-										O	S		S		S			
Ficus carica	無花果	Tree	Exotic	-	-							S											
Ficus hirta	粗葉榕	Shrub	Native	Common	-										S								O
Ficus hispida	對葉榕	Shrub	Native	Very common	-					S		S	S	S	S	O	S		S	O			O
Ficus microcarpa	榕樹	Tree	Native	Common	-					S					C			S	C					S
Ficus microcarpa `Golden Leaf`	黃榕	Shrub	Exotic	-	-										S								
Ficus pumila	薜荔	Climber	Native	Very common	-							S	S		S				S			S	S

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Ficus religiosa	菩提樹	Tree	Exotic	Common	-										S									
Ficus subpisocarpa	筆管榕	Tree	Native	-	-						S		S	S						S				
Ficus tinctoria subsp. gibbosa	斜葉榕	Tree	Native	Restricted	-									S	S									
Ficus virens var. *sublanceolata*	黃葛樹	Tree	Native	Common	-										O				S	S				
Fimbristylis aestivalis	夏飄拂草	Herb	Native	Restricted	-								C											
Fimbristylis dichotoma	兩歧飄拂草	Herb	Native	Very common	-										O				S					
Flueggea virosa	白飯樹	Shrub	Native	Common	-					S	S		S	S	S				S				S	
Glochidion eriocarpum	毛果算盤子	Shrub	Native	Very common	-											S								
Gnaphalium pensylvanicum	匙葉鼠麴草	Herb	Native	-	-					S			S										S	
Gomphrena celosioides	銀花莧	Herb	Native	Restricted	-					O			S											
Hedychium coronarium	薑花	Herb	Exotic	-	-							S												
Hedyotis acutangula	金草	Herb	Native	Very common	-											S								
Hedyotis corymbosa	傘房花耳草	Herb	Native	Very common	-										S									
Hedyotis hedyotidea	牛白藤	Shrub	Native	Very common	-										S				S				S	
Helianthus annuus	向日葵	Herb	Exotic	-	-										S									
Hibiscus rosa-sinensis	朱槿	Shrub	Exotic	-	-							S			S			S						
Hibiscus tiliaceus	黃槿	Tree	Native	Very common	-										S				S					
Hippeastrum vittatum	花朱頂蘭	Herb	Exotic	-	-						S													
Hydrocotyle verticillata	銅錢草	Herb	Exotic	-	-										S									
Hylocereus undatus	量天尺	Herb	Exotic	-	-							S												
Hypserpa nitida	夜花藤	Climber	Native	Very common	-																			C

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Ilex asprella	梅葉冬青	Shrub	Native	Very common	-																			S
Imperata cylindrica	大白茅	Herb	Native	Very common	-			O		O	S		S	S	O			O	S				O	
Ipomoea aquatica	蕹菜	Herb	Exotic	Very common	-						O	O	S					O						
Ipomoea batatas	番薯	Herb	Exotic	-	-						O													
Ipomoea cairica	五爪金龍	Climber	Exotic	Very common	-	S	O	C	C	O	O	O	C		C	C	C		O		S		C	O
Ipomoea mauritiana	七爪龍	Climber	Exotic	Restricted	-														S					
Ipomoea nil	牽牛	Climber	Exotic	Common	-					S			O	S									O	
Ipomoea pes-caprae	厚藤	Herb	Native	Common	-									S										
Ipomoea triloba	三裂葉薯，三裂葉牽牛	Herb	Native	-	-					C	S	S	S		C	O		S					C	
Ischaemum barbatum	粗毛鴨嘴草	Herb	Native	Very common	-										C				S					
Ixeris polycephala	多頭苦買菜	Herb	Native	-	-								S											
Ixora chinensis	龍船花	Shrub	Native	Restricted	-										S			S	S					
Jatropha integerrima	全緣葉麻瘋樹	Shrub	Exotic	-	-													S						
Jatropha podagrica	佛肚樹	Shrub	Exotic	-	-							S												
Juniperus chinensis cv. *Kaizuca*	龍柏	Tree	Exotic	-	-										S	S								
Justicia gendarussa	小駁骨	Shrub	Native	Common	-													S						
Kalanchoe pinnata	落地生根	Herb	Exotic	Common	-							S			S					S				
Kalanchoe tubiflora	洋吊鍾	Herb	Exotic	-	-						S													
Kandelia obovata	秋茄樹，水筆仔	Shrub	Native	Very common	-								S	S								S		

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Kyllinga nemoralis	單穗水蜈蚣	Herb	Native	Very common	-							S			S								
Kyllinga polyphylla	水蜈蚣	Herb	Exotic	Common	-					O		S	S		S			S		S			O	
Lagerstroemia speciosa	大花紫薇	Tree	Exotic	-	Cap. 96A [6]										S			S	S					
Lantana camara	馬纓丹	Shrub	Exotic	Very common	-					S	O	O	S		S			S	O				S	
Lemna minor	浮萍	Herb	Native	Common	-								S							S				
Leonurus japonicus	益母草	Herb	Native	Restricted	-					S		S												
Leptochloa chinensis	千金子	Herb	Native	Very common	-													S						
Leptochloa fusca	雙稃草	Herb	Native	-	-								S											
Leucaena leucocephala	銀合歡	Tree	Exotic	Common	-		S		C	O	O	O	O	C	C	S	O	O	C	S			C	O
Ligustrum sinense	山指甲	Tree	Native	Common	-										S	S			S					o
Lindernia crustacea	母草	Herb	Native	Restricted	-							S							S					
Lindernia rotundifolia	圓葉母草	Herb	Exotic	-									C					S						
Liquidambar formosana	楓香	Tree	Native	Common	-													S						
Liriope spicata	山麥冬	Herb	Native	Very common	-																			s
Litchi chinensis	荔枝	Tree	Exotic	Restricted	Threatened Species List of China's Higher Plants: Endangered [3] China Plant Red Data Book: Vulnerable [4] State Protection (Category II) [5]										S					S				
Litsea glutinosa	潺槁樹	Tree	Native	Very common	-					S					S				S				S	C

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Litsea monopetala	假柿木薑子	Tree	Native	Restricted	-					S														S
Litsea rotundifolia var. *oblongifolia*	豺皮樟	Shrub	Native	Very common	-																			C
Livistona chinensis	蒲葵	Tree	Exotic	-	-										O				S					
Lophostemon confertus	紅膠木	Tree	Exotic	-	-										S				S					
Loropetalum chinense f. *rubrum*	紅花檵木	Shrub	Exotic	-	-										S									
Ludwigia erecta	美洲水丁香	Herb	Exotic	-	-															O			O	
Ludwigia hyssopifolia	草龍	Herb	Native	-	-						S	S	S		S									
Ludwigia octovalvis	毛草龍	Herb	Native	Common	-								S											
Ludwigia perennis	細花丁香蓼	Herb	Native	Restricted	-								S											
Lycopersicon esculentum	番茄	Herb	Exotic	-	-							S												
Lygodium japonicum	海金沙	Herb	Native	Very common	-										S			S	S	S				
Macaranga tanarius var. *tomentosa*	血桐	Tree	Native	Common	-	S	S			S			S	S	S	S			O	S			S	C
Macroptilium atropurpureum	紫花大翼豆	Herb	Exotic	Common	-					S					S								S	
Macroptilium lathyroides	大翼豆	Herb	Exotic	Common	-					S					S								S	
Mallotus paniculatus	白楸	Tree	Native	Very common	-														S					
Malvastrum coromandelianum	賽葵	Shrub	Native	Common	-					C			S		S				S				C	
Malvaviscus penduliflorus	垂花懸鈴花	Shrub	Exotic	-	-							S							S					
Mangifera indica	芒果	Tree	Exotic	-	-							S			S	S			S					S
Manihot esculenta	木薯	Shrub	Exotic	-	-					S	S	S			S									
Markhamia stipulata	貓尾木	Tree	Exotic	-	-										S	O			C					
Melaleuca cajuputi subsp. *cumingiana*	白千層	Tree	Exotic	-	-										S				S					

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Melastoma malabathricum	野牡丹	Shrub	Native	Common	-											S								S
Melia azedarach	苦楝	Tree	Exotic	Common	-					S			S	S	S		S	S	O				S	C
Melinis repens	紅毛草	Herb	Exotic	Very common	-									C	S				S					
Merremia hederacea	魚黃草	Climber	Native	Restricted	-								O							S			S	
Michelia x *alba*	白蘭	Tree	Exotic	-	Cap. 96A [6]										S									S
Microcos nervosa	破布葉	Shrub	Native	Common	-					S		S			O				S					
Microstegium ciliatum	剛莠竹	Herb	Native	Very common	-					O			O		S	S			S					S
Mikania micrantha	薇甘菊	Herb	Exotic	Very common	-	S	C		C	C	C	C	C		S	S	O	S	C	S	S		C	O
Millettia nitida	亮葉崖豆藤	Climber	Native	Very common	-																			S
Mimosa diplotricha	巴西含羞草	Herb	Exotic	Rare	-					O			S							S			C	
Mimosa pudica	含羞草	Herb	Exotic	Very common	-					O	S	S	S		S	S			S				C	
Mirabilis jalapa	紫茉莉	Herb	Exotic	-	-							S												
Miscanthus floridulus	五節芒	Herb	Native	Common	-					S			S	S	C		C		C	S			O	O
Miscanthus sinensis	芒	Herb	Native	Very common	-								S	S			S	S	S		S			C
Momordica charantia	苦瓜	Climber	Exotic	-	-							S												
Morus alba	桑	Tree	Native	Common	-		S			S				S	O				O				S	
Murraya paniculata	九里香	Tree	Exotic	-	-										S				S					
Musa acuminata cv. *Cavendishii*	香蕉	Herb	Exotic	-	-						S	S			S									
Musa x *paradisiaca*	大蕉	Herb	Exotic	-	-					S		S	S							S				
Myosoton aquaticum	鵝腸菜	Herb	Native	Common	-							S												

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Nandina domestica	南天竺	Shrub	Exotic	-	-														S					
Nelumbo nucifera	蓮	Herb	Exotic	-	-															S				
Nephrolepis auriculata	腎蕨	Herb	Native	Common	-													S						
Nerium oleander	夾竹桃	Shrub	Exotic	-	-										S			S						
Neyraudia reynaudiana	類蘆	Herb	Native	Very common	-								S	O		S			O					
Nymphoides cristatum	水皮蓮	Herb	Native	-	-								S											
Ocimum basilicum	羅勒，薰尊、九層塔	Herb	Exotic	Very rare	-							S												
Oenanthe javanica	水芹	Herb	Native	Restricted	-							S												
Oplismenus compositus	竹葉草	Herb	Native	Very common	-										O			S	O					O
Osmanthus fragrans	桂花	Tree	Exotic	-	-							S			S									
Oxalis corniculata	酢漿草	Herb	Native	Very common	-					S					S				C				C	S
Oxalis debilis subsp. *corymbosa*	紅花酢漿草	Herb	Exotic	Common	-					O					S			S	S				O	
Pachira aquatica	瓜栗	Tree	Exotic	-	-										S									
Paederia scandens	雞矢藤	Climber	Native	Very common	-	S	S	O		S	O	O	S		S	S		O	C				S	
Panicum maximum	大黍	Herb	Exotic	Common	-			C	O	C	C	O	C	C	C	O	C		C	S	S		C	O
Panicum repens	鋪地黍	Herb	Native	Very common	-								O											
Parthenocissus dalzielii	爬牆虎	Climber	Exotic	-	-										S				S					
Paspalum conjugatum	兩耳草	Herb	Native	Common	-					S	S	S	S		O	S			S				O	
Paspalum distichum	雙穗雀稗	Herb	Native	Common	-								S											
Paspalum urvillei	絲毛雀稗	Herb	Exotic	Common	-					O			O											

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Passiflora foetida	龍珠果	Climber	Exotic	Very common	-		S						S		S				S				O	S
Passiflora suberosa	南美西番蓮	Climber	Exotic	Common	-													S						
Pennisetum alopecuroides	狼尾草	Herb	Native	Common	-						S	S			S								S	
Pennisetum polystachion	牧地狼尾草	Herb	Exotic	Very common	-								S											
Pennisetum purpureum	象草	Herb	Exotic	Very common	-					O	S		S		S				O					
Peperomia obtusifolia	鈍葉豆瓣綠	Herb	Exotic	-	-										S									
Persicaria barbata	毛蓼	Herb	Native	Common	-								S							S				
Persicaria chinensis	火炭母	Herb	Native	Common	-						O	O			S				S				S	o
Persicaria lapathifolia	大馬蓼	Herb	Native	Common	-								S											
Persicaria orientalis	**紅蓼**	**Herb**	**Native**	**Very rare**	**-**																		**S**	
Persicaria sp.	春蓼屬	Herb	Unknown	-	-										S									
Phragmites australis	蘆葦	Herb	Native	Very common	-	C	O		S				C				C	C		O	C	C		
Phragmites vallatorius	卡開蘆	Herb	Native	Very common	-	O							S											
Phyllanthus debilis	銳尖葉下珠	Herb	Unknown	-	-										O									
Phyllanthus emblica	餘甘子	Tree	Native	Very common	-										O									
Phyllanthus reticulatus	小果葉下珠	Shrub	Native	Common	-										S									c
Phyllanthus tenellus	纖梗葉下珠	Herb	Unknown	-	-										O									

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Phyllanthus urinaria	葉下珠	Herb	Native	Common	-					S													O	
Physalis angulata	苦蘵	Herb	Native	Restricted	-					S			S		S								O	
Phytolacca acinosa	商陸	Herb	Exotic	Rare	-										S									
Pilea microphylla	小葉冷水花	Herb	Exotic	Very common	-									C	S									
Piper sarmentosum	假蒟	Herb	Native	Restricted	-										S				S					
Plantago major	車前草	Herb	Native	Very common	-										S								S	
Platycladus orientalis	側柏	Tree	Exotic	-	-										O									
Plectranthus amboinicus	到手香	Herb	-	-	-										S									
Plumeria rubra	雞蛋花	Tree	Exotic	-	-							S			S									
Portulaca oleracea	馬齒莧	Herb	Native	Very common	-										S								O	
Pouzolzia zeylanica	霧水葛	Herb	Native	Common	-					S					S				S				S	
Praxelis clematidea	假臭草	Herb	Exotic	Very common	-					O														
Prunus persica	桃	Tree	Exotic	-	-							S			S									
Psidium guajava	番石榴	Tree	Exotic	Common	-		S					S			S								S	
Psychotria asiatica	九節	Tree	Native	Very common	-														S					O
Pteris semipinnata	半邊旗	Herb	Native	Very common	-																			S
Pteris vittata	蜈蚣草	Herb	Native	Very common	-										S				S					
Pueraria lobata var. *montana*	葛麻姆	Climber	Native	Common	-						O	O			O		S		O				O	
Pueraria lobata var. *thomsonii*	粉葛	Climber	Exotic	-	-								O		C	O					O			o
Pueraria phaseoloides	三裂葉野葛	Climber	Native	Very common	-																		S	

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						AP	Po	DA	Me	WI	AbAl	AcAl	AP	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	WO
Pycreus polystachyos	多枝扁莎	Herb	Native	Very common	-								O										
Pyrostegia venusta	炮仗花	Climber	Exotic	-	-										O								
Ranunculus sceleratus	石龍芮	Herb	Native	Restricted	-								S										
Rhaphiolepis indica	石斑木	Shrub	Native	Very common	-										O								
Rhododendron spp.	杜鵑屬	Shrub	-	-	Cap 96A [6]													S					
Ricinus communis	蓖麻	Shrub	Exotic	Restricted	-							S	S									S	
Rosa chinensis	月季花	Shrub	Exotic	-	-										S								
Ruellia coerulea	蘭花草	Herb	Exotic	-	-										S			S					
Rumex japonicus	羊蹄	Herb	Native	Restricted	-					S			S										
Rumex trisetifer	長刺酸模	Herb	Native	Common	-								S							S		S	
Saccharum officinarum	甘蔗	Herb	Exotic	-	-							S			S								
Sanchezia nobilis	黃脈爵床	Shrub	Exotic	-	-													S					
Sansevieria trifasciata	虎尾蘭	Herb	Exotic	-	-										S								
Sapium sebiferum	烏桕	Tree	Native	Common	-					S			S		S				S				
Schefflera arboricola	鵝掌藤	Climber	Exotic	-	-										S			S	C				
Scleria ciliaris	緣毛珍珠茅	Herb	Native	Very common	-																		s
Scoparia dulcis	野甘草	Herb	Exotic	Common	-					S	S	S			S							O	
Sesbania cannabina	田菁	Herb	Exotic	Common	-								S										
Sesbania javanica	沼生田菁	Herb	Native	-	-					S			S									O	
Sida acuta	黃花稔	Herb	Native	Common	-																	S	
Sida rhombifolia	白背黃花稔	Shrub	Native	Common	-					O			S		S							C	

Scientific name	Chinese name	Growth form	Origin	Rarity in HK [1]	Protection/Conservation status [2 3 4 5 6]	Application Site					Study Area												
						AP	Po	DA	Me	WI	AbAl	AcAl	AP	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	WO
Smilax china	金剛藤	Climber	Native	Very common	-													S						o
Solanum americanum	少花龍葵	Herb	Exotic	-	-					O			S		S			S	S				O	
Solanum torvum	水茄	Shrub	Exotic	Common	-					S		S	S		S								O	
Soliva anthemifolia	裸柱菊，座地菊	Herb	Exotic	Restricted	-																		S	
Sonchus arvensis	苣荬菜	Herb	Native	Very common	-										S									
Sonchus oleraceus	苦苣菜	Herb	Exotic	Very common	-					S			S										O	
Sonneratia sp.	海桑屬	Tree	Exotic	-	-				O				S	C			O							
Spathodea campanulata	火焰樹	Tree	Exotic	-	-										O									
Spermacoce remota	光葉豐花草	Herb	-	-	-			S		S		S	S		O								O	
Spermacoce sp.	豐花草屬	Herb	-	-	-					S														
Sporobolus fertilis	鼠尾粟	Herb	Native	Very common	-					S			S		S				O				S	
Stephania longa	糞箕篤	Climber	Native	Common	-					S					S				S					S
Sterculia lanceolata	假蘋婆	Tree	Native	Very common	-										S									O
Stromanthe sanguinea	紫背竹芋	Herb	Exotic	-	-							S												
Strophanthus divaricatus	羊角拗	Climber	Native	Common	-																			o
Syagrus romanzoffiana	皇后葵	Tree	Exotic	-	-										S									
Synedrella nodiflora	金腰箭	Herb	Exotic	Very common	-					O														
Syngonium podophyllum	合果芋	Herb	Exotic	-	-										S				S					
Syzygium jambos	蒲桃	Tree	Exotic	Common	-										S				S					
Syzygium myrtifolium	長紅木	Shrub	-	-														S						

Scientific name	Chinese name	Growth form	Origin	Rarity in HK [1]	Protection/Conservation status [2 3 4 5 6]	Application Site					Study Area													
						AP	Po	DA	Me	WI	AbAl	AcAl	AP	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	WO
Tabernaemontana divaricata	狗牙花	Shrub	Exotic	-	-													S						
Tadehagi triquetrum	葫蘆茶	Shrub	Native	Very common	-											S								
Terminalia catappa	欖仁樹	Tree	Exotic	Very rare	-										S									
Terminalia mantaly	小葉欖仁	Tree	Exotic	-	-													S						
Tetradium glabrifolium	楝葉吳茱萸	Tree	Native	Common	-																			s
Thevetia peruviana	黃花夾竹桃	Shrub	Exotic	-	-										S									
Thysanolaena latifolia	粽葉蘆	Herb	Native	Common	-								S											
Tinospora sinensis	中華青牛膽	Climber	Native	Common	-																			S
Torenia fournieri	藍豬耳	Herb	Exotic	-	-								S											
Toxocarpus wightianus	弓果藤	Climber	Native	Very common	-																			O
Trema tomentosa	山黃麻	Shrub	Native	Common	-														S				S	
Tridax procumbens	羽芒菊	Herb	Exotic	Very common	-			S					S	S	S				C				S	
Trigonotis peduncularis	附地菜	Herb	-	-	-																		S	
Typha angustifolia	水燭	Herb	Exotic	Rare	-								C											
Urena lobata	肖梵天花	Herb	Native	Common	-					S					S								O	
Urena procumbens	梵天花	Shrub	Native	Common	-																			S
Verbena officinalis	馬鞭草	Herb	Native	Restricted	-							S							O					
Vernonia cinerea	夜香牛	Herb	Native	Very common	-					S					S								S	
Wedelia trilobata	三裂葉蟛蜞菊	Herb	Exotic	Common	-	S	C			O	C	S	C	C	O	S		S	C				C	S
Youngia japonica	黃鵪菜	Herb	Native	Very common	-										O				S		S			

Scientific name	Chinese name	Growth form	Origin	Rarity in HK [1]	Protection/Conservation status [2 3 4 5 6]	Application Site					Study Area													
						AP	Po	DA	Me	WI	AbAl	AcAl	AP	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	WO
Zanthoxylum nitidum	兩面針	Climber	Native	Very common	-														S					S
Zanthoxylum piperitum	胡椒木	Shrub	Exotic	-	-													S						
Zanthoxylum scandens	花椒簕	Climber	Native	Common	-																			o
Zingiber officinale	薑	Herb	Exotic	-	-							S												
Total species number						10	16	11	8	90	43	89	109	40	203	51	17	60	125	36	10	3	98	74

Notes:

1. Corlett *et al*. (2000). Hong Kong vascular plants: distribution and status.
2. International Union of Conservation for Nature. (2019). The IUCN Red List of Threatened Species. Version 2019-2.
3. Qin *et al*. (2017). Threatened Species List of China's Higher Plants.
4. Fu & Chin (1992). China Plant Red Data Book – Rare and Endangered Plants.
5. State Forestry Administration & Ministry of Agriculture. (1999). List of Wild Plants under State Protection (Part 1).
6. Cap. 96 Forests and Countryside Ordinance.

- **Species in bold are considered of conservation importance.**
- *Coccinia grandis* and *Rhododendron* spp. are cultivated therefore not considered species of conservation importance, despite being considered very rare by Corlett et al. (2000) or listed under Cap. 96 Forests and Countryside Ordinance.
- *Araucaria heterophylla, Casuarina equisetifolia, Dimocarpus longan, Lagerstroemia speciosa, Litchi chinensis, Michelia* x *alba, Mimosa diplotricha, Ocimum basilicum, Phytolacca acinosa, Terminalia catappa , Typha angustifolia* are exotic to Hong Kong and not considered of conservation importance, despite being considered rare/ very rare by Corlett et al. (2000), listed as Vulnerable by IUCN (2019), listed as endangered/ vulnerable in Threatened Species List of China's Higher Plants, listed as vulnerable in China Plant Red Data Book, listed under Category II in the List of Wild Plants under State Protection (Part 1), and/ or listed under Cap. 96 Forests and Countryside Ordinance.

Abbreviations:

- Habitats: AbAl: abandoned agricultural land; AcAl: active agricultural land; AP: abandoned pond; Ch: channel; DA: developed area; G/S: grassland/shrubland; Me: meander; MW: mitigation wetland; PI: plantation; Po: pond; Re: Reedbed; TM: Tidal marsh; WI: wasteland; Wo: woodland; Relative abundance: C = Common; O = Occasional; S = Scarce

Appendix B Mammal Species Recorded within the Study Area

Common Names	Scientific Names	Rarity (AFCD Assessment), Distribution in Hong Kong	Conservation status	Application Site	Study Area *(excluding Application Site)*			
				WI	AP	Ch	DA	WI
Domestic Dog	*Canis lupus familiaris*	Common, Widely distributed in forested areas throughout Hong Kong.	-				5	
Domestic Cat	*Felis catus*	Uncommon, Widely distributed in urban and forested areas throughout Hong Kong.	-				6	
Japanese Pipistrelle	***Pipistrellus abramus***	**Very Common, Widely distributed throughout Hong Kong.**	**(Cap. 170)**	**5**	**8**	**5**	**4**	**5**
Small Asian Mongoose	***Herpestes javanicus***	**Uncommon, Found in N.T. countryside area**	**(Cap. 170); Red List of China's Vertebrate: (Vulnerable)**		**1**			
Total				5	9	5	15	5

Notes:

1. AFCD (2020). Hong Kong Biodiversity Database.
2. Cap. 170 Wild Animals Protection Ordinance.

Abbreviations:

- Habitats: AbAl : abandoned agricultural land; AcAl: active agricultural land; AP: abandoned pond; Ch: channel; DA: developed area; G/S: grassland/shrubland; Me: meander; MW: mitigation wetland; Pl: plantation; Po: pond; Re: Reedbed; TM: Tidal marsh; Wl: wasteland; Wo: woodland; Relative abundance: C = Common; O = Occasional; S = Scarce

Appendix C Bird Species Recorded within the Study Area

Remarks: all wild bird species are protected under Cap. 170 Wild Animals Protection Ordinance in Hong Kong[2]

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*												
				AP	Po	DA	Me	WI	Ab AI	AP	Ac AI	Ch	D A	G/ S	M e	M W	PI	Po	Re	T M	WI	W o
Asian Barred Owlet	***Glaucidium cuculoides***	**Uncommon resident. Widely distributed in woodland throughout Hong Kong.**	**Class 2 Protected Animal of China; Appendix 2 of CITES**					1													**1**	
Black Kite	***Milvus migrans***	**Common resident and winter visitor. Widely distributed in Hong Kong.**	**Fellowes et al. (2002): (RC); Appendix 2 of CITES**		4			1				**2**	**1**	**2**		**1**	**9**	**1**			**1**	3
Black-crowned Night Heron	***Nycticorax nycticorax***	**Common resident and winter visitor. Widely distributed in Hong Kong.**	**Fellowes et al. (2002): (LC)**							**3**					**3**	**3**						
Black-faced Spoonbill	***Platalea minor***	**Common winter visitor. Found in Deep Bay area.**	**Class 2 Protected Animal of China;China Red Data Book Status: (Endangered);Fellowes et al. (2002): PGC;**									**1**										

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*													
				AP	Po	DA	Me	WI	Ab AI	AP	Ac AI	Ch	D A	G/ S	M e	M W	PI	Po	Re	T M	WI	W o
			IUCN Red List Status: EN																			
Black-winged Kite	***Elanus caeruleus***	**Occasional visitor. Found in Ha Tsuen, Deep Bay area.**	**China Red Data Book Status: (Vulnerable);Fellowes et al. (2002): LC; Appendix 2 of CITES**															**1**				
Black-winged Stilt	***Himantopus himantopus***	**Common passage migrant. Found in Deep Bay area, Long Valley, Kam Tin.**	**Fellowes et al. (2002): RC**							**3**		**146**										
Bluethroat	***Luscinia svecica***	**Common passage migrant and winter visitor. Widely distributed in wet agricultural areas throughout Hong Kong.**	**Fellowes et al. (2002): LC**														**1**					
Chinese Pond Heron	***Ardeola bacchus***	**Common resident. Common resident. Widely distributed in Hong Kong.**	**Fellowes et al. (2002): PRC,(RC)**		**3**		**1**	**4**	**2**	**1**		**76**	**5**		**2**		**2**	**9**	**1**	**1**	**4**	
Collared Crow	***Corvus torquatus***	**Uncommon resident. Found in Inner Deep Bay area, Nam Chung, Kei Ling Ha, Tai Mei Tuk, Pok Fu Lam, Chek lap Kok, Shuen Wan, Lam Tsuen.**	**Fellowes et al. (2002): LC; IUCN Red List Status: Vulnerable**										**5**				**2**		**1**	**1**		
Collared Scops Owl	***Otus lettia***	**Common resident. Widely distributed in shrubland throughout Hong Kong.**	**Class 2 Protected**																			1

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*												
				AP	Po	DA	Me	WI	Ab AI	AP	Ac AI	Ch	D A	G/ S	M e	M W	PI	Po	Re	T M	WI	W o
			Animal of China; Appendix 2 of CITES																			
Common Greenshank	***Tringa nebularia***	**Abundant passage migrant and winter visitor. Found in Deep Bay area.**	**Fellowes et al. (2002): RC**									**35**										
Common Redshank	***Tringa totanus***	**Common passage migrant. Found in Deep Bay area.**	**Fellowes et al. (2002): RC**									**16**										
Crested Serpent Eagle	***Spilornis cheela***	**Uncommon resident. Widely distributed in shrublands on hillsides throughout Hong Kong.**	**China Red Data Book Status: (Vulnerable);Fellowes et al. (2002): (LC); Appendix 2 of CITES**											**1**								
Eastern Buzzard	***Buteo japonicus***	**Common winter visitor. Widely distributed in Hong Kong.**	**Appendix 2 of CITES**					1								**1**					**1**	
Eurasian Teal	***Anas crecca***	**Common winter visitor. Found in Deep Bay area, Shuen Wan, Tai Lam Chung Reservoir, Victoria Harbour, Urban Park.**	**Fellowes et al. (2002): RC**									**17**			**2**							
Great Cormorant	***Phalacrocorax carbo***	**Common winter visitor. Widely distributed in coastal areas throughout Hong Kong.**	**Fellowes et al. (2002): PRC**		**11**					**200**		**21**				**2**		**8**	**9**			

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*												
				AP	Po	DA	Me	WI	Ab AI	AP	Ac AI	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	Wo
Great Egret	***Ardea alba***	**Common resident and winter visitor. Widely distributed in Hong Kong.**	**Fellowes et al. (2002): PRC,(RC)**							**1**		**28**			**4**	**1**		**2**	**4**	**1**		
Greater Coucal	***Centropus sinensis***	**Common resident. Widely distributed in Hong Kong.**	**Class 2 Protected Animal of China;China Red Data Book Status: (Vulnerable)**							**1**			**1**		**2**	**2**	**1**		**1**	**1**		
Grey Heron	***Ardea cinerea***	**Common winter visitor. Found in Deep Bay area, Starling Inlet, Kowloon Park, Cape D'Aguilar.**	**Fellowes et al. (2002): PRC**		1			1				**82**	**2**			**13**		**5**	**1**		**1**	
Grey-headed Lapwing	***Vanellus cinereus***	**Scarce winter visitor. Found in Kam Tin, Tsim Bei Tsui, Lo Wu, Tai Long Wan, Shuen Wan, Castle Peak coast, Chek Lap Kok**	**Fellowes et al. (2002): LC**									**13**										
Intermediate Egret	***Egretta intermedia***	**Common passage migrant. Found in Deep Bay area, Tai Long Wan, Starling Inlet, Tai O, Cape D'Aguilar.**	**Fellowes et al. (2002): RC**																**1**			
Little Egret	***Egretta garzetta***	**Common resident. Widely distributed in coastal area throughout Hong Kong.**	**Fellowes et al. (2002): PRC,(RC)**		**4**			**4**	**6**	**3**	**1**	**119**	**8**		**5**	**2**	**7**	**16**	**4**	**2**	**4**	
Little Grebe	***Tachybaptus ruficollis***	**Common resident. Found in Deep Bay area.**	**Fellowes et al. (2002): LC**							**1**		**1**						**11**				

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*												
				AP	Po	DA	Me	WI	Ab AI	AP	Ac AI	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	Wo
Little Ringed Plover	***Charadrius dubius***	**Common winter visitor and passage migrant. Widely distributed in freshwater areas throughout Hong Kong.**	**Fellowes et al. (2002): (LC)**									**4**										
Marsh Sandpiper	***Tringa stagnatilis***	**Common winter visitor and passage migrant. Found in Deep Bay area, Shuen Wan, Long Valley, Kam Tin, Sai Kung.**	**Fellowes et al. (2002): RC**									**25**										
Northern Shoveler	***Anas clypeata***	**Abundant winter visitor. Found in Deep Bay area.**	**Fellowes et al. (2002): RC**									**333**										
Pied Avocet	***Recurvirostra avosetta***	**Abundant winter visitor. Found in Deep Bay area.**	**Fellowes et al. (2002): RC**									**199**										
Pied Kingfisher	***Ceryle rudis***	**Uncommon resident. Widely distributed in lakes and ponds throughout Hong Kong.**	**Fellowes et al. (2002): (LC)**									**2**				**1**		**1**				
Purple Heron	***Ardea purpurea***	**Uncommon passage migrant. Found in Deep Bay area.**	**Fellowes et al. (2002): RC**							**1**						**1**						
Spotted Redshank	***Tringa erythropus***	**Abundant in winter and spring. Found in Deep Bay area.**	**Fellowes et al. (2002): RC**									**6**										
White-shouldered Starling	***Sturnia sinensis***	**Common passage migrant. Found in Kam Tin, Deep Bay area, Po Toi Island, Long Valley, Victoria Park, Ho Chung, Ma Tso Lung, Mui Wo, Lam Tsuen Valley.**	**Fellowes et al. (2002): (LC)**			6		4					**3**	**5**							**4**	

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*												
				AP	Po	DA	Me	WI	Ab Al	AP	Ac Al	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	Wo
White-throated Kingfisher	***Halcyon smyrnensis***	**Common resident. Widely distributed in coastal areas throughout Hong Kong**	**Fellowes et al. (2002): (LC)**									**1**	**1**	**1**	**1**				**1**			
Wood Sandpiper	***Tringa glareola***	**Common passage migrant and winter visitor. Widely distributed in wetland area throughout Hong Kong.**	**Fellowes et al. (2002): LC**									**65**										
Yellow Bittern	***Ixobrychus sinensis***	**Uncommon summer visitor and passage migrant. Found in Deep Bay area, Chek Keng, Tai Long Wan.**	**Fellowes et al. (2002): (LC)**		2										**1**			**1**				
Zitting Cisticola	***Cisticola juncidis***	**Common passage migrant and winter visitor. Widely distributed in grassland throughout Hong Kong.**	**Fellowes et al. (2002): LC**							**1**												
Asian Brown Flycatcher	*Muscicapa latirostris*	Common passage migrant and winter visitor. Widely distributed in Hong Kong.	-														1					
Asian Koel	*Eudynamys scolopaceus*	Common resident. Widely distributed in Hong Kong.	-		1								1		2	1	6					
Azure-winged Magpie	*Cyanopica cyanus*	Introduced resident. Found in Mai Po.	-										7									
Barn Swallow	*Hirundo rustica*	Abundant passage migrant and summer visitor. Widely distributed in Hong Kong.	-	2	4	1	1	11				1	42	16			8	3	5	5	11	
Black Drongo	*Dicrurus macrocercus*	Common summer visitor. Widely distributed in open area throughout Hong Kong.	-		4			1					5	2		1	3				1	1
Black-collared Starling	*Gracupica nigricollis*	Common resident. Widely distributed in Hong Kong.	-		4		1	19	2		1	11	38	18		5	44	6			19	5

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*													
				AP	Po	DA	Me	WI	Ab AI	AP	Ac AI	Ch	D A	G/ S	M e	M W	PI	Po	Re	T M	WI	W o
Black-throated Laughingthrush	*Garrulax chinensis*	Common resident. Widely distributed in woodland and shrubland throughout Hong Kong	-														2					
Black-winged Cuckooshrike	*Coracina melaschistos*	Scarce passage migrant and winter visitor. Widely distributed in woodland throughout Hong Kong.	-											2								
Blue Whistling Thrush	*Myophonus caeruleus*	Common resident. Widely distributed in shrubland and woodland throughout Hong Kong.	-											1								1
Brown Shrike	*Lanius cristatus*	Common passage migrant. Widely distributed in open areas throughout Hong Kong.	-									1		1								
Chinese Blackbird	*Turdus mandarinus*	Common winter visitor. Widely distributed in Hong Kong.	-														2					
Chinese Bulbul	*Pycnonotus sinensis*	Abundant resident. Widely distributed in Hong Kong.	-	2	6	18	3	6	5		8	4	70	15		7	64	4	17	1	6	13
Cinereous Tit	*Parus cinereus*	Common resident. Widely distributed in Hong Kong.	-		1		1		1		1		20	6		4	37	1				7
Common Kingfisher	*Alcedo atthis*	Common passage migrant and winter visitor. Widely distributed in wetland habitat throughout Hong Kong.	-		2		1		1			6			1			6	1			
Common Moorhen	*Gallinula chloropus*	Common resident. Found in Deep Bay area, Shuen Wan, Starling Inlet.	-		1							1										

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*													
				AP	Po	DA	Me	WI	Ab AI	AP	Ac AI	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	Wo
Common Myna	*Acridotheres tristis*	Uncommon resident. Found in Mai Po, Sheung Uk Tsuen, Sheung Shui, Kam Tin, Shek Kong, Ping Shan, Mong Tseng.	-			2							18									
Common Sandpiper	*Actitis hypoleucos*	Common passage migrant and winter visitor. Widely distributed in wetland area throughout Hong Kong.	-									26			1							
Common Snipe	*Gallinago gallinago*	Common passage migrant and winter visitor. Found in Long Valley, Chau Tau, Sai Kung.	-																	2		
Common Tailorbird	*Orthotomus sutorius*	Common resident. Widely distributed in Hong Kong.	-		4		1	5	5	2	1	4	33	14	4	1	38	3	12		5	1
Crested Myna	*Acridotheres cristatellus*	Common resident. Widely distributed in Hong Kong.	-		9	1	11	20				23	80	35	4	8	74	6	11		20	3
Daurian Redstart	*Phoenicurus auroreus*	Common winter visitor. Widely distributed in Hong Kong.	-		1			2	1		1	3	4	1		2	11		2		2	
Dusky Warbler	*Phylloscopus fuscatus*	Common passage migrant and winter visitor. Widely distributed in shrubland and waterside vegetation throughout Hong Kong.	-		2			4	2			10	8	2	6	3	8	1	6	2	4	
Eastern Yellow Wagtail	*Motacilla tschutschensis*	Common passage migrant and winter visitor. Widely distributed in agricultural fields and marsh edges throughout Hong Kong.	-														1					
Eurasian Collared Dove	*Streptopelia decaocto*	Found in Mai Po, Tsim Bei Tsui, Fung Lok Wai.	-		2			2					2	1					1		2	

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*												
				AP	Po	DA	Me	WI	Ab AI	AP	Ac AI	Ch	D A	G/ S	M e	M W	PI	Po	Re	T M	WI	W o
Eurasian Magpie	*Pica pica*	Common resident. Widely distributed in Hong Kong	-			1							1			1	4					2
Eurasian Tree Sparrow	*Passer montanus*	Abundant resident. Widely distributed in Hong Kong.	-			15	3					1	129	40			30	1				2
Fork-tailed Sunbird	*Aethopyga christinae*	Common resident. Widely distributed in Hong Kong.	-						1				2				3					
Garganey	*Anas querquedula*	Common passage migrant. Found in Deep Bay area, Long Valley, Kam Tin.	-									2										
Grey Wagtail	*Motacilla cinerea*	Common passage migrant and winter visitor. Widely distributed in hill streams throughout Hong Kong.	-				1					4	2									
Hair-crested Drongo	*Dicrurus hottentottus*	Common passage migrant and summer visitor. Widely distributed in wooded area throughout Hong Kong.	-											7								
House Swift	*Apus nipalensis*	Abundant spring migrant and locally common resident. Widely distributed in Hong Kong.	-					1				1	21	1		7	4				1	1
Japanese White-eye	*Zosterops japonicus*	Abundant resident. Widely distributed in Hong Kong.	-	4	16		7		7		9	8	127	69		13	151	7	9			8
Large Hawk Cuckoo	*Hierococcyx sparverioides*	Common passage migrant and summer visitor. Widely distributed in woodland throughout in Hong Kong.	-																			1
Large-billed Crow	*Corvus macrorhynchos*	Common resident. Widely distributed in Hong Kong	-		1	1		2				2	4	5							2	1

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*													
				AP	Po	DA	Me	WI	Ab AI	AP	Ac AI	Ch	D A	G/ S	M e	M W	PI	Po	Re	T M	WI	W o
Little Bunting	*Emberiza pusilla*	Common passage migrant and winter visitor. Widely distributed in open area throughout Hong Kong.	-		1																	
Long-tailed Shrike	*Lanius schach*	Common resident. Widely distributed in open areas throughout Hong Kong.	-		2			5	1		1		4	1		7			1		5	
Masked Laughingthrush	*Garrulax perspicillatus*	Abundant resident. Widely distributed in shrubland throughout Hong Kong.	-			1	4		3		5	6	10	27		3	36	1	2			3
Olive-backed Pipit	*Anthus godlewskii*	Common passage migrant and winter visitor. Widely distributed in Hong Kong.	-					1									7				1	
Oriental Magpie Robin	*Copsychus saularis*	Abundant resident. Widely distributed in Hong Kong.	-		1	3	2		2		1	9	29	9	2	1	22		2	2		2
Pallas's Leaf Warbler	*Phylloscopus proregulus*	Common winter visitor. Found in woodland throughout Hong Kong.	-									1	3	1			6					
Pintail Snipe	*Gallinago stenura*	Common passage migrant. Found in Long Valley, Chau Tau, Ha Tsuen.	-														1					
Plain Prinia	*Prinia inornata*	Common resident. Widely distributed in grassland throughout Hong Kong.	-		3		2	3	2	2	1	15	2	1		5	3	1	7	3	3	
Plaintive Cuckoo	*Cacomantis merulinus*	Uncommon summer visitor. Widely distributed in open area throughout Hong Kong.	-						1					1		1						
Red Turtle Dove	*Streptopelia tranquebarica*	Uncommon passage migrant. Found in Deep Bay area, Cheung Chau, Po Toi, Lantau Island, Hong Kong Island.	-					1													1	

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*												
				AP	Po	DA	Me	WI	Ab Al	AP	Ac Al	Ch	D A	G/ S	M e	M W	Pl	Po	Re	T M	WI	W o
Red-billed Blue Magpie	*Urocissa erythroryncha*	Common resident. Widely distributed in woodland edges throught Hong Kong	-						1			1					4					
Red-whiskered Bulbul	*Pycnonotus jocosus*	Abundant resident. Widely distributed in Hong Kong.	-	2	14	30	4	4	26		6	4	139	105	5	7	104	5	14	2	4	15
Savanna Nightjar	*Caprimulgus affinis*	Uncommon resident and passage migrant. Widely distributed in Hong Kong.	-										3									
Scaly-breasted Munia	*Lonchura punctulata*	Common resident. Widely distributed in Hong Kong	-		4	3		39				18	22	17		1	18		10		39	
Scarlet Minivet	*Pericrocotus speciosus*	Common resident. Found in Tai Po Kau, the Peak, Lam Tsuen, Cape D'Aguilar Road, Peel Rise, Shing Mun.	-						1								2					
Scarlet-backed Flowerpecker	*Dicaeum cruentatum*	Common resident. Widely distributed in wooded area throughout Hong Kong.	-														3					
Spotted Dove	*Spilopelia chinensis*	Abundant resident. Widely distributed in Hong Kong.	-		3	10	3	17	1	1	1	1	63	37		8	21	3	10		17	10
Stejneger's Stonechat	*Saxicola stejnegeri*	Common passage migrant and winter visitor. Widely distributed in open cultivated fields throughout Hong Kong.	-		1								1						1			
White Wagtail	*Motacilla alba*	Common passage migrant and winter visitor. Widely distributed in Hong Kong.	-		1	3			3			24	7	3			12	2	1	3		2
White-breasted Waterhen	*Amaurornis phoenicurus*	Common resident. Widely distributed in wetland throughout Hong Kong.	-		2		3					7	1		1	1	2		1			
Yellow-bellied Prinia	*Prinia flaviventris*	Common resident. Widely distributed in Hong Kong.	-		4		10	23	4		5	14	33	22		17	23	1	17	1	23	5

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*												
				AP	Po	DA	Me	WI	Ab Al	AP	Ac Al	Ch	D A	G/ S	M e	M W	Pl	Po	Re	T M	WI	W o
Yellow-browed Warbler	*Phylloscopus inornatus*	Common winter visitor. Found in woodland throughout Hong Kong.	-									8	16	5		2	26					2
Total				10	119	95	59	182	78	220	42	1408	973	474	46	133	803	106	153	27	182	89

Notes

1. AFCD (2020). Hong Kong Biodiversity Database.
2. Cap. 170 Wild Animals Protection Ordinance.
3. Cap. 586 Protection of Endangered Species of Animals and Plants Ordinance.
4. Convention on International Trade in Endangered Species of Wild Flora and Fauna (2019). Appendices I, II and III.
5. Fellowes *et al*. (2002). Wild animals to watch: Terrestrial and freshwater fauna of conservation concern in Hong Kong.
    - For conservation status listed by Fellowes *et al*. (2002), letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.
6. International Union of Conservation for Nature. (2019). The IUCN Red List of Threatened Species. Version 2020-1.
7. Jiang, Z. G., Jiang, J. P., Wang, Y. Z., Zhang, E., Zhang, Y. Y., Li, L. L., ... & Dong, L. (2016). Red list of China's vertebrates
8. List of State Protected Wild Animals, promulgated by the State Council
9. Zheng and Wang (1998). China Red Data Book of Endangered Animals: Aves.

Abbreviations:

- Conservation Status in Fellowes *et al.* (2002): LC = Local Concern; PRC = Potential Regional Concern; RC = Regional Concern
- Habitats: AbAl : abandoned agricultural land; AcAl: active agricultural land; AP: abandoned pond; Ch: channel; DA: developed area; G/S: grassland/shrubland; Me: meander; MW: mitigation wetland; Pl: plantation; Po: pond; Re: Reedbed; TM: Tidal marsh; Wl: wasteland; Wo: woodland; Relative abundance: C = Common; O = Occasional; S = Scarce

Appendix D Reptile Species Recorded within the Study Area

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Study Area			
				AbAl	DA	G/S	PI
Changeable Lizard	*Calotes versicolor*	Widely distributed throughout Hong Kong.	-		1	1	
Four-clawed Gecko	*Gehyra mutilata*	Widely but thinly distributed throughout Hong Kong.	-		1		
Chinese Gecko	*Gekko chinensis*	Widely distributed throughout Hong Kong.	-				1
Bowring's Gecko	*Hemidactylus bowringii*	Distributed throughout Hong Kong.	-		22		1
Long-tailed Skink	*Eutropis longicaudata*	Widely distributed throughout Hong Kong.	-		2		
Chinese Skink	*Plestiodon chinensis*	Widely distributed throughout Hong Kong.	-	1			
Total				1	26	1	2

Notes:

1. AFCD (2020). Hong Kong Biodiversity Database.
2. Cap. 586 Protection of Endangered Species of Animals and Plants Ordinance.
3. Convention on International Trade in Endangered Species of Wild Flora and Fauna (2019). Appendices I, II and III.
4. Fellowes *et al*. (2002). Wild animals to watch: Terrestrial and freshwater fauna of conservation concern in Hong Kong.
    - For conservation status listed by Fellowes *et al*. (2002), letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.
5. Jiang, Z. G., Jiang, J. P., Wang, Y. Z., Zhang, E., Zhang, Y. Y., Li, L. L., ... & Dong, L. (2016). Red list of China's vertebrates
6. Zhao, E. (1998). China red data book of endangered animals: Amphibia and Reptilia.

Abbreviations:

- Habitats: AbAl : abandoned agricultural land; AcAl: active agricultural land; AP: abandoned pond; Ch: channel; DA: developed area; G/S: grassland/shrubland; Me: meander; MW: mitigation wetland; PI: plantation; Po: pond; Re: Reedbed; TM: Tidal marsh; Wl: wasteland; Wo: woodland; Relative abundance: C = Common; O = Occasional; S = Scarce

Appendix E Amphibian Species Recorded within the Study Area

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Study Area						
				AP	Ch	DA	MW	PI	Po	WI
Asian Common Toad	*Duttaphrynus melanostictus*	Widely distributed in Hong Kong.	-			27	1	2		2
Asiatic Painted Frog	*Kaloula pulchra*	Widely distributed in Hong Kong.	-			6				1
Paddy Frog	*Fejervarya limnocharis*	Widely distributed in Hong Kong.	-			1	2			
Gunther's Frog	*Hylarana guentheri*	Widely distributed throughout Hong Kong.	-				3			1
Brown Tree Frog	*Polypedates megacephalus*	Widely distributed throughout Hong Kong.	-	5	1	3	4	1	3	
Greenhouse frog	*Eleutherodactylus planirostris*	-	Exotic			4	3			
				5	1	41	13	3	3	4

Notes:

1. AFCD (2020). Hong Kong Biodiversity Database.
2. Fellowes *et al*. (2002). Wild animals to watch: Terrestrial and freshwater fauna of conservation concern in Hong Kong.
    - For conservation status listed by Fellowes *et al*. (2002), letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence.
3. Jiang, Z. G., Jiang, J. P., Wang, Y. Z., Zhang, E., Zhang, Y. Y., Li, L. L., ... & Dong, L. (2016). Red list of China's vertebrates
4. List of State Protected Wild Animals, promulgated by the State Council

Abbreviations:

- Habitats: AbAl : abandoned agricultural land; AcAl: active agricultural land; AP: abandoned pond; Ch: channel; DA: developed area; G/S: grassland/shrubland; Me: meander; MW: mitigation wetland; PI: plantation; Po: pond; Re: Reedbed; TM: Tidal marsh; WI: wasteland; Wo: woodland; Relative abundance: C = Common; O = Occasional; S = Scarce

Appendix F Butterfly Species Recorded within the Study Area

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*												
				AP	Po	DA	Me	WI	AbAI	AP	AcAI	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	Wo
Common Awl	***Hasora badra***	**Very Rare. Wu Kau Tan, Lai Chi Wo, Hong Kong Wetland Park**	**Fellowes et al. (2002): LC**														1					
Swallowtail	***Papilio xuthus***	**Rare. Kap Lung, Ma On Shan, Tai Tam, Sha Lo Wan, Kat O, Lung Kwu Tan, Wu Kau Tang, Lung Kwu Chau**	**-**																		1	
Danaid Eggfly	***Hypolimnas misippus***	**Uncommon. Ngau Ngak Shan, Lung Kwu Tan, Hong Kong Wetland Park, Mount Parker, Cloudy Hill, Lin Ma Hang**	**Fellowes et al. (2002): LC**										1									
Metallic Cerulean	***Jamides alecto***	**Very Rare. Victoria Peak, Fung Yuen, Chuen Lung, Mui Wo**	**-**																			1
Common Hedge Blue	*Acytolepis puspa*	Common. Widely distributed throughout Hong Kong	-										1									1
Angled Castor	*Ariadne ariadne*	Common. Widely distributed throughout Hong Kong	-	1	1	1			2	2			3	1		1	1				4	
Formosan Swift	*Borbo cinnara*	Common. Widely distributed in open grassland and abandoned field throughout Hong Kong	-																	1		
Lemon Emigrant	*Catopsilia pomona*	Common. Widely distributed throughout Hong Kong	-										8	1			4					1
Common Mime	*Chilasa clytia*	Common. Widely distributed throughout Hong Kong	-					1						1		1						
Rustic	*Cupha erymanthis*	Very Common. Widely distributed throughout Hong Kong	-										1									
Common Mapwing	*Cyrestis thyodamas*	Common. Widely distributed in woodland area throughout Hong Kong	-														1					

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*												
				AP	Po	DA	Me	WI	AbAl	AP	AcAl	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	Wo
Plain Tiger	*Danaus chrysippus*	Uncommon. Lung Kwu Tan, Tong Fuk, Tai Ho, Tung Chung, Pak Tam Chung	-						1				2					1			1	
Common Tiger	*Danaus genutia*	Common. Widely distributed throughout Hong Kong	-														2				1	
Red-base Jezebel	*Delias pasithoe*	Very Common. Widely distributed throughout Hong Kong	-														4					
Common Indian Crow	*Euploea core*	Common. Widely distributed throughout Hong Kong	-										1	3		1	2	1				
Common Grass Yellow	*Eurema hecabe*	Very Common. Widely distributed throughout Hong Kong	-			4		8	2		1	1	9	1		1	4				8	1
White-edged Blue Baron	*Euthalia phemius*	Common. Widely distributed in woodland and agricultural field throughout Hong Kong	-										1	1								
Large Faun	*Faunis eumeus*	Common. Widely distributed in woodland throughout Hong Kong.	-														2					
Common Jay	*Graphium doson*	Common. Widely distributed throughout Hong Kong	-											1							3	
Common Bluebottle	*Graphium sarpedon*	Very Common. Widely distributed throughout Hong Kong	-									1	2									
Great Orange Tip	*Hebomoia glaucippe*	Common. Widely distributed throughout Hong Kong	-										1									
Purple Sapphire	*Heliophorus epicles*	Common. Widely distributed throughout Hong Kong	-																		1	
Red Ring Skirt	*Hestina assimilis*	Common. Widely distributed in woodland throughout Hong Kong.	-														1					

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*												
				AP	Po	DA	Me	WI	AbAl	AP	AcAl	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	Wo
Great Egg-fly	*Hypolimnas bolina*	Common. Widely distributed throughout Hong Kong	-		1	2	2	1	1	1	1		13	2	2	3	11				2	2
Ceylon Blue Glassy Tiger	*Ideopsis similis*	Very Common. Widely distributed throughout Hong Kong	-														1					
Grey Pansy	*Junonia atlites*	Common. Widely distributed in abandoned grassland and abandoned agricultural field throughout Hong Kong	-										1			1						
Long-tailed Blue	*Lampides boeticus*	Common. Widely distributed in abandoned field throughout Hong Kong	-														1				1	
Banded Tree Brown	*Lethe confusa*	Common. Widely distributed in woodland throughout Hong Kong	-										1									
Dark Evening Brown	*Melanitis phedima*	Uncommon. Widely distributed in woodland throughout Hong Kong	-																		4	
Dark Brand Bush Brown	*Mycalesis mineus*	Very Common. Widely distributed throughout Hong Kong	-			4		1					11	5		3	10				2	1
South China Bush Brown	*Mycalesis zonata*	Common. Widely distributed in woodland throughout Hong Kong	-										1									
Quaker	*Neopithecops zalmora*	Uncommon. Shek Mun Kap, Fan Lau, Tung Chung, Fung Yuen, Wu Kau Tang, Pak Tam Chung	-																			3
Common Sailer	*Neptis hylas*	Very Common. Widely distributed throughout Hong Kong	-										2								2	
Lime Butterfly	*Papilio demoleus*	Common. Widely distributed throughout Hong Kong	-											1			2					

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*													
				AP	Po	DA	Me	WI	AbAl	AP	AcAl	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	Wo
Red Helen	*Papilio helenus*	Very Common. Widely distributed throughout Hong Kong	-										1			1						
Great Mormon	*Papilio memnon*	Very Common. Widely distributed throughout Hong Kong	-						2		1		1	2			2					1
Paris Peacock	*Papilio paris*	Very Common. Widely distributed throughout Hong Kong	-										1	1								
Common Mormon	*Papilio polytes*	Very Common. Widely distributed throughout Hong Kong	-			4	2	2	2		1		17	6	2	2	17	2	1		2	6
Spangle	*Papilio protenor*	Very Common. Widely distributed throughout Hong Kong	-										6				3				1	1
Common Straight Swift	*Parnara guttata*	Common. Widely distributed in grassland throughout Hong Kong	-																	1		
Indian Cabbage White	Pieris canidia	Very Common. Widely distributed throughout Hong Kong	-			2	3	8	7		2	4	28	14	3	5	24		1		4	1
Pale Grass Blue	Pseudozizeeria maha	Very Common. Widely distributed throughout Hong Kong	-			4		3				3	49	2			24				9	5
Black Prince	Rohana parisatis	Common. Widely distributed throughout the woodland in Hong Kong	-			1							1									
Common Five-ring	Ypthima baldus	Very Common. Widely distributed in grassland throughout Hong Kong	-			1							2									1
Lesser Grass Blue	Zizina otis	Common. Widely distributed throughout Hong Kong	-										1				6					
Total				1	2	23	7	24	17	3	6	9	166	42	7	19	123	4	2	2	46	25

Notes:

1. AFCD (2020). Hong Kong Biodiversity Database.

Abbreviations:

- Conservation Status in Fellowes *et al.* (2002): LC = Local Concern
- Habitats: AbAl : abandoned agricultural land; AcAl: active agricultural land; AP: abandoned pond; Ch: channel; DA: developed area; G/S: grassland/shrubland; Me: meander; MW: mitigation wetland; Pl: plantation; Po: pond; Re: Reedbed; TM: Tidal marsh; Wl: wasteland; Wo: woodland; Relative abundance: C = Common; O = Occasional; S = Scarce

Appendix G Odonate Species Recorded within the Study Area

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*												
				AP	Po	DA	Me	WI	AbAI	AP	AcAI	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	Wo
Blue Chaser	***Potamarcha congener***	**Common. Widely distribute in marsh throughout Hong Kong**	**Fellowes et al. (2002): LC**									1					2					
Ruby Darter	***Rhodothemis rufa***	**Common. Widely distribute in ponds and marshes throughout Hong Kong**	**Fellowes et al. (2002): LC**							1					2							
Scarlet Basker	***Urothemis signata***	**Common. Common in areas containing abandoned fish ponds throughout Hong Kong**	**Fellowes et al. (2002): LC**							7		1			2							
Amber-winged Glider	*Hydrobasileus croceus*	Common. Widely distribute in forested areas throughout Hong Kong	-																		1	
Asian Amberwing	*Brachythemis contaminata*	Abundant. Widely distribute in weedy ponds and sluggish streams	-		1		1	5		1		19	8			1			2	5	6	
Asian Pintail	*Acisoma panorpoides*	Common. Widely distribute in marshes and weedy ponds throughout Hong Kong	-						3		3					2						
Blue Dasher	*Brachydiplax chalybea*	Common. Widely distribute in marshes and weedy ponds throughout Hong Kong	-		1					1			1		2	2					2	
Blue Percher	*Diplacodes trivialis*	Abundant. Widespread, especially in late summer, when it	-										2			1						

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*												
				AP	Po	DA	Me	WI	AbAl	AP	AcAl	Ch	DA	G/S	Me	MW	Pl	Po	Re	TM	WI	Wo
		can be found almost everywhere in Hong Kong																				
Common Blue Skimmer	*Orthetrum glaucum*	Abundant. Widely distributed in streams, conduits, drainage channels, seepages and road gutters throughout Hong Kong.	-		3					3												
Common Bluetail	*Ischnura senegalensis*	Abundant. Widely distribute in all wetland habitats except fast flowing rivers throughout Hong Kong	-		2			20	1	2	1	2	2		3		6				2	
Common Flangetail	*Ictinogomphus pertinax*	Common. Widely distribute in ponds throughout Hong Kong	-		2					2												
Common Red Skimmer	*Orthetrum pruinosum*	Abundant. Widely distribute in slow streams, ponds, rain puddles and irrigation conduits	-		2				6	2	6	3										
Crimson Darter	*Crocothemis servilia*	Abundant. Widely distribute in cultivated areas, ponds and marshes throughout the New Territories	-			1	1	2					5		2	1					3	
Crimson Dropwing	*Trithemis aurora*	Abundant. Widely distribute in marshes, ponds, streams and ornamental ponds throughout Hong Kong	-										2									

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*												
				AP	Po	DA	Me	WI	AbAI	AP	AcAI	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	Wo
Evening Skimmer	*Tholymis tillarga*	Common. Widely distribute in marshes, weedy ponds and tanks throughout Hong Kong	-		4	4				4			6						1	1	1	
Green Skimmer	*Orthetrum sabina*	Abundant. Widely distribute in all wetland habitats throughout Hong Kong	-					2	6		6	1	5	1	1	1	2		1	2	3	
Lesser Emperor	*Anax parthenope*	Common. Aberdeen Country Park, Au Tau, Fung Yuen, Hok Tau Reservoir, Lamma Island, Lung Tsai Ng Yuen, Sha Lo Tung, South Lamma, Tung Chung Bay and Tung Ping Chau	-		3					3		2										
Orange-tailed Sprite	*Ceriagrion auranticum*	Abundant. Widely distribute in ponds and marshes throughout Hong Kong	-												1	1	3				1	
Pale-spotted Emperor	*Anax guttatus*	Common. Widely distribute in ponds and sluggish streams throughout Hong Kong	-																		1	
Pied Percher	*Neurothemis tullia*	Common. Widely distributed in swampy areas and marshes through out Hong Kong	-																		2	
Pied Skimmer	*Pseudothemis zonata*	Common. Widely distribute in woodlands adjacent to reservoirs, sluggish streams, ponds, tanks	-		2			1	1	2	1	6					1					

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*													
				AP	Po	DA	Me	WI	AbAI	AP	AcAI	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	Wo
		and marshes throughout Hong Kong																				
Red-faced Skimmer	*Orthetrum chrysis*	Abundant. Widely distribute in pools and marshy areas adjacent to flowing streams throughout Hong Kong.	-						3		3											
Regal Pond Cruiser	*Epophthalmia elegans*	Common. Widely distribute in reservoirs and large ponds throughout Hong Kong	-		1					1												
Russet Percher	*Neurothemis fulvia*	Common. Widely distribute in cultivated areas and streams throughout Hong Kong	-						4		4											
Saddlebag Glider	*Tramea virginia*	Abundant. Widely distribute in trees adjacent to ponds and lakes throughout Hong Kong	-			1	1					1	1								2	
Variegated Flutterer	*Rhyothemis variegata arria*	Common. Widely distribute in marshes, ponds and tanks throughout Hong Kong	-	10	22	3	1	17		32		4	20	2			10	2	4	15	4	
Wandering Glider	*Pantala flavescens*	Abundant. Widely distribute in all wetland habitats throughout Hong Kong	-	3	10	2		45	1	13	1	19	61	15	20	24	13		4	2	49	2
Wandering Midget	*Agriocnemis pygmaea*	Common. Widely distribute in marshes and weedy margins of ponds throughout Hong Kong	-		1					1												
Yellow Featherlegs	*Copera marginipes*	Abundant. Widely distribute in streams throughout Hong Kong	-		1					1												

Common Names	Scientific Names	Rarity and Distribution in Hong Kong	Conservation status	Application Site					Study Area *(excluding Application Site)*													
				AP	Po	DA	Me	WI	AbAl	AP	AcAl	Ch	DA	G/S	Me	MW	PI	Po	Re	TM	WI	Wo
Total				13	55	11	4	92	25	75	25	59	113	18	33	33	37	2	12	25	77	2

Notes:

1. AFCD (2020). Hong Kong Biodiversity Database.

Abbreviations:

- Conservation Status in Fellowes *et al.* (2002): LC = Local Concern
- Habitats: AbAl : abandoned agricultural land; AcAl: active agricultural land; AP: abandoned pond; Ch: channel; DA: developed area; G/S: grassland/shrubland; Me: meander; MW: mitigation wetland; PI: plantation; Po: pond; Re: Reedbed; TM: Tidal marsh; WI: wasteland; Wo: woodland; Relative abundance: C = Common; O = Occasional; S = Scarce

Appendix H Abundance of Firefly recorded within the Study Area

Month	Apr		May		Jun		Jul		Aug		Sep		Oct	
Habitat	Bent-winged Firefly	Pyro sp.	Bent-winged Firefly	Pyro sp.	Bent-winged Firefly	Pyro sp.	Bent-winged Firefly	Pyro sp.	Bent-winged Firefly	Pyro sp.	Bent-winged Firefly	Pyro sp.	Bent-winged Firefly	Pyro sp.
Meander (Me)	4	6						1						
Tidal Marsh (TM)			1			1		2						
Abandoned Pond (AP)								1						
Developed Area (DA)							1							
Wasteland (WI)								10		1				
Plantation (PI)												1		
Total count	**4**	**6**	**1**	**0**	**0**	**1**	**1**	**14**	**0**	**1**	**0**	**1**	**0**	**0**

Appendix I Aquatic Fauna recorded within the Study Area

Species Name	Common Name	Relative Abundance at Sampling Locations						Conservation Status
		A	B	C	D	E	F	
Fish								
Channa maculata	Spotted snakehead				+		+	-
Clarias gariepinus	North African catfish		+					-
Ctenopharyngodon idellus	Grass carp				+		+	-
Hypophthalmichthys nobilis	Big Head Carp				+		+	-
Oreochromis niloticus	Nile tilapia	+	++	+	+++	+	+++	-
Periophthalmus cantonensis	Mudskipper				+++		+	-
Invertebrate								
Perisesarma bidens	Sesarmine crab				++		+++	-
Pomacea canaliculata		++		++		++		-
Uca arcuata	Fiddler crab				+++			-

Appendix J – Night-Time Glare Impact Assessment for Firefly and Great Cormorant Night Roost in Nam Sang Wai

1 Introduction

1.1.1 The Mai Po Bent-winged Firefly habitat and Great Cormorant night roost in Nam Sang Wai (**Figure 3a** of the current EcoIA refers) are considered as two light sensitive receivers partially within the Assessment Area. The Mai Po Bent-winged Firefly habitat is located slightly closer to the Proposed Development than the Great Cormorant night roost, although it should be noted that the extent of both is indicative only and could change from time to time. There are two nos. of night roost of ardeids identified on both sides of Kam Tin River (**Figure 2b** of the current EcoIA refers). However, ardeid night roost is not considered as a sensitive site under the current light assessment compared with the former two. With reference to the locations of the two night roost, there are existing light sources in the vicinity i.e. the light along Yuen Long Highway. And it is also not uncommon for ardeids to choose some relatively urbanised locations as their night roost.

1.1.2 A night-time glare impact assessment has been conducted to illustrate the night-time artificial light impact on the fireflies and Great Cormorant night roost in Nam Sang Wai. This Technical Note presents the results of night-time ambient light intensity measurements and light modelling to simulate the potential change on the night-time ambient light environment at the southern part of Nam Sang Wai near Yuen Long Town, due to the Proposed Development.

2 Locations of Habitats for Firefly and the Cormorant Night Roost

2.1 Mai Po Bent-winged Firefly

2.1.1 Mai Po Bent-winged Firefly (*Pteroptyx maipo*)[1] mainly occurs around the Deep Bay Ramsar Site and the Wetland Conservation Area (WCA). This species was found to be associated with mangrove fringed intertidal water courses (Yiu, 2012)[2]. A recent EcoIA also revealed the distribution of this species in Nam Sang Wai (AEC, 2016)[3].

2.1.2 While relevant studies on the impact of artificial light on firefly are limited in Hong Kong, a certain degree of behavioural response by the Mai Po Bent-winged Firefly against an experimental artificial light set up at night was recorded by Yiu in 2012 in Tin Shui Wai. The experiment showed that this firefly species started to flash at about 35 minutes after sunset when the ambient light intensity dropped to about 0.2 lux (Yiu, 2012). The number of flashing reduced when there were light sources nearby.

2.1.3 In the EcoIA for the Proposed Development at Nam Sang Wai & Lut Chau (Application No. A/YL-NSW/242) (AEC, 2016), light intensity measurements at sites used by this firefly (including Nam Sang Wai, Tin Shui Wai and Hong Kong Wetland Park) showed that the light intensity range where this firefly occurred and actively flashing was 0.01 – 0.49 lux. Another EcoIA for the Proposed Development at Fung Lok Wai (Application No. A/YL-LFS/224) (Environ, 2013)[4],

[1] Mai Po Bent-winged Firefly (*Pteroptyx maipo*) was first discovered as an unidentified firefly species in the mangrove of Hong Kong Wetland Park in 2003 by AFCD. This species is currently not known to occur elsewhere outside Hong Kong and thus it is regarded as an endemic species in Hong Kong and considered to be of conservation importance.

[2] Yiu V. (2012) Effect of artificial light on firefly flashing activity. Insect News – Hong Kong Entomological Society Newsletter No. 4, 2012

[3] AEC (2016) Proposed Comprehensive Development with Wetland Enhancement at Nam Sang Wai and Lut Chau – Ecological Impact Assessment (Application No. A/YL-NSW/242)

[4] Environ (2013) S.16 Application (Ref: A/YL-LFS/224) Proposed Comprehensive Residential Development with a Wetland Nature Reserve in "Other Specified Uses" Annotated "Comprehensive Development and Wetland Enhancement Area" Zone at Lot 1457 R.P. in DD123 and Adjoining Government Land Fung Lok Wai, Lau Fau Shan, Yuen Long – Ecological Impact Assessment

which conducted light intensity measurements between April and September 2012 at Fung Lok Wai; and between July and September in Tsim Bei Tsui and Sheung Pak Nai, showed that the light intensity range where the firefly occurred and actively flashing was 0.05 – 0.33 lux. Whilst the areas with high number of firefly flashing were as high as 0.32 lux. In the EcoIA for the Proposed Development at Tung Shing Lei (Application No. A/YL-NSW/274), the measures light intensity was in the range of 0.00 – 0.7 Lux at the accessible locations within the two habitats. The measured light intensity under clear sky night was mostly within the range 0.10 – 0.20 Lux while that for an overcast sky was 0.30 – 0.50 Lux. According to the measurement result of A/YL-NSW/274, under different sky or weather conditions, the ambient light intensity at the 2 habitats could vary by about 0.3 Lux.

2.1.4 The current EcoIA also conducted ecological survey for fireflies and measured the background light intensity when fireflies were recorded. The detailed survey results refer to the EcoIA.

2.2 Cormorant Night Roost

2.2.1 The cormorants roosted mainly in exotic trees such as *Eucalyptus* spp. It is located about 500m away from the Application Site and is at the periphery or beyond the 500m Assessment Area (**Figure 3a** of the current EcoIA refers). The Great Cormorant roost is also separated from the Application Site by a section of Old Kam Tin River and other habitats.

3 Study Site for Night-time Light Impact Assessment & Existing Environs

3.1.1 **Figure 1** shows the locations of the firefly habitat and the existing environs in the vicinity. The closest distance of the habitat from the Application Site boundary is about 437m. Therefore, it is within the 500m Assessment Area.

3.1.2 The firefly habitat along a meander located at the south-western corner of Nam Sang Wai could be broadly divided into the eastern and western portions. The eastern portion mainly consists of abandoned ponds, the existing village Chung Hau Yu Man San Tsuen, narrow paved and unpaved roads, patchy grasslands and fruit trees grown by villagers, etc. The western portion consists of an extensive marshy area covered by mangrove trees and reeds and is in proximity to the existing Hong Kong School of Motoring's Yuen Long Driving School (YLDS). An access footpath separating the eastern and western portions connect the Nam Sang Wai Jetty and a store.

3.1.3 There is an existing residential development named The Parcville which is located in proximity to the firefly habitat. This residential development is of 13 – 15 storeys, accommodating about 1,618 units and has a separation distance of about 350m from the firefly habitat (closer than that from the Application Site boundary).

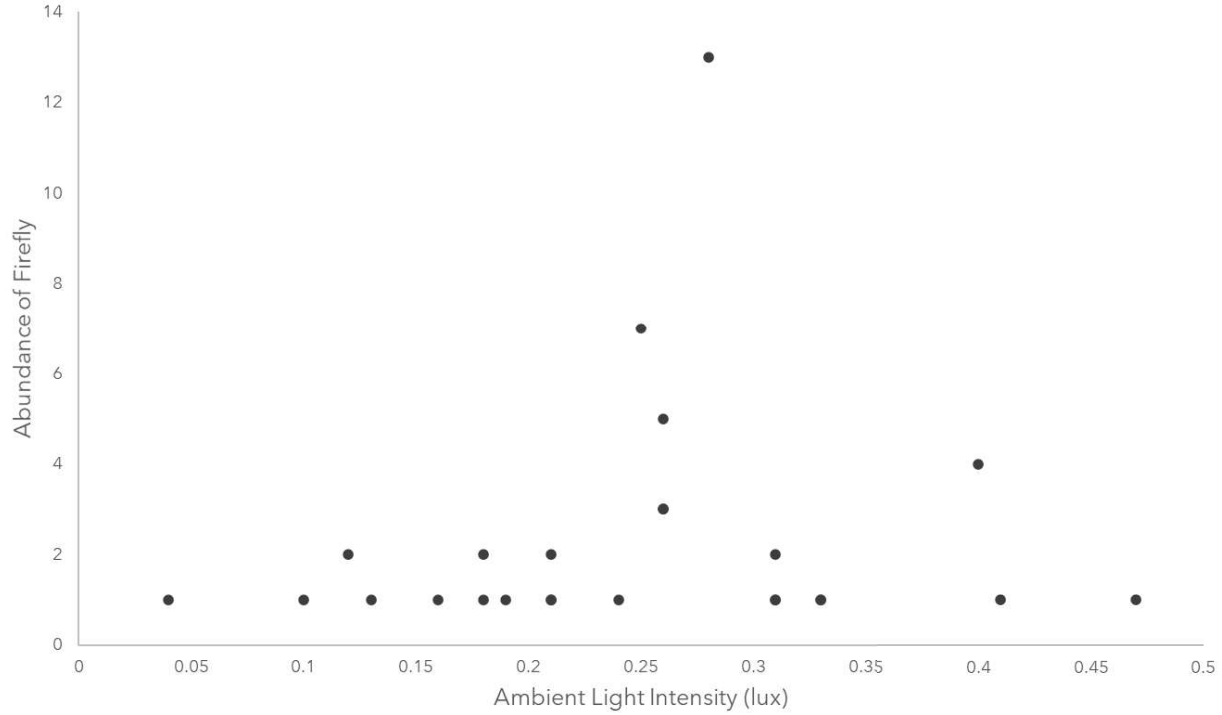
3.1.4 Besides, the Hong Kong School of Motoring's (HKSM) Yuen Long Driving School (YLDS) is located right adjacent to and on the opposite side of the firefly habitat. According to the mobile app of YLDS, this facility offers training sessions for learner drivers and would operate till 2230 during weekdays, Saturdays and public holidays, and 1830 during Sundays.

4 Night-Time Light Intensity Measurement Results

4.1.1 Night-time light intensity measurements were conducted in parallel to firefly night survey between Apr – Oct 2020 at the accessible locations within the habitat. Whenever firefly was recorded, the background light would be recorded using a light intensity meter[5] at the same time. Details of the night-time light intensity measurement methodology refers to the EcoIA. The measurements were conducted during night surveys each starting at approximately 30 minutes after sunset and lasted for about 1.5 hours. The light intensity meter had the lowest detection limit down to 0.01 lux, they were facing upward during the measurements.

4.1.2 The overall range of background light intensity recorded during the firefly survey was 0.03 – 0.65 Lux. A total of two firefly species i.e. Mai Po Bent-winged Firefly and *Pyrocoelia* sp. were recorded. The background light intensity when Mai-po Bent-winged Firefly was recorded are presented in **Plate 4.1** below:

Plate 4.1 Ambient light intensity when Mai Po Bent-winged Firefly was recorded



4.1.3 The range of the ambient light intensity when Mai Po Bent-winged Firefly was recorded is between about 0.04 Lux to 0.47 Lux, where a single individual was recorded. A total of 13 individuals

[5] TES-1334A

were recorded during a single occasion during the entire survey period (Apr – Oct 2020). The ambient light intensity at this occasion was 0.28 Lux.

4.1.4 The distribution of Mai Po Bent-winged Firefly within the Assessment Area is provided in Figure 6e of the EcoIA. Apart from Mai Po Bent-winged Firefly, another species i.e., *Pyrocoelia* sp. was also recorded during the survey but this species is not considered to be of conservation importance.

5 Light Intensity Simulation – Reasonable Worst-Case Scenario

5.1.1 The DIALux software[6] has been adopted to simulate the light intensity that would be emitted by the Proposed Development onto the two habitats. This software was adopted in a previously approved planning application in Fung Lok Wai (Application No. A/YL-LFS/224) and Tung Shing Lei (Application No. A/YL-NSW/274). The approach of the current light intensity simulation is also similar to the approach adopted in this approved planning application.

5.1.2 It should be noted that it is very unlikely for every room of a residential building to have their lights switched on at the same time at night. Site observations conducted in the Approved Planning Application No. A/YL-NSW/274 also found that, during night-time (i.e., within 2 hours after sunset), only about 10-30% of the flat units in The Parcville (i.e. residential development of similar development intensity as the Proposed Development but at a closer distance from Nam Sang Wai) were with lights turned on, and most of those units had only either the living rooms or the bedrooms with light turned on. Also, depending on the locations within the firefly habitat, majority of the lower storeys of residential buildings was screened off by the trees/vegetation/physical barriers nearby.

5.1.3 Building height adopted in the simulation model follow the building layout plan and as below:

Input Parameter	Nos. of Storey[1]	Approximate Main Roof Level (mPD)[2]
Residential Block	T1 – 23 storeys	T1 – 99.9
	T2 – 24 storeys	T2 – 99.9
	T3 – 24 storeys	T3 – 99.9
	T5 – 24 storeys	T5 – 100.0
	T6 – 24 storeys	T6 – 100.0
	T7 – 24 storeys	T7 – 100.0
	T8 – 24 storeys	T8 – 100.0

Note:
[1] Tower 4 (T4) is omitted deliberately.

[2] Ground level is 6.5 mPD.

5.1.4 In order to quantify a reasonable worst-case light intensity generated by the Proposed Development, the following key assumptions have been adopted. The design parameters and building sections

[6] DIALux is widely adopted for the quantification of light intensity generated by different lighting schemes, including indoor and outdoor lighting schemes.

showing the environ between the Proposed Development and Nam Sang Wai are given in **Figure 1 and 3** respectively.

- Only lighting in the units that facing north and northwest are considered in the model as the light from other directions would be completely blocked by the building itself.
- For every unit facing north and northwest in all 7 residential towers, lighting in the living room and one bedroom would be turned on.
- An average light intensity of 300 lux[7] below the lighting fixture within those living rooms and bedrooms are adopted, which is a very conservative assumption as compared to actual measurements of only about 100 – 150 lux for residential development.
- Two small knolls, one at the south of Shan Pui Tsuen (about 60m tall) and another one to the north of the Application Site (about 25m tall) had been incorporated into the model, the dimension reflects the contour in the base map.
- Total number of floors of all towers follows the building plan.
- To account for building envelope reflection, a 20%[8] – 30%[9] reflectance can be assumed. For the current simulation, the building envelope adopted 30% reflectance.
- Ceiling 60%[10] reflectance.
- Floor 10%[11] reflectance.
- 78% transmittance[12] has been assumed for the glass panes to reflect the current design parameter.
- All blinds are open, which is also a very conservative assumption.

5.1.5 As a reasonable worse case, outdoor and security lighting are not included in the simulation. It is because that considered the separation (i.e., about 437m) between the nearest night-time light sensitive receivers i.e., the Mai Po Bent-winged Firefly habitat, the vegetation of existing topography as well as the tree planting along the fringe of the proposed development would act as effective physical barriers which would be able to screen out the outdoor and security lighting on the ground floor and lower storeys.

5.1.6 The light simulation model had also considered the local topography including the knoll behind Shan Pui Tsuen and the knoll at the north side of the proposed development. These topography features may help screen off the potential light impact from the nearby residential developments.

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[7] Typical measurements suggested a 150 lux for living room and less than 100 lux for bedrooms. In addition, reference also stated that the light intensity of general household ranges from 50 – 300 lux. (cont'd in next page)

- J. Holton, "Strategy Guideline: High Performance Residential Lighting", U.S. Department of Energy (February 2012).
- "Recommended Light Levels (Illuminance) for Outdoor and Indoor Venues", National optical Astronomy Observatory.
- "IESNA Lighting Handbook", Illuminating Engineering Society of North America.
- EN12464-1:2011, "Light and Lighting – Lighting of Work Places".

[8] BEAM Plus New Buildings Version 2.0 (09.2019).

[9] https://www.dial.de/en/DIALUX/

[10] BEAM Plus New Buildings Version 2.0 (09.2019).

[11] *Ibid.*

[12] Double glazing clear glass window with 78% transmittance adopted in the model as a reasonable worst case (reference: https://www.archibiz.com.sg/wp-content/uploads/2018/01/SYP-Catalogue-Architectural-Glass-2017.pdf). Transmittance of less than 50% should not be used for windows to comply with the requirements of the Residential Thermal Transfer Value (RTTV) requirements in Guidelines on Design and Construction Requirements for Energy Efficiency of Residential Buildings 2014 (BD, 2014).

5.1.7 Two potential points of interest within the firefly habitat i.e., Point A and Point B are anticipated to be receiving higher degree of light as their locations are the nearest to the proposed development (**Figure 1** refers). Simulation results from DIALux are given in **Figure 2a – c**. It shows that the increase in light intensity contributed by the Proposed Development is the highest (0.03 lux) at the southern section of Nam Sang Wai (Point B), which only occupied a tiny portion (about 2%) of the total area of the firefly habitat. The rest of the eastern half of the firefly habitat, the increase is about 0.01 – 0.02 lux. For the western half of the firefly habitat, the increase is negligible (0.00 lux) which occupied about 50% of the firefly habitat.

5.1.8 This simulation is based on a reasonable worst-case in which all the flats that are facing north and northwest side towards the firefly habitat would have lights on in the living room and one bedroom and ALL the blinds/curtains are open. This is a very conservative approach because, in reality, a considerable number of the flats would not have lights on or have the blinds/curtains closed.

6 Evaluation and Conclusion

6.1.1 **Section 4** has discussed that the existing ambient night-time light intensity at the south of Nam Sang Wai was in the order of 0.03 – 0.65 lux at areas away from local light sources. While the range of the ambient light intensity when the concerned Mai Po Bent-winged Firefly could be recorded was 0.04 – 0.47 lux. According to the measurement in the same location conducted for approved planning application A/YL-NSW/274, the variation in light intensity during nights with different sky conditions could be up to about 0.3 lux. The light intensity simulation exercise conducted for the current Proposed Development adopted a similar approach and adopted the same software as previously approved planning applications (Application No. A/YL-LFS/224 and Application No. A/YL-NSW/274). The current simulation predicted a minor increase in light intensity of 0.00 – 0.03 lux generated by the Proposed Development which is far below the natural variation measured during the field measurement. For night roost of Great Cormorant, the predicted increase in light intensity is also minor (0.00 – 0.02 lux) (**Figures 2a – c** refer). Such increase is considered to be minor for the night roost when considering the natural fluctuation due to different sky conditions.

6.1.2 Besides, previous studies as summarised in **Section 2** have also concluded that Mai Po Bent-winged Firefly appeared to be well adapted to ambient light intensity from 0.05 to 0.32[13] which is within the range of the current ambient light measurement results in the firefly habitat in Nam Sang Wai. The natural fluctuation in night-time light intensity due to different weather conditions is also much higher than the predicted increase of 0.00 – 0.03 lux in light intensity generated by the Proposed Development.

6.1.3 It should be noted that all the outdoor and security lights are situated at ground level and lower storeys. There would not be large outdoor advertisement boards nor flood light directing towards the north and northwest where the concerned night-time light sensitive receivers i.e., the Mai Po Bent-winged Firefly and other wetland habitats are located. Considering the distance between the proposed development and the concerned night-time light sensitive receivers is over 430m, the vegetation of existing topography as well as the tree planting currently proposed along the edge of

[13] Environ (2013) S.16 Application (Ref: A/YL-LFS/224) Proposed Comprehensive Residential Development with a Wetland Nature Reserve in "Other Specified Uses" Annotated "Comprehensive Development and Wetland Enhancement Area" Zone at Lot 1457 R.P. in DD123 and Adjoining Government Land Fung Lok Wai, Lau Fau Shan, Yuen Long – Ecological Impact Assessment

the Application Site would be able to act as physical barriers to screen out these outdoor and security light sources.

6.1.4 It is therefore considered that the Proposed Development would not cause significant impacts on the Mai Po Bent-winged Firefly and Great Cormorant night roost in Nam Sang Wai in term of night-time artificial light. Although mitigation measures are not required in terms of artificial light during night-time, it is recommended for the Proposed Development to avoid orientating any external flood light towards the firefly habitat in Nam Sang Wai to minimise any potential disturbance.

FIGURES

N

NAM SANG WAI ROAD
NAM SANG WAI
LEEMAN HYDRAULIC TECHNOLOGY CO LTD
CHINA DYING HOLDING LTD
DAIDO BUILDING MATERIAL LTD
SHAN PUI RIVER
HONG KONG SCHOOL OF MOTORING
MEANDER
POINT A
320M
POINT B
CHUNG HAU YU MAN SAN TSUEN
SHAN PUI TSUEN
PROJECT SITE
TWIN REGENCY
YUEN LONG LOGISTICS CENTRE
CROWN DATA CENTRE III
THE PARCVILLE
KNOLL
YUEN LONG HIGHWAY
WONG UK TSUEN

0 50 100 150 200 250
METRES

LEGEND

- PROJECT SITE
- 500m ASSESSMENT AREA
- NAM SANG WAI BOUNDARY
- MAI PO BENT-WINGED FIREFLY HABITAT IN NAM SANG WAI (INDICATIVE) (AEC, 2016)
- GREAT CORMORANT NIGHT ROOST IN NAM SANG WAI (INDICATIVE)
- THE PARCVILLE
- WETLAND CONSERVATION AREA
- WETLAND BUFFER AREA

Rev	Description	By	Date
G	SEVENTH ISSUE	GL	07/23
F	SIXTH ISSUE	GL	01/23
E	FIFTH ISSUE	GL	12/22
D	FOURTH ISSUE	GL	01/22

Consultant
ARUP

Project Title
FEASIBILITY OF A SITE IN VARIOUS LOTS IN D.D. 115, TUNG SHING LEI, YUEN LONG, THE NEW TERRITORIES FOR APPLICATION UNDER LAND SHARING PILOT SCHEME

Drawing title
HABITATS OF MAI PO BENT-WINGED FIREFLY AND GREAT CORMORANT NIGHT ROOSTS IN NAM SANG WAI

Drawing no.	Rev.
FIGURE 1	G

Drawn	Date	Checked	Approved
GL	07/23	IW	FC

Scale: 1:5000 @A3
Status: PRELIMINARY

Topwood Ltd. and Success King Ltd.

Printed by : 7/10/2023
Filename : \\global\EastAsia\HKG\Group\C1ENV\env\project\Tung Shing Lei Phase 2\13 Drawing Deliverables\Light assessment\20230602 layout update\Figure 1 - Habitats of Mai Po Bent-winged Firefly in Nam Sang Wai.dgn

LEGEND

- PROJECT SITE
- MAI PO BENT-WINGED FIREFLY HABITAT IN NAM SANG WAI
- GREAT CORMORANT NIGHT ROOST IN NAM SANG WAI (INDICATIVE)

Rev	Description	By	Date
C	THIRD ISSUE	GL	07/23
B	SECOND ISSUE	GL	01/23
A	FIRST ISSUE	GL	12/22

Consultant

ARUP

Project Title

FEASIBILITY OF A SITE IN VARIOUS LOTS IN D.D. 115, TUNG SHING LEI, YUEN LONG, THE NEW TERRITORIES FOR APPLICATION UNDER LAND SHARING PILOT SCHEME

Drawing title

PREDICTED LIGHT INTENSITY (LUX) CAUSED BY TOWER 1,2,3 DURING NIGHT TIME (NORTH AND NORTHWEST - FACING LIGHT ONLY)

Drawing no.	Rev.
FIGURE 2a	C

Drawn	Date	Checked	Approved
GL	07/23	EL	FC

Scale	Status
AS SHOWN	PRELIMINARY

Topwood Ltd. and Success King Ltd.

Printed by : 7/10/2023
Filename : \\global\EastAsia\HKG\Group\CIEN\env\project\Tung Shing Lei\Phase 2\13 Drawing Deliverables\Light assessment\20230706 site boundary update\Figure 2a - Predicted Light Intensity (lux) Caused by Tower 1,2,3).dgn

LEGEND

- PROJECT SITE
- MAI PO BENT-WINGED FIREFLY HABITAT IN NAM SANG WAI
- GREAT CORMORANT NIGHT ROOST IN NAM SANG WAI (INDICATIVE)

Rev	Description	By	Date
C	THIRD ISSUE	GL	07/23
B	SECOND ISSUE	GL	01/23
A	FIRST ISSUE	GL	12/22

Consultant

ARUP

Project Title

FEASIBILITY OF A SITE IN VARIOUS LOTS IN D.D. 115, TUNG SHING LEI, YUEN LONG, THE NEW TERRITORIES FOR APPLICATION UNDER LAND SHARING PILOT SCHEME

Drawing title

PREDICTED LIGHT INTENSITY (LUX) CAUSED BY TOWER 5,6 DURING NIGHT TIME (NORTH AND NORTHWEST - FACING LIGHT ONLY)

Drawing no.			Rev.
FIGURE 2b			C
Drawn: GL	Date: 07/23	Checked: EL	Approved: FC
Scale: AS SHOWN		Status: PRELIMINARY	

Topwood Ltd. and Success King Ltd.

Printed by : 7/10/2023
Filename : \\global\EastAsia\HKG\Group\CIEN\env\project\Tung Shing Lei\Phase 2\13 Drawing Deliverables\Light assessment\20230706 site boundary update\Figure 2b - Predicted Light Intensity (lux) Caused by Tower 5,6,7.dgn

LEGEND

- PROJECT SITE
- MAI PO BENT-WINGED FIREFLY HABITAT IN NAM SANG WAI
- GREAT CORMORANT NIGHT ROOST IN NAM SANG WAI (INDICATIVE)

Rev	Description	By	Date
C	THIRD ISSUE	GL	07/23
B	SECOND ISSUE	GL	01/23
A	FIRST ISSUE	GL	12/22

Consultant

ARUP

Project Title

FEASIBILITY OF A SITE IN VARIOUS LOTS IN D.D. 115, TUNG SHING LEI, YUEN LONG, THE NEW TERRITORIES FOR APPLICATION UNDER LAND SHARING PILOT SCHEME

Drawing title

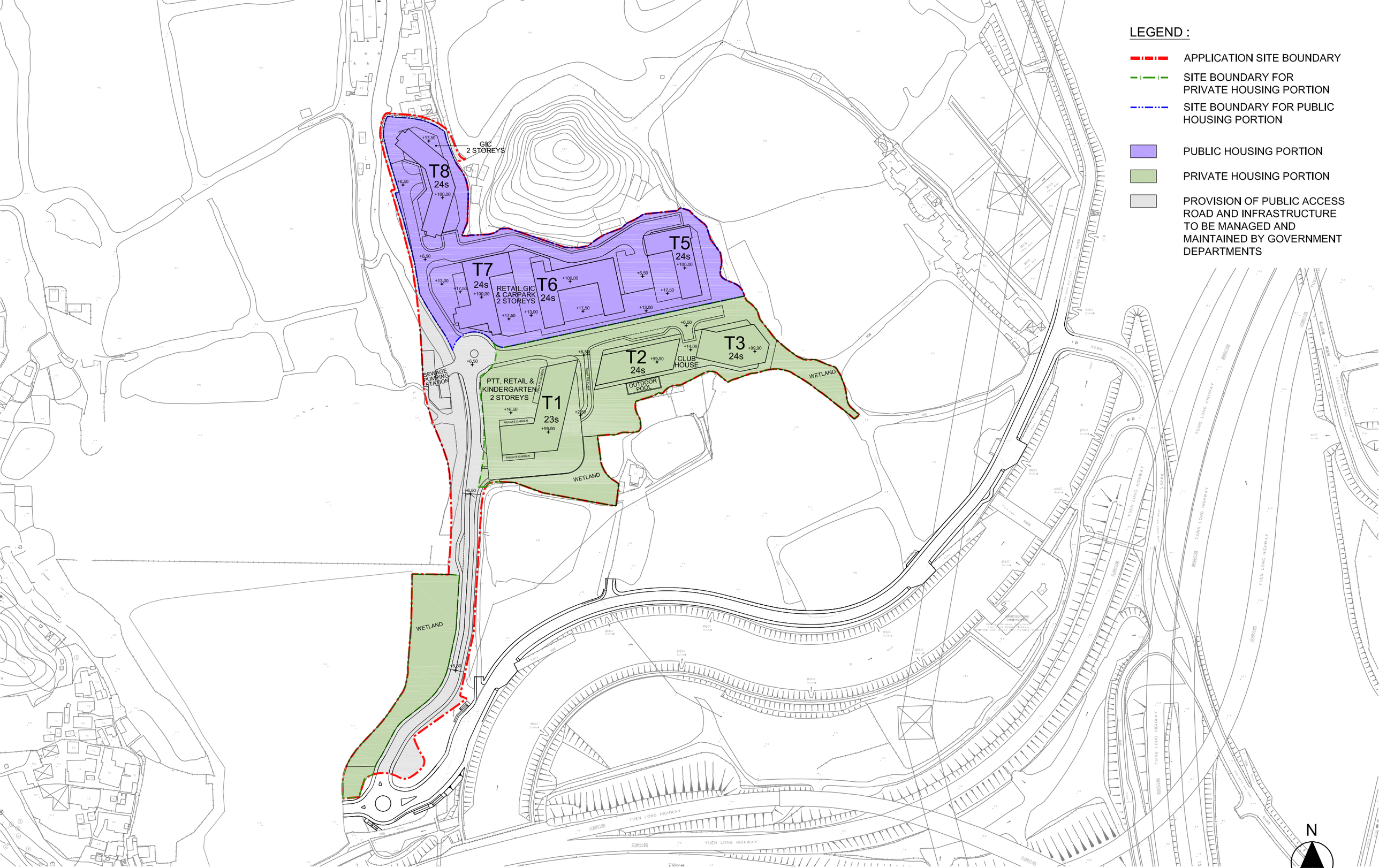
PREDICTED LIGHT INTENSITY (LUX) CAUSED BY TOWER 7 8 DURING NIGHT TIME (NORTH AND NORTHWEST - FACING LIGHT ONLY)

Drawing no.			Rev.
FIGURE 2c			C
Drawn: GL	Date: 07/23	Checked: EL	Approved: FC
Scale: AS SHOWN		Status: PRELIMINARY	

Topwood Ltd. and Success King Ltd.

Printed by : 7/10/2023
Filename : \\global\EastAsia\HKG\Group\CIEN\env\project\Tung Shing Lei\Phase 2\13 Drawing Deliverables\Light assessment\20230706 site boundary update\Figure 2c - Predicted Light Intensity (lux) Caused by Tower 8,9,10.dgn

APPENDICES



Site Demarcation Plan

TUNG SHING LEI "R(D)" ZONE

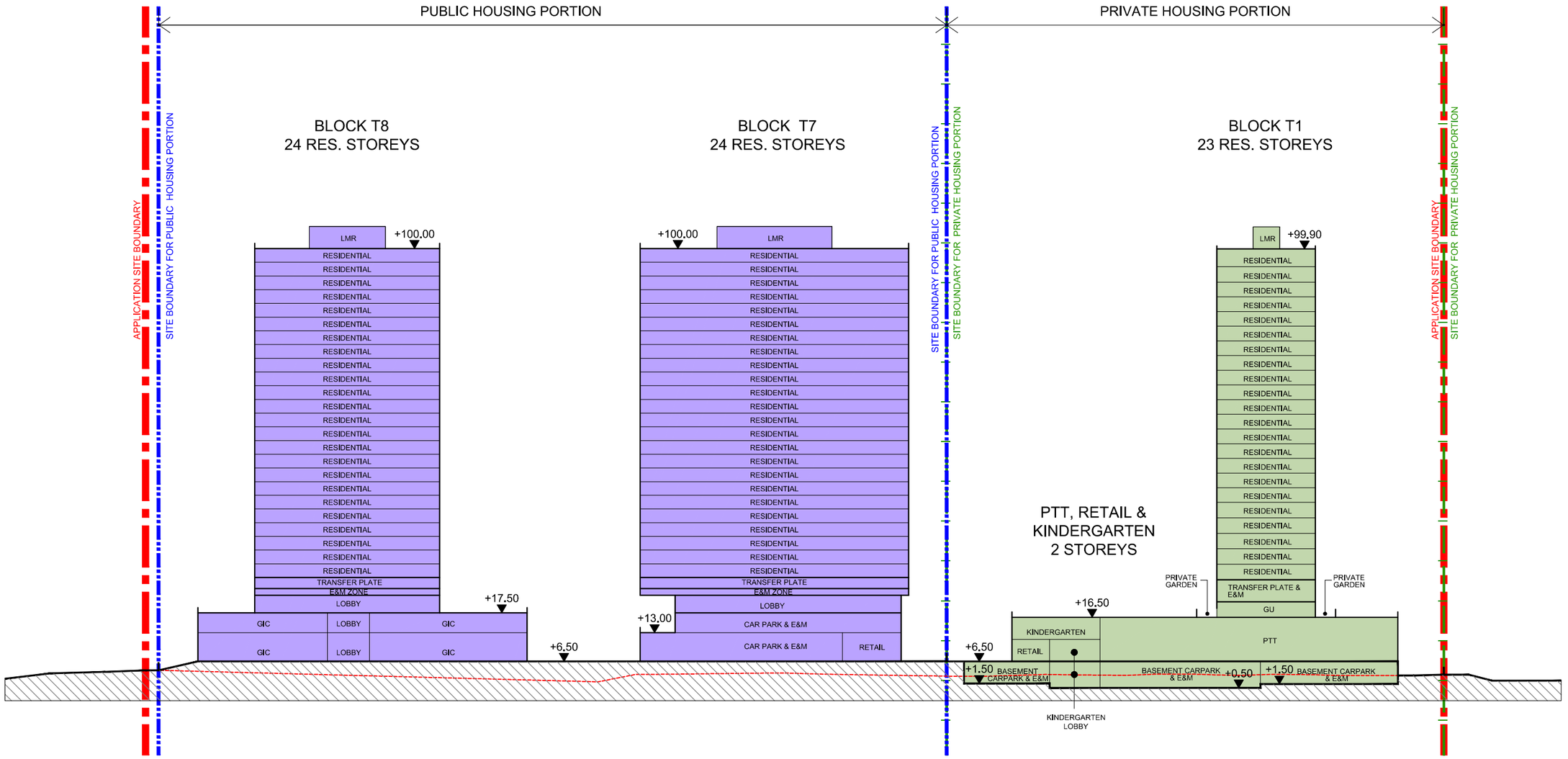
PROPOSED LAND SHARING PILOT SCHEME (LSPS) FOR A SITE AT VARIOUS LOTS IN D.D. 115,
TUNG SHING LEI, YUEN LONG, THE NEW TERRITORIES

DATE : 15 MAR 2024
1 : 2500 (A3)

ARCHI+
ARCHIPLUS INTERNATIONAL LIMITED

LEGEND

------ EXISTING SITE LEVEL



SECTION S1

Indicative Section S1

TUNG SHING LEI "R(D)" ZONE

PROPOSED LAND SHARING PILOT SCHEME (LSPS) FOR A SITE AT VARIOUS LOTS IN D.D. 115,
TUNG SHING LEI, YUEN LONG, THE NEW TERRITORIES

DATE : 30 OCT 2023
1 : 1000 (A3)

ARCHI+
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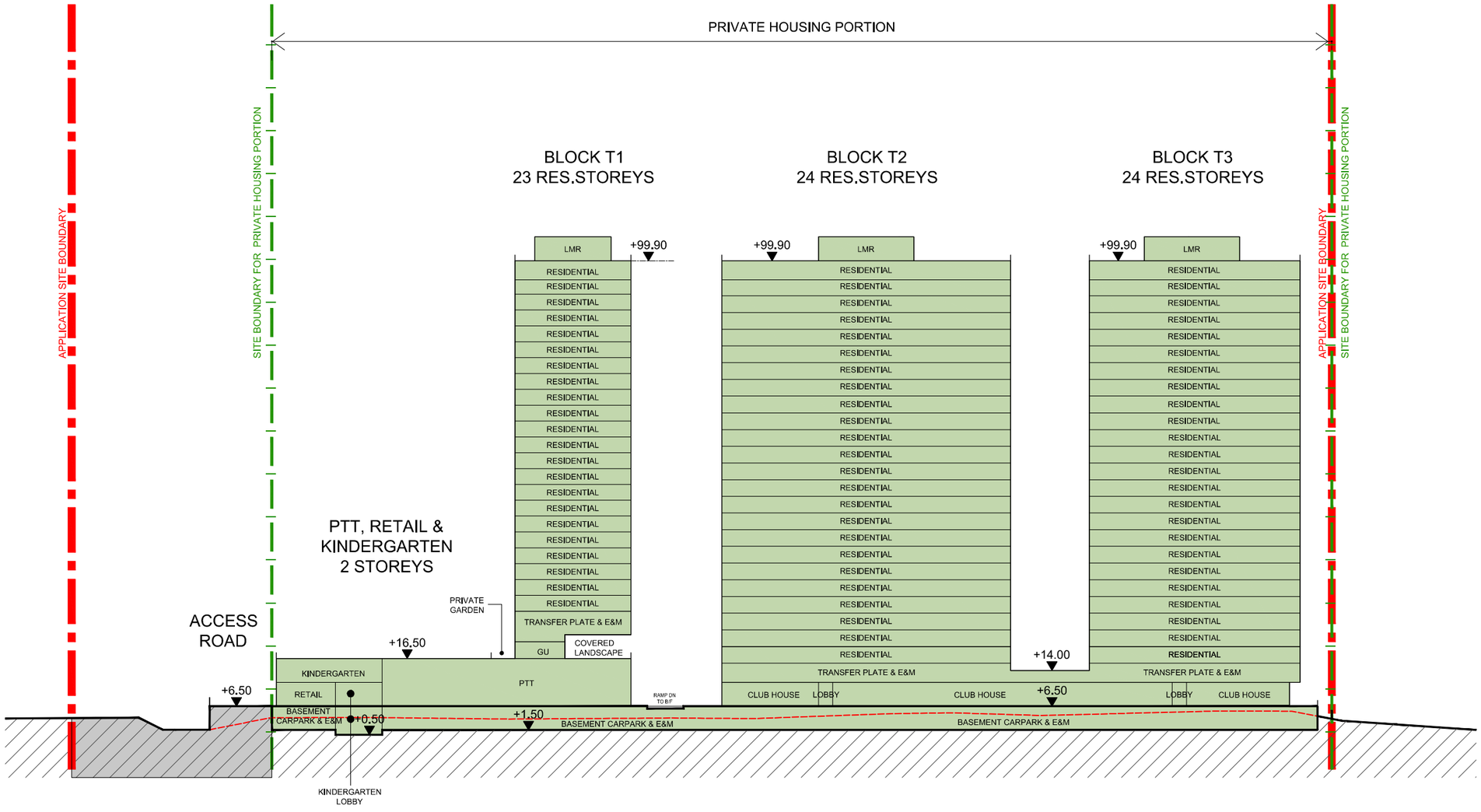
LEGEND

------ EXISTING SITE LEVEL



SECTION S2

Indicative Section S2

TUNG SHING LEI "R(D)" ZONE

PROPOSED LAND SHARING PILOT SCHEME (LSPS) FOR A SITE AT VARIOUS LOTS IN D.D. 115,
TUNG SHING LEI, YUEN LONG, THE NEW TERRITORIES

DATE : 05 JUL 2023
1 : 1000 (A3)

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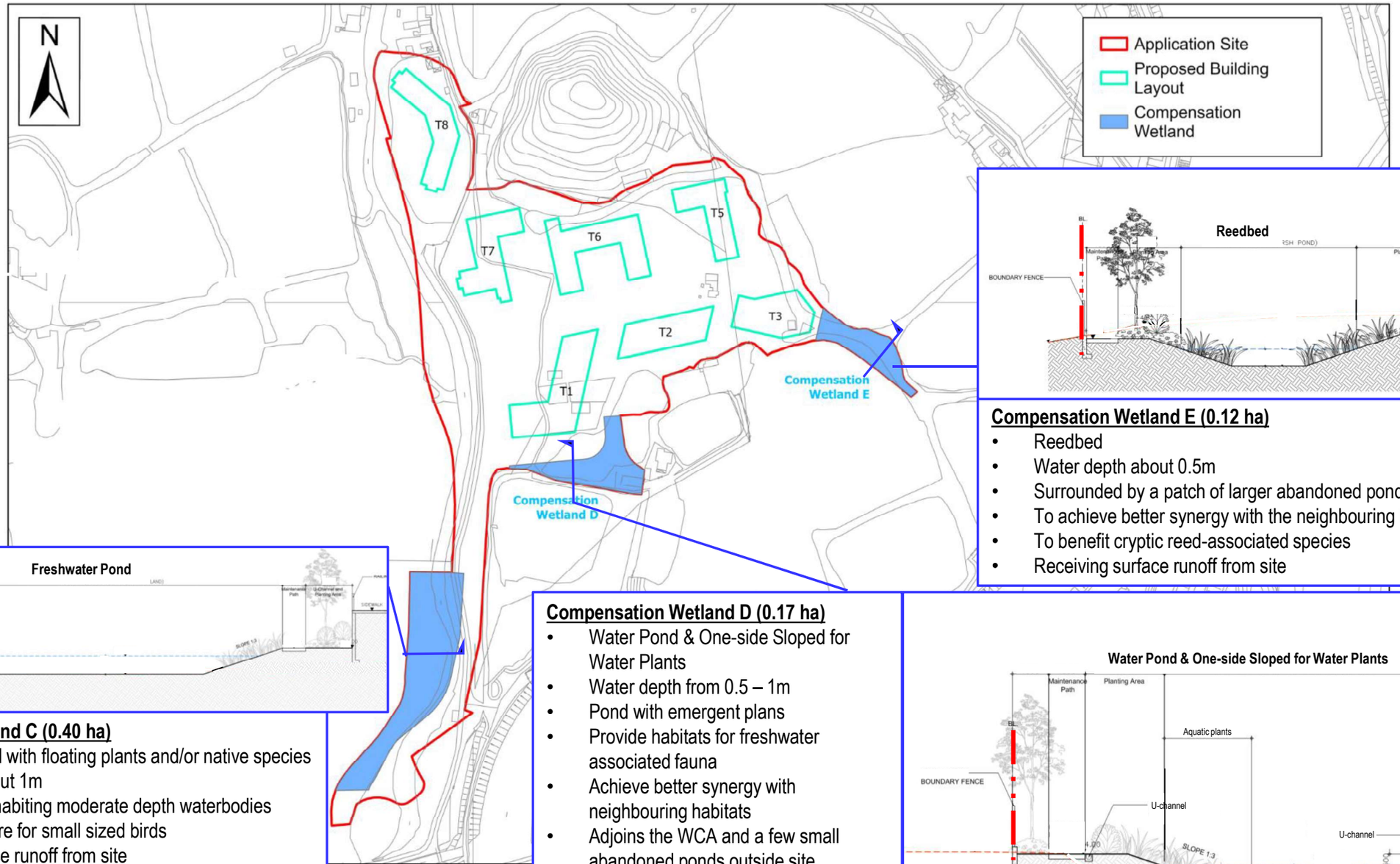
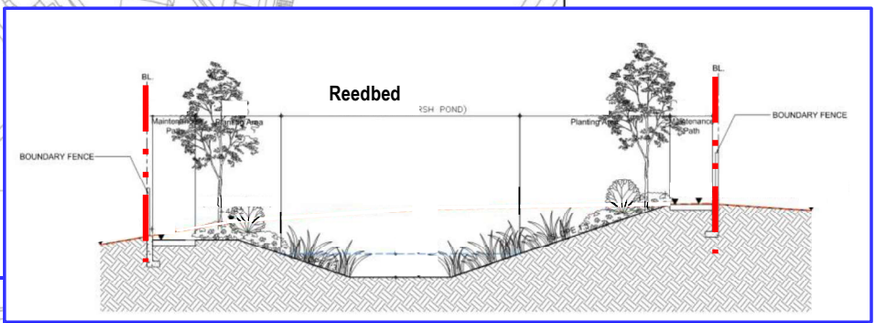
APPENDIX K – Summary of Preliminary Ecological Considerations of the Compensation Wetlands

Total Size (0.69 ha)	Design considerations	Construction	Operation approach	Long term management approach
Compensation Wetland C (0.40 ha)	• Form – Retention pond with soft substrate bottom • Water depth about 1m • Vegetation – terrestrial native species at pond edge; floating plants • Ecology – Benefit fauna inhabiting moderate depth waterbodies; perching structures for small sized birds	• Excavate and compact in-situ soil to form pond bottom • Suitable waterproofing as necessary • Rainwater as the water source	• Collect stormwater runoff from the private development site • Replenish water from retention tank as necessary • Overflow to N49	• Low maintenance • Occasional removal of debris/dead plants from water • Occasional trimming or removal of invasive vegetation
Compensation Wetland D (0.17 ha)	• Form – Retention pond with soft substrate bottom • Water depth around 0.5 – 1m • Vegetation – Emergent plants • Ecology – Provide habitats for freshwater associated fauna; adjoins the WCA and a few small abandoned ponds outside site boundary to achieve better synergy of habitats	• Excavate and compact in-situ soil to form pond bottom • Suitable waterproofing as necessary • Rainwater as the water source	• Collect stormwater runoff from the private development site • Overflow to retention tank for irrigation • Potential visual amenity for residents	• Regular checking of water quality and potential artificial aeration as necessary • Regular removal of debris/ dead plants from water • Regular trimming or removal of invasive vegetation
Compensation Wetland E (0.12 ha)	• Form – Freshwater reedbed (water depth about 0.5m) • Vegetation – Reeds • Ecology – Benefit cryptic reed-associated species; surrounded by a patch of larger abandoned ponds to achieve better synergy of habitats	• Excavate and compact in-situ soil • Pond mud might be required for reeds • Allow stormwater to fill up the pond • Planting of reed and aid the establishment in the early stage if necessary	• Collect stormwater runoff from the private development site • Overflow to retention tank for irrigation • Self-operational; require minimal operational intervention	• Cutting overgrown reed • Removal of invasive vegetation

Note: A Habitat Creation and Management Plan will be developed for all the compensation wetlands during the detailed design stage. The information in this appendix will be subject to further review and potential changes.

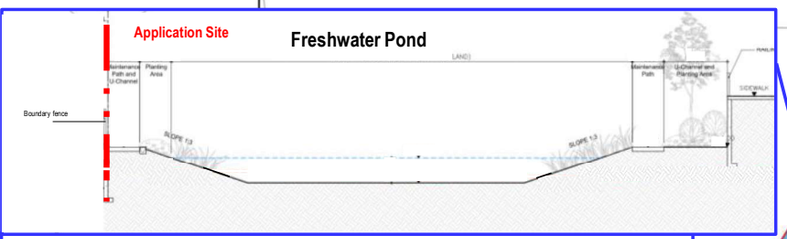
Appendix L – Conceptual Design of the Compensation Wetlands





Compensation Wetland E (0.12 ha)

- Reedbed
- Water depth about 0.5m
- Surrounded by a patch of larger abandoned ponds
- To achieve better synergy with the neighbouring habitats
- To benefit cryptic reed-associated species
- Receiving surface runoff from site

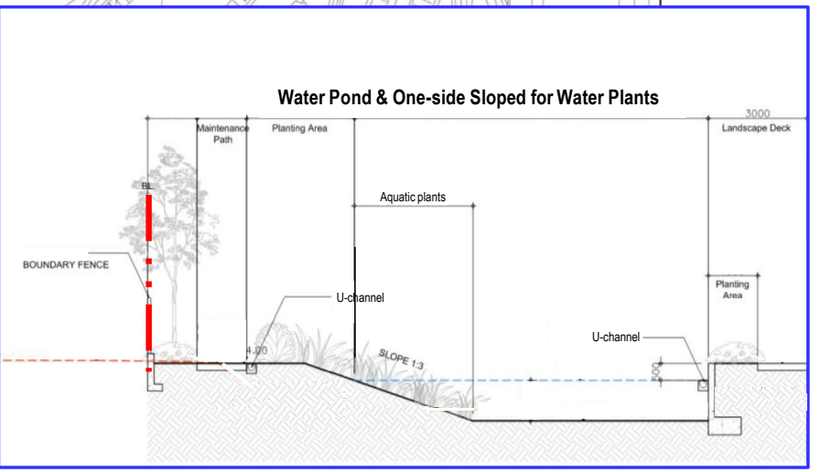


Compensation Wetland C (0.40 ha)

- Freshwater pond with floating plants and/or native species
- Water depth about 1m
- Benefit fauna inhabiting moderate depth waterbodies
- Perching structure for small sized birds
- Receiving surface runoff from site
- Water reusing for irrigation

Compensation Wetland D (0.17 ha)

- Water Pond & One-side Sloped for Water Plants
- Water depth from 0.5 – 1m
- Pond with emergent plans
- Provide habitats for freshwater associated fauna
- Achieve better synergy with neighbouring habitats
- Adjoins the WCA and a few small abandoned ponds outside site boundary
- Receiving surface runoff from site



Proposed Land Sharing Pilot Scheme for a Site at Various Lots in D.D. 115, Yuen Long, the New Territories – Wetland Creation Scheme

1. BACKGROUND

1.1 The Application Site is located within the Wetland Buffer Area (WBA), which is approximately 6 hectares in size and on "Residential (Group D)" Zone under the approved Nam Sang Wai Outline Zoning Plan (OZP) – S/YL-NSW/8.

1.2 About 0.23 ha of abandoned pond (low ecological value) and about 0.46 ha of pond (low to medium ecological value) (i.e., a total of 0.69ha) within the Application Site will be lost due to the proposed development. The affected pond and abandoned pond are of lower ecological value than other similar habitats in the region, given their small sizes, being isolated from other similar habitats, and lack of proper management, the ecological impact due to their permanent loss is considered as **minor** and **minor to moderate** respectively and mitigation is recommended to compensate the loss of wetland during operational phase. Compensation should also be able to achieve the no net loss of wetland principle under TPB PG No. 12C. In order to compensate for the wetland loss, three wetland units (in the form as managed pond, and reedbed with expected higher overall ecological value than the existing habitats) would be recreated within the Application Site during the operational phase. The purposes of the proposed wetlands would consider beneficial functions including but not limited to e.g., provision for wildlife habitats, educational demonstration and/or water polishing etc.

2. SITE CHARACTERISTICS

2.1 As discussed in baseline sections of the EcoIA, the Application Site is entirely located within Wetland Buffer Area (WBA). The Application Site is largely left vacant and is currently dominated by wasteland habitat. However, there are also a pond, portions of an abandoned pond, sections of a tidal meander, and small area of developed area within the Application Site.

2.2 Though the pond at the northern end of the Application Site is reported to have engaged in a Fishpond Management Agreement, based upon on site observations during the ecological surveys over the past years, it might not be operated for commercial fish farming and thus not be managed at the same level as normal commercial fishponds. The abandoned pond was abandoned long time ago and has been fully overgrown by vegetations. Due to its close proximity to Yuen Long Highway and some village settlements nearby, the existing environment within and near the Application Site has endured a certain level of disturbance from human activities in nearby villages.

3. LINKAGE WITH NEARBY HABITATS

3.1 In order to rationalize the strategy for implementing the creation of wetlands inside the Application Site, it is required to have an overview of the surrounding habitats. As the northern, eastern and southern sides of the Application Site are within the WCA boundary, which is intended for wetland conservation, synergistic effects between the proposed wetlands within the Application Site and the wetlands within the WCA might

occur.

3.2 As shown in the habitat map of the EcoIA (**Figure A**), the area adjoining the eastern side of the Application Site is abandoned pond, but it was observed that weedy vegetation was cleared in these ponds and there was shallow water inside since 2021. An ecological enhancement study at six ponds to the east of the Application Site is underway. Four ponds were served as trials and two as control. Water level management were conducted at the trial ponds to enhance the feeding opportunities of waterbirds. Other management practices include clearance of weedy vegetation as needed.

3.3 Habitats adjoining the south and southwestern side of the Application Site are wasteland, abandoned pond and meander, which have their respective ecological values of low, low to medium, and medium respectively.

3.4 Habitats adjoining the west side of the Application Site are meander, wasteland and reedbed which have their respective ecological values of low to medium, low, and low to medium respectively. Habitats adjoining the northern side of the Application Site are woodland, and mitigation wetland which have their respective ecological values of low, and medium respectively.

4. RATIONALES FOR PROVIDING THE WETLAND HABITATS

4.1 According to the EcoIA, the small area size 0.69ha of abandoned pond and pond within the Application Site only supported low waterbird usage (i.e., only 8 species of waterbirds (**Table 4.1**)), and hence the direct impact due to the permanent loss of 0.23ha of abandoned pond during operational phase is considered as **minor** while that of the semi-active pond is considered as **minor to moderate**. Mitigation for the permanent loss of the semi-active pond by provisions of compensation wetland is recommended. Compensation should also be able to achieve the principle of no net loss of wetland under TPB PG No. 12C.

4.2 After reviewing the neighboring habitats adjoining the Application Site, the proposed habitats for the compensation wetland within the Application Site would follow the wetland habitat types found in the vicinity of the Application Site. The ecological value of different wetland habitats within the Study Area specified in the EcoIA is shown in **Table 4.2**. The designs of the proposed habitats in the compensation wetland are also aimed to attract the waterbirds found during the baseline survey as specified in the EcoIA. In addition, as shown on Landscape Master Plan, about 5-10m at the periphery of the Application Site is a building set back from the WCA. This proposed landscape area together with the compensation wetland along the periphery of the Application Site would also serve as a wetland and visual buffer for the surrounding environment during the operational phase.

4.3 As the proposed project is a housing development, elements with education purpose for the residents would be incorporated in the present wetland design. Examples for education demonstration include kiosks to provide nature conservation information such as plant species, ecological functions etc. to the residents.

4.4 Due to the site constraints, wetland areas for compensation will be provided mainly at

the edge of the Application Site, which can also together with the landscape planting to provide a wetland and visual buffer to the WCA to comply with the TPB PG-No. 12C.

Table 4.1 Waterbird Species Recorded within the Abandoned Pond and Pond within the Application Site during the Baseline Survey for EcoIA

No.	Species
1	Great Cormorant
2	Little Egret
3	Chinese Pond Heron
4	Yellow Bittern
5	Common Kingfisher
6	White-breasted Waterhen
7	Grey Heron
8	Common Moorhen

Table 4.2 Ecological Value of Different Wetland Habitats within the Study Area according to the EcoIA

Wetland habitat	Within / Outside Application Site	Ecological value
Abandoned Pond	Within and outside	Within: Low, outside: low to medium
Channel	Outside	Medium
Meander	Within and outside	Within: low, outside: low to medium
Mitigation wetland	Outside	Medium
Pond	Within and outside	Within: Low to medium, outside: Medium
Reedbed	Outside	Low to medium
Tidal marsh	Outside	Medium

5. PRELIMINARY DESIGN

5.1 The compensation wetland will include three proposed wetland units, which are further discussed in subsequent paragraphs. All of these compensation wetlands are proposed with soft substrate in order to have better ecological function. The schematic designs of the three proposed wetland units are shown in **Figure C to E** for reference.

- Compensation Wetland C at the southwest near the main entrance of the Site (approx. 0.40ha);
- Compensation Wetland D at the south (approx. 0.17 ha); and
- Compensation Wetland E at the southeast (approx. 0.12 ha)

5.2 ***Compensation Wetland C –*** It is noted that a landscape area with natural habitat and water feature has been proposed to the eastern portion of the application site under the approved planning application A/YL-NSW/274. This landscape area with natural habitat and water feature is aimed to respect the flightpath of breeding ardeids from Tung Shing Lane Egretry. In order to achieve a better ecological synergy with this

landscape area, it is proposed to provide a managed pond (i.e. Wetland C) adjoining this landscape area.

5.3 The compensation wetland would be designed to receive part of the surface runoff from the Application Site. Water depth of the compensation wetland would be in the order of about 1m. Native vegetation species (mainly floating plants such as *Nymphaea* spp., and/or other native species e.g., *Adina pilulifera*, *Commelina diffusa* and *Impatiens chinensis*) would be considered to be planted within this compensation wetland, and could benefit fauna inhabiting waterbodies of moderate depth. Perching structures for small sized birds would also be provided. This compensation wetland would be designed to ensure that the runoff would be retained to allow the particulates to settle before discharge. By achieving this, the surface runoff would be suitably polished before reusing for irrigation. Suitable landscape planting would also be implemented around this compensation wetland to discourage access by residents so as to minimize disturbance. However, maintenance staff would be allowed to enter into this compensation wetland to conduct necessary maintenance work.

5.4 ***Compensation Wetland D –*** the southern site boundary adjoins the WCA. The habitats adjoining the southern site boundary include a few small, abandoned ponds (including the outside portion of the abandoned pond lying on Application Site boundary), and wasteland as shown in the habitat map.

5.5 It is proposed to recreate a managed pond (i.e., Wetland D) in this area to achieve a better synergy with the neighboring habitats. The compensation wetland would be designed to receive part of the surface runoff from the development within the Application Site. Water depth of the compensation pond would range from about 1m to about 0.5m, and would provide habitats for typical freshwater associated fauna such as odonates. Typical marsh / pond species such as *Cyperus* spp. and other emergent freshwater plants suitable for perching by odonates would be considered to be planted within this compensation wetland. Similar to Wetland C, this compensation wetland would be designed to ensure that the runoff would be retained, and suitable landscape planting would also be implemented around this compensation wetland.

5.6 ***Compensation Wetland E –*** the southeastern corner of the Application Site is surrounded by a patch of larger abandoned ponds. Hence, it is proposed to recreate a reedbed (i.e., Wetland E) in this area to achieve a better synergy with the neighboring habitats. The compensation wetland would be designed to receive part of the surface runoff from the development within the Application Site. Water depth of the compensation wetland would be about 0.5m and reeds would be planted. By providing a reedbed in this location, cryptic reed-associated species could be benefited.

5.7 A summary of preliminary ecological considerations of the proposed wetlands is shown in **Table 5.1**. The total area of these three compensation wetlands is about 0.69 ha which is the same as the total area size of the pond and abandoned pond to be affected. The three compensation wetlands can provide different habitat types including pond with floating aquatic plants, pond with emergent plants, and reedbed, and could enhance the habitat diversity in the Application Site and have synergy effects with surrounding habitats and landscape area under other project (i.e., the landscape area with natural habitat and water feature under the approved planning application A/YL-NSW/274). These proposed wetlands are strategically located along the western and

southeast sides of the Application Site boundary, serving as ecological corridors and could offer ecological linkage with neighboring habitats adjoining the site (see **Figure A**). With the better ecological functions provided by these wetlands, the impact from the loss of the small areas of pond and abandoned pond could be fully compensated in accordance with TPB PG No. 12C. Depending on their locations, these compensation wetlands could be implemented in tandem with the construction programme for respective portions of the Application Site namely the access road, private housing site and public housing site. The compensation wetlands will be implemented as soon as the land is available upon approval. Details of the construction programme will be provided in the detailed design stage.

Table 5.1 Summary of Preliminary Ecological Considerations of the Compensation Wetland

Total Size (0.69 ha)	Design considerations	Construction	Operation approach	Long term management approach
Compensation Wetland C (0.40 ha)	• Form – Retention pond with soft substrate bottom • Water depth about 1m • Vegetation – Terrestrial native species at pond edge; floating plant • Ecology – Benefit fauna inhabiting moderate depth waterbodies; perching structures for small sized birds	• Excavate and compact in-situ soil to form pond bottom • Suitable waterproofing as necessary • Rainwater as the water source	• Collect stormwater runoff from the private development site • Replenish water from retention tank as necessary • Overflow to N49	• Low maintenance • Occasional removal of debris/dead plants from water • Occasional trimming or removal of invasive vegetation
Compensation Wetland D (0.17 ha)	• Form – Retention pond with soft substrate bottom • Water depth about 0.5 – 1m • Vegetation – Emergent plants • Ecology – Provide habitats for freshwater associated fauna; adjoins the WCA and a few small abandoned ponds outside site boundary to achieve better synergy of habitats	• Excavate and compact in-situ soil to form pond bottom • Suitable waterproofing as necessary • Rainwater as the water source	• Collect stormwater runoff from the private development site • Overflow to retention tank for irrigation • Potential visual amenity for residents	• Regular checking of water quality and potential artificial aeration as necessary • Regular removal of debris/dead plants from water • Regular trimming or removal of invasive vegetation
Compensation Wetland E (0.12 ha)	• Form – Freshwater reedbed (water depth ~0.5m) • Vegetation – Reeds • Ecology – Benefit cryptic reed-associated species; surrounded by a patch of larger abandoned ponds to achieve better synergy of habitats	• Excavate and compact in-situ soil • Pond mud might be required for reeds • Allow stormwater to fill up the pond • Planting of reed and aid the establishment in the early stage if necessary	• Collect stormwater runoff from the private development site • Overflow to retention tank for irrigation • Self-operational; require minimal operational intervention	• Cutting overgrown reed • Removal of invasive vegetation

5.8 In order to maintain the ecological functions of the proposed compensation wetlands in the long run, a Habitat Creation and Management Plan (HCMP) for the compensation ponds will need to be developed during the detailed design stage. An outline of the content of the HCMP is presented in **Table 5.2**.

Table 5.2 Outline of Key Items in the Habitat Creation and Management Plan

Key Sections in HCMP	Outline Content to be Further Developed
Objectives	• Presents the keys objectives of the HCMP • Describes site conditions such as location, boundary, topography, hydrology etc. • Summarises / updates habitat evaluation, species of conservation importance, impact evaluation
Mitigation Objectives	• Proposes management goals and objectives of the compensation ponds, for both construction and operational phases • Recommends suitable targets (e.g. habitat condition targets) for the compensation wetlands
Detailed Design and Construction Methods	• Design for water sources (mainly from rain water and surface runoff) • Design for hydrology and water level • Recommend vegetation species
Management Strategy	• Interface with the other areas of the development • Review the feasibility for nature-educational demonstration activities and propose where appropriate. All nature-educational demonstration activities will be organised and controlled to minimise interfering the functions of the wetlands.
Monitoring	• Monitoring of water level and water quality • Monitoring of the habitat quality • Monitoring of wildlife use including bird, dragonfly and amphibians (no specific monitoring target would be proposed)

6. EXPECTED ECOLOGICAL FUNCTIONS

Habitats

6.1 Three wetland habitat types (i.e., abandoned pond, pond, and meander) are identified within the Application Site, but only abandoned pond and pond will be lost due to the proposed development. Mitigation measure is recommended for the permanent loss during operational phase according to the EcoIA though the respectively low and low to medium ecological value of the wetland habitats that supported low diversity and abundance of waterbirds. Compensation should also achieve the no net loss principle requirement under TPB PG No. 12C.

6.2 The abandoned pond and pond within the Application Site are of low, and low to medium ecological value, respectively. It is expected that the three proposed wetland

types i.e. pond with floating aquatic plants, pond with emergent plants, and reedbed will all have at least low to medium ecological value given that appropriate management strategy can be applied.

6.3 With the implementation of the proposed wetlands for compensation purpose, the overall ecological value of the original two wetland types (i.e., abandoned pond and pond) within the Application Site will be increased from low / low to medium to at least low to medium. As the Application Site is located at the fringe of the Wetland Buffer Area and is considered as remotely connected to Deep Bay Area, the compensation ponds can act as slight enhancement to the overall ecological value of the region. **Table 6.1** summarizes the wetland habitats and the corresponding ecological value before and after the compensation.

Table 6.1 Summary of Wetland Habitat Loss vs. Compensation

Habitat	Area (ha)	Ecological value	Impact
Before compensation			
Abandoned pond	0.23	Low	Will be lost
Pond	0.46	Low to medium	Will be lost
After compensation			
Pond with floating aquatic plant (C)	C: 0.40	At least low to medium	Positive ecological impact
Pond with emergent plant (D)	D: 0.17	At least low to medium	Positive ecological impact
Reedbed (E)	E: 0.12	At least low to medium	Positive ecological impact

Waterbirds and Other Fauna

6.4 Given lack of significant pond drain down practice and overgrown of vegetation inside or along the bunds within the abandoned pond and pond of the Application Site, only 8 species of waterbirds were recorded during the baseline survey. The wetland creation aims to provide ecological functions as well as suitable habitats for waterbirds including the 8 recorded species.

6.5 **Table 6.2** shows the preferred habitat for the waterbirds recorded within the abandoned pond and pond of the Application Site. The proposed managed ponds and reedbed can provide suitable habitats for these waterbird species.

6.6 Besides, the compensation wetlands can also provide habitats for dragonfly and amphibians. With planting of aquatic plants and reed and the soft substrate water bodies, there will be perching spots for dragonfly adults and habitats for their nymphs. Wetlands with aquatic plants could also attract insects and provide feeding habitats for amphibians.

6.7 With the provision of the 3 wetland units of a total 0.69 ha, and the ecological functions as habitats for waterbirds and other fauna, the permanent habitat loss impact could be compensated and the no net loss principle requirement under TPB PG No. 12C can also be fulfilled.

Table 6.2 The Preferred Habitat for the Waterbirds Recorded within the Abandoned Pond and Pond of the Application Site

No.	Species	Preferred habitat		Remark
		Managed pond	Reedbed	
1	Great Cormorant	✓		The tree buffer next to managed pond provides roosting location
2	Little Egret	✓		
3	Chinese Pond Heron	✓		
4	Yellow Bittern		✓	
5	Common Kingfisher	✓		
6	White-breasted Waterhen		✓	
7	Grey Heron	✓		
8	Common Moorhen	✓	✓	

7. MANAGEMENT

7.1 The Compensation Wetlands will be maintained and managed together with the future private residential portion, with reference to the approaches demonstrated in Sha Po Marsh. Contractor with experience in wetland construction, management and wetland planting will be appointed to carry out the works for the construction and establishment. Appropriately qualified specialists with wetland design and management experience will be responsible for supervising implementation, management, and monitoring of the Compensation Wetlands.

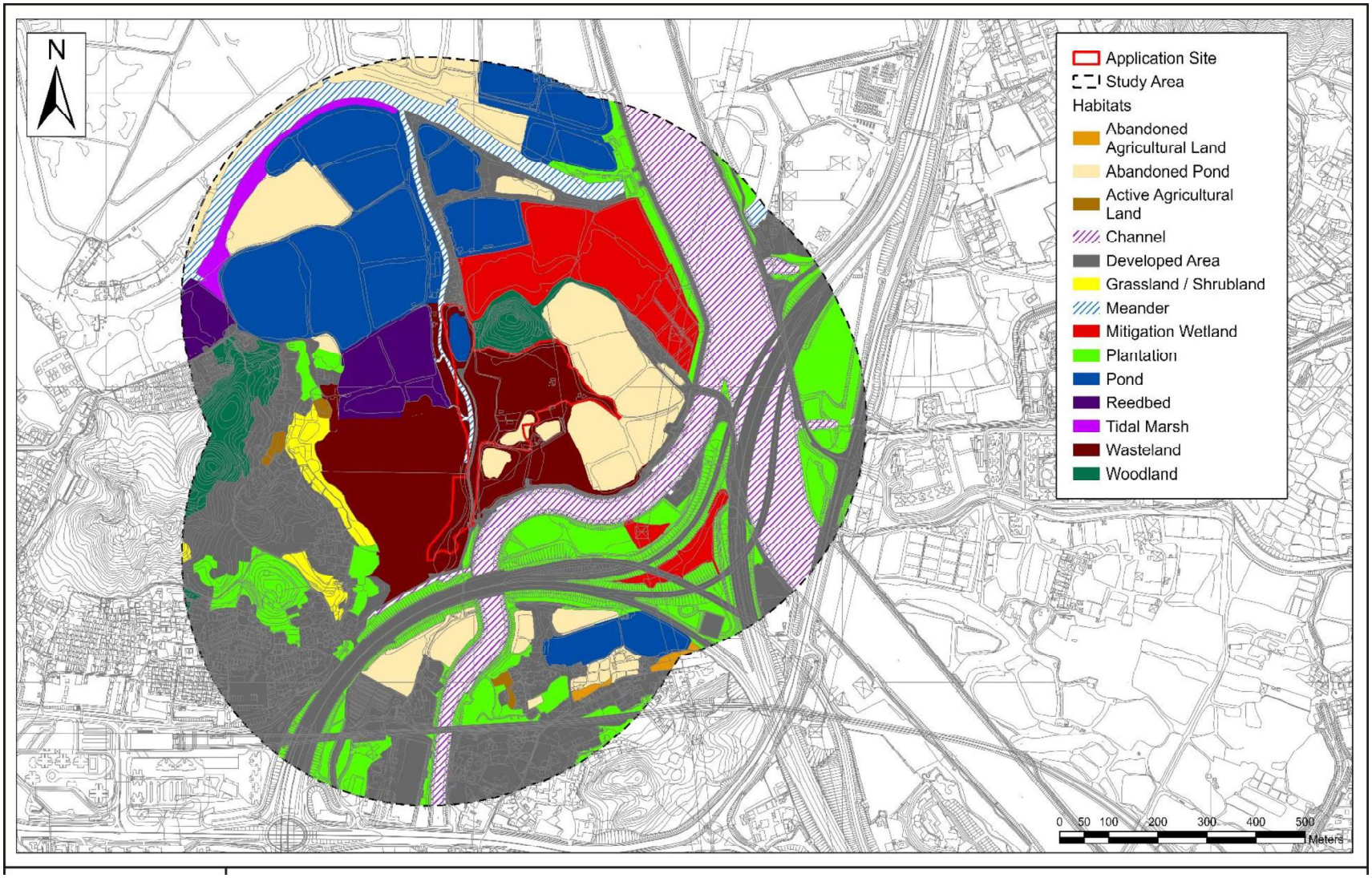


Figure A Application Site and Surrounding Habitats (from EcoIA)

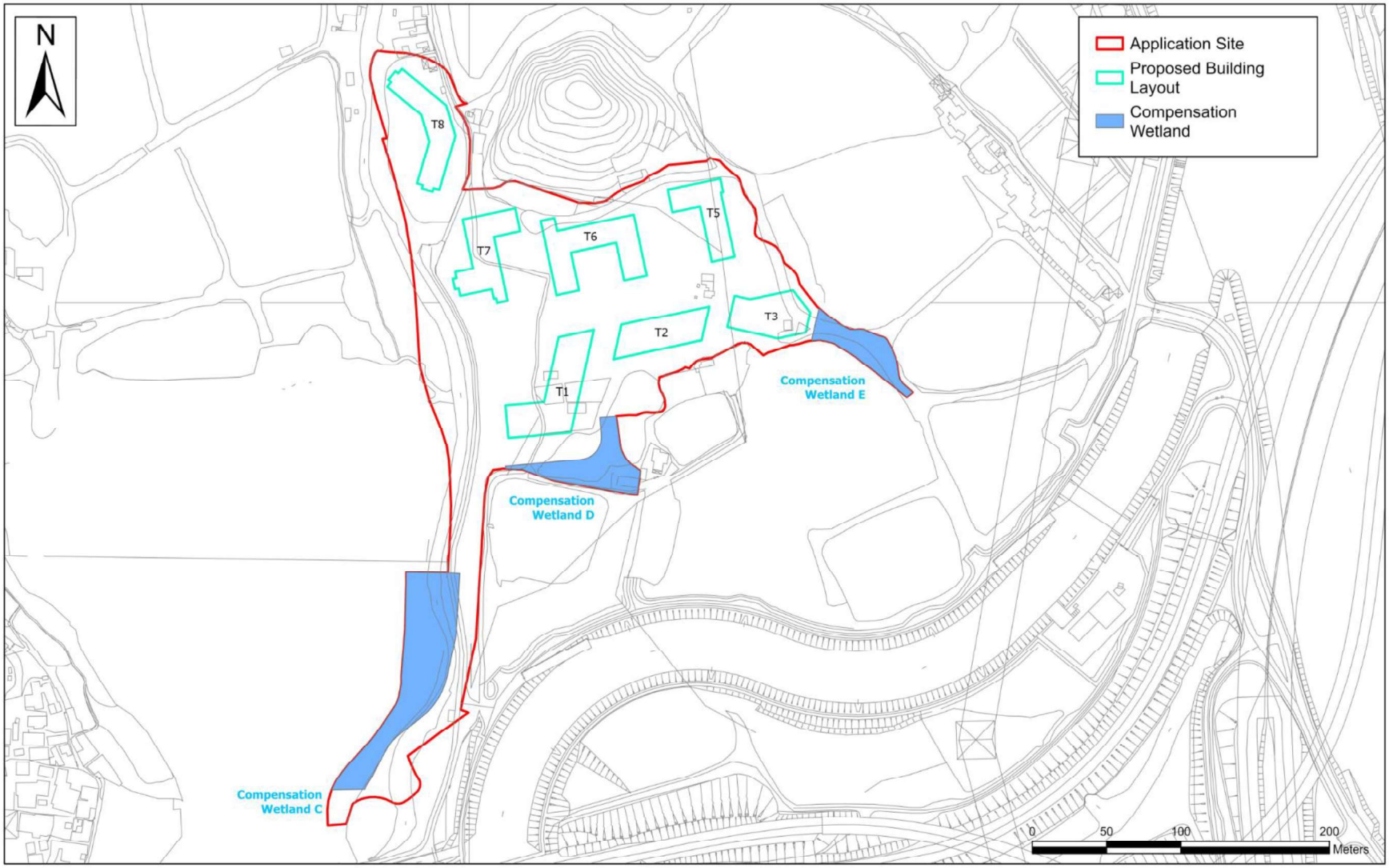


Figure B Locations and Layout of the Proposed Compensation Wetland Units

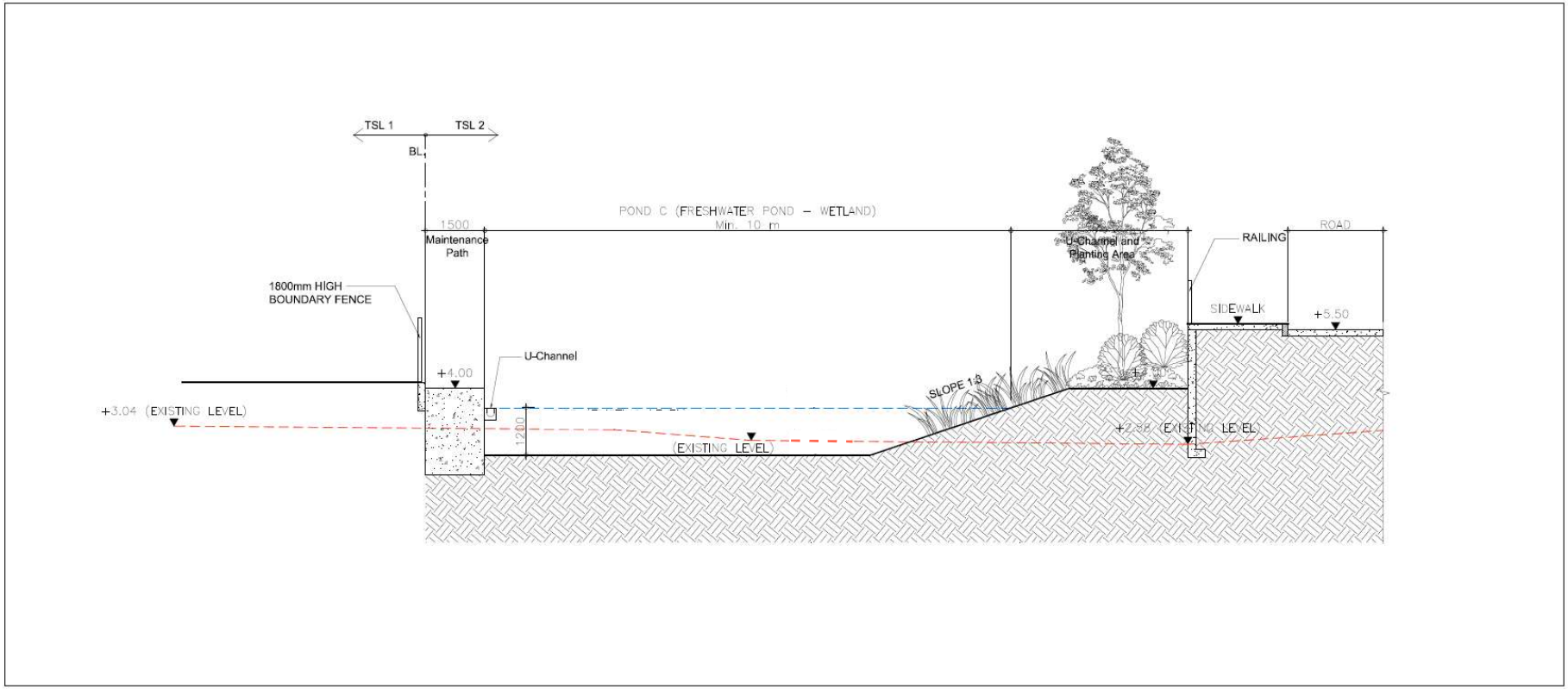


Figure C Proposed Section of Compensation Wetland C

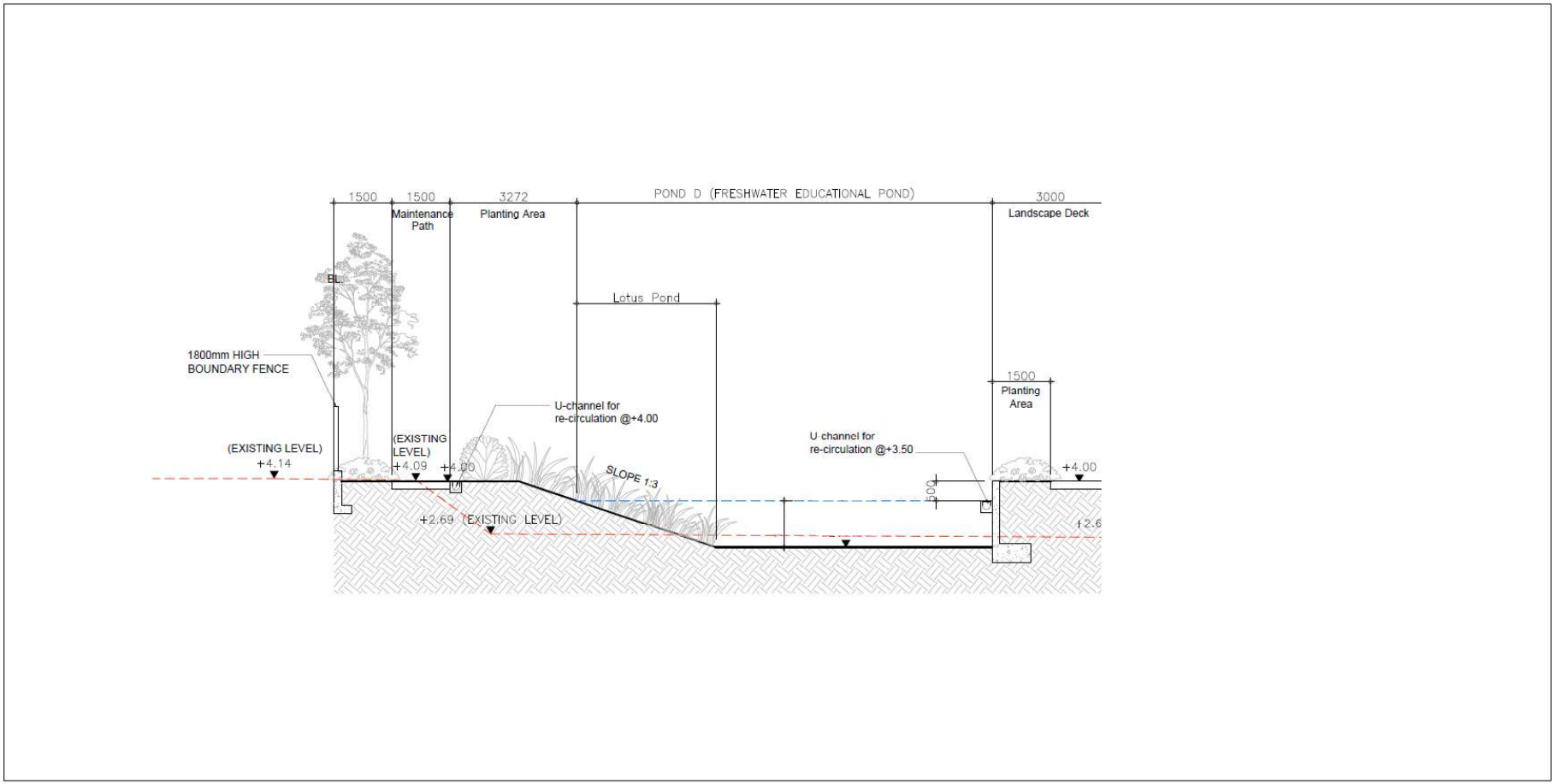


Figure D Proposed Section of Compensation Wetland D

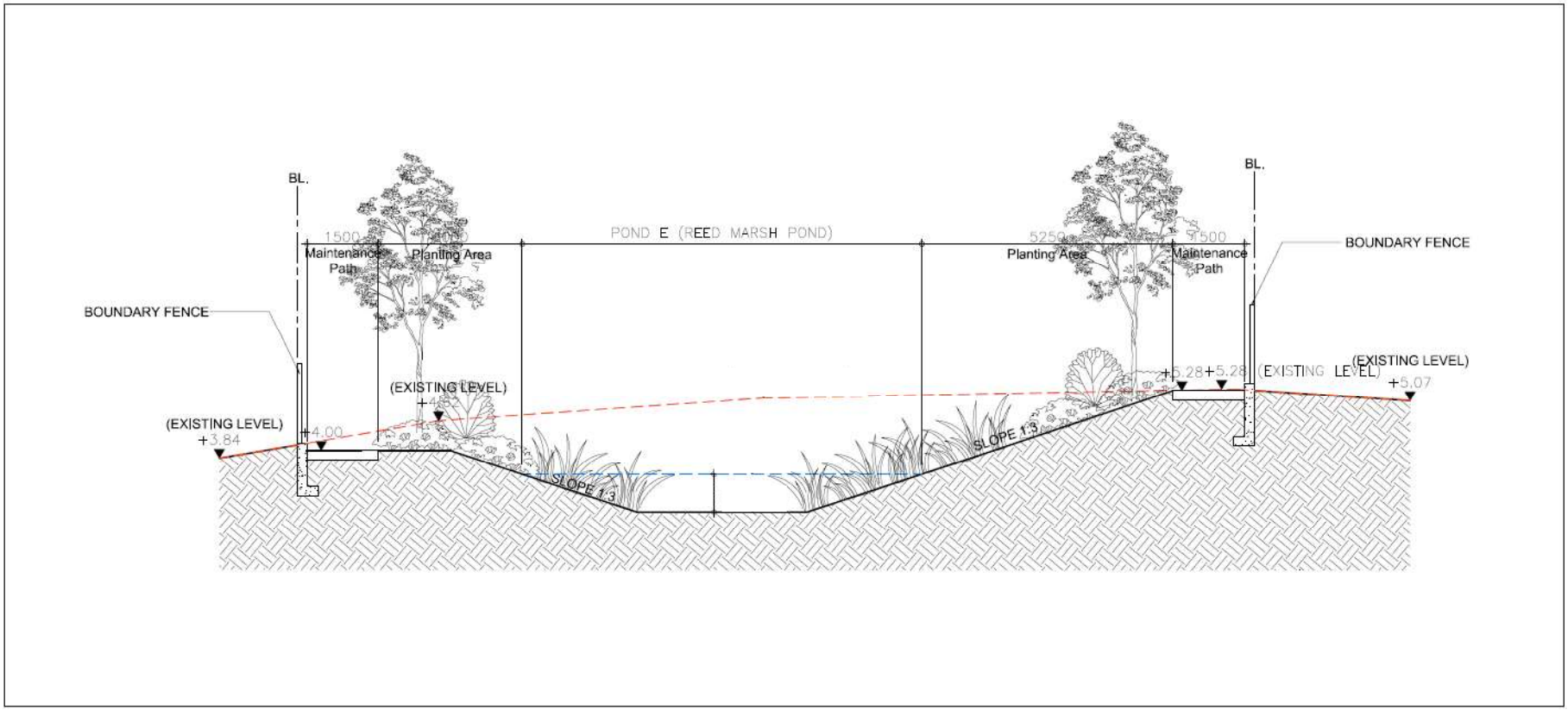


Figure E Proposed Section of Compensation Wetland E
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