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10. ECOLOGY (TERRESTRIAL AND AQUATIC)

10.1 INTRODUCTION

10.1.1.1 This section presents the baseline ecological profile within the Assessment Area, and the assessment results of the potential ecological impacts resulting from the construction and operation of the Project. The location plan and description of the project are presented in **Figure 1.1** and **Section 2** respectively.

10.1.1.2 According to the EIAO-TM, baseline conditions for ecological components of the terrestrial environment were evaluated based on information from available literature and field surveys conducted for the purposes of this EIA. Measures required to mitigate any identified adverse impacts are recommended, where appropriate, and residual impacts are assessed.

10.2 ENVIRONMENTAL LEGISLATION, STANDARDS AND GUIDELINES

10.2.1.1 This report makes reference to the following HKSAR Government ordinances, regulations, standards, guidelines, and documents when identifying ecological importance of habitats and species, and evaluating and assessing potential impacts of the Project on the ecological resources:

- Environmental Impact Assessment Ordinance (EIAO) (Cap. 499)
- Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) Annexes 8 and 16
- EIAO Guidance Note No. 3/2010, 6/2010, 7/2010, and 10/2010
- Forests and Countryside Ordinance (Cap. 96)
- Wild Animals Protection Ordinance (Cap. 170)
- Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)
- Town Planning Ordinance (Cap. 131)
- Water Pollution Control Ordinance (Cap. 358)
- Chapter 10 of the Hong Kong Planning Standard and Guidelines (HKPSG)
- Development Bureau (DEVB) TC(W) No. 4/2020 Tree Preservation; and
- Drainage Services Department Practice Note No. 3/2021 Guidelines on Design for Revitalisation of River Channel

10.2.1.2 This assessment also made reference to the following international conventions and national legislation:

- The International Union for Conservation of Nature (IUCN) Red List of Threatened Species
- The List of Wild Plants and Wild Animals Under Special State Protection under the Law of the People's Republic of China on the Protection of Wildlife; and
- The Convention on Biological Diversity (the CBD), and an associated city-level Biodiversity Strategy and Action Plan (BSAP) developed by Agriculture, Fisheries and Conservation Department (AFCD) under the CBD.

10.3 ASSESSMENT METHODOLOGY

10.3.1 Assessment Area

10.3.1.1 In accordance with the EIA Study Brief No. ESB-340/2021, the Assessment Area for the purpose of the terrestrial and aquatic ecological impact assessment includes areas within 500 m from the boundary of the Project and associated works as well as other areas likely to be impacted by the Project (**Figure 10.1** refers).

10.3.1.2 Other nearby ecological resources (e.g. roosting ardeids and Great Cormorants at the ponds near San Tin and Sam Po Shue) were observed outside the Assessment Area (**Figure 10.6** refers). These roosting avifauna may transit through or utilise habitats within the Project site. Therefore, ecological survey and ecological impact assessment on these roosting avifauna were included.

10.3.2 Ecological Survey Methodology

10.3.2.1 Ecological field surveys covering the Assessment Area for a 12-month survey period were conducted, covering both wet and dry seasons (**Table 10.1** refers). The purpose of the ecological surveys is to fill information gap, collect up-to-date ecological baseline information, and verify the information from literature review for subsequent assessment of ecological value, evaluation of the potential ecological impacts resulting from the Project, and provision of appropriate mitigation measures. The walk transects for ecological surveys, vantage points for egretry and flight path surveys, and freshwater communities sampling points are shown in **Figure 10.2**. Where coverage by walk-transect was not possible (e.g. inaccessible areas within workshops, open storage, or barrack areas, areas close to firing range where access is not allowed, hillside areas with limited accessibility and safety concern), high-power binoculars were used to determine the habitat structure, general vegetation composition, at a location as close as possible.

10.3.2.2 The field surveys covered flora, fauna and any other habitats / species of conservation importance. The proposed survey methodology has made reference to the EIAO Guidance Notes (No. 7/2010 and No. 10/2010) and covered active seasons of fauna groups. The criteria and guidelines as stated in Annexes 8 and 16 of the EIAO-TM were followed for evaluating and assessing the potential ecological impacts. All field surveys were carried out in such ways that would not cause any unnecessary stress or damage to the existing habitats and wildlife.

Habitat Mapping and Vegetation Survey

10.3.2.3 Terrestrial habitats within the Assessment Area were identified, sized and mapped. Ecological characteristics of each habitat type, including size, vegetation type, species present, dominant species found, species diversity and abundance, community structure, ecological value and inter-dependence of the habitats and species, and presence of any features of ecological importance were defined and characterised. Representative photographs of the habitat types and/or any important ecological features identified were taken. A habitat map of suitable scale (1:1000 to 1:5000) showing types and locations of terrestrial and aquatic habitats within the Assessment Area were prepared from aerial photographs. The habitat map was then checked during ground truthing and ecological surveys.

10.3.2.4 Potential watercourses within the Assessment Area were identified from maps published by the Survey and Mapping Office of the Lands Department and checked and mapped out during ground truthing, with particular attention to potential seasonal patterns as evidenced by presence of surface flowing water.

10.3.2.5 Vegetation surveys were conducted by direct observation to record diversity and dominance of plant species present in different habitat types once in wet season and once in dry season. The location of any plant species of conservation importance were recorded. Identification of flora species and status in Hong Kong were made with reference to Xing et al. (2000), Hu et al. (2003), Lai et al. (2008), Hong Kong Herbarium (2012), and Hong Kong Herbarium and South China Botanical Gardens (2007; 2008; 2009; 2011).

Avifauna Survey

10.3.2.6 The presence and abundance of avifauna at various habitats within the Assessment Area were recorded visually and aurally. Both daytime and night-time surveys were conducted

during both dry and wet seasons, using transect count method along the proposed walk transect (**Figure 10.2** refers). The location of any avifauna species of conservation importance were recorded, along with notable behaviour (e.g. breeding behaviour such as nesting and presence of recently fledged juveniles, roosting, and feeding activities). Ornithological nomenclature in this report follows Carey et al. (2001), Viney et al. (2005) and the most recently updated list from the Hong Kong Bird Watching Society (HKBWS).

Egretry Surveys (including Egretry Count and Flight Path)

10.3.2.7 Ecological field surveys at Mai Po Village Egretry and Mai Po Lung Village Egretry were undertaken during the ardeid breeding season to record the status of egretries and ardeid nesting activities (**Table 10.1** and **Figure 10.2** refer). The extent of the egretry was mapped and the physical environment was described, including identification of trees that were supporting nests, their sizes, and any presence of human disturbance within or in close proximity to the egretry. The distribution and abundance of nests from all ardeid species were identified from ground level using binoculars as close to the egretries as possible. The nest status (vacant or occupied), notable breeding behaviours (e.g. brooding, feeding of chicks), and presence of adult / juveniles were recorded.

10.3.2.8 Flight path surveys for the breeding ardeids were undertaken at the proposed vantages point for egretry (VP1A, VP1B, VP2A and VP2B), and started around half an hour before sunrise and last for about two hours. The flight path and flight height of ardeid individuals were followed by means of high-power binoculars to identify their landing locations, wherever possible. Where the ardeids fly out of sight prior to landing, the location at which they are lost from sight was recorded. High-power binoculars were also used at a further vantage point (VP3B) to supplement on the potential landing location of ardeids from the egretry, where necessary.

Roosting Ardeids & Great Cormorants

10.3.2.9 Given potential roosts of ardeids and other roosts (e.g. roosts of Great Cormorants) may be present within the Assessment Area, attention were given during ecological field surveys to confirm the presence of any potential roosting site(s), in particular trees adjacent to fishponds and other wetland habitats. Where potential roosts were identified, direct observation was made at vantage points as close as possible, at an appropriate viewing angle and distance to the roost. The avifauna species, abundance, location and extent of the roosting area, and the tree species used by the roosting avifauna community were recorded.

10.3.2.10 Observation of the flight path and returning time of the roosting individuals were undertaken at the proposed vantage points for identified roosts within the Assessment Area and in close vicinity (VP3A, VP3B, VP4, VP5, VP6, and VP7). For these identified ardeid night roosts, the flight path survey started about an hour before sunset and last until nightfall, which is the peak period of ardeid return. The exact time of sunset on the date of survey was referred from the Hong Kong Observatory. Where other roosting avifauna were observed, time of their peak activities were noted, while flight path survey were conducted before their peak return time.

Terrestrial Mammal Survey

10.3.2.11 Surveys for terrestrial mammals covered both dry and wet seasons, conducted in areas which might potentially be utilised by terrestrial mammals. The surveys focused on searching for field signs such as droppings, footprints, diggings or burrows left by larger mammals. Mammal identification was made as accurate as possible from the field signs encountered. In addition, any mammals directly observed were also identified and recorded, while survey for nocturnal mammal species were also undertaken at night-time by active searching with spotlight. A total of 20 camera traps were deployed throughout the Assessment Area at secure and appropriate locations (**Figure 10.2** refers), focusing

on areas with potential mammal usage, and with considerable distance away from existing human activities. Nomenclature of mammal follows Shek (2006).

10.3.2.12 Bat surveys were undertaken at night by surveyor(s) equipped with ultrasonic bat detector at potential roosting, commuting, foraging and drinking sites. The bat species was located upon the detection location of echolocation calls and from direct observation. The acoustic information was recorded for subsequent analysis, supplemented with other direct observation (e.g. size and flying pattern) for species identification.

Herpetofauna Survey

10.3.2.13 Herpetofauna within the Assessment Area were surveyed along survey transects. Potential microhabitats (e.g. leaf litter, underneath of rotten logs) were searched. All reptiles and amphibians sighted during both daytime and night-time surveys were recorded.

10.3.2.14 Amphibian survey was conducted whenever possible on evening following or during periods of rainfall, focusing on areas suitable for amphibians (e.g. forests, shrublands, grasslands, streams, catchwaters, fishponds and marshes, if any). Records of calling amphibians formed the bulk of the data collected, but this was also supplemented, when possible, by visual observation of eggs, tadpoles and frogs and toads.

10.3.2.15 During reptile surveys, careful searches of appropriate microhabitats and refugia (e.g. stones, pond bunds, crevices, leaf litter / debris, rotten log) were undertaken. All reptiles observed were identified. In addition to active searching, observation of exposed, basking or foraging reptiles were also recorded.

10.3.2.16 Nomenclature of amphibian and reptile follows Chan et al. (2005) and Chan et al. (2006), respectively.

Butterfly and Odonate Survey

10.3.2.17 Butterflies and odonates (dragonflies and damselflies) within the Assessment Area were surveyed along survey transects. Attention was given to their potential habitats. Relative abundance of butterfly, dragonfly and damselfly was recorded, while larvae and pupae encountered was also recorded. Nomenclature of butterfly follows Lo & Hui (2010) and odonate on Tam et al. (2011) and Reels (2019).

Freshwater Community Survey

10.3.2.18 Freshwater communities were surveyed through active searching and/or direct observation at representative freshwater sampling locations within the Assessment Area (FS1 – FS10) (**Figure 10.2** refers). To avoid driving organisms (e.g. fish and shrimps) away, and avoid disturbing the bottom substrate, direct observation from a suitable distance was conducted before active searching (hand netting and kick sampling), where appropriate. Boulders within the watercourse were turned over to locate aquatic animals beneath, while hand-net and kick-sampling were conducted to collect organisms along the watercourse. Organisms encountered were recorded and identified to the lowest possible taxon level. Nomenclature of freshwater fish and invertebrate communities follows Lee et al. (2004) and Dudgeon (2003).

10.3.3 Ecological Survey Programme

10.3.3.1 A schedule for the 12-month ecological surveys is presented below.

Table 10.1 Schedule of Ecological Surveys

Proposed Survey	Dry Season						Wet Season					
	Nov 2021	Dec 2021	Jan 2022	Feb 2022	Mar 2022	* Apr 2022	May 2022	Jun 2022	Jul 2022	Aug 2022	Sep 2022	* Oct 2022
Habitat and Vegetation Survey	✓	✓								✓		
Avifauna (Day and Night)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Egretry Surveys (incl. Egretry Count and Flight Path)					✓	✓	✓	✓	✓	✓		
Roosting Ardeids & Great Cormorants (incl. Flight paths)	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Terrestrial Mammal (Day and Night)	✓		✓		✓		✓		✓		✓	
Herpetofauna (Day and Night)					✓	✓	✓	✓	✓	✓	✓	✓
Butterfly and Odonate	✓				✓	✓	✓	✓	✓	✓	✓	✓
Freshwater Community				✓						✓		

Note: * Transitional Period

10.3.4 Assessment Approach

10.3.4.1 The criteria and guidelines as stated in Annexes 8 and 16 of the EIAO-TM were followed for evaluating and assessing ecological impact arising from the construction and operation of the Project. Potential direct / indirect, on-site / off-site, primary, secondary, cumulative and residual ecological impacts arising from the construction and operation of the Project were identified and evaluated where possible. Mitigation measures and monitoring and audit programme were recommended, where necessary.

10.4 DESCRIPTION OF THE ENVIRONMENT

10.4.1 Recognised Sites of Conservation Importance

Sam Po Shue Wetland Conservation Park (SPS WCP)

10.4.1.1 The Agriculture, Fisheries and Conservation Department (AFCD) has commenced a Strategic Feasibility Study on the Development of Wetland Conservation Parks System, which proposed the SPS WCP as the first park to be developed. The Government will establish the SPS WCP to enhance the ecological quality and biodiversity of the Northern Metropolis, provide quality outdoor eco-education and recreation facilities for public enjoyment, as well as introduce modernised aquaculture in the park. The SPS WCP, with a proposed area of approximately 338 ha, will serve dual purposes. First, it allows the Government to enhance the overall ecological value, biodiversity and connectivity in the Deep Bay area through proactive conservation and management. Secondly, it will enhance the ecological function and capacity of 288 ha of wetlands with active conservation management and enhance the fisheries resources of 40 ha of fishponds with modernised aquaculture, to compensate for the loss in wetland habitats and fisheries resources arising from the development of San Tin Technopole and to achieve no-net-loss in ecological function and capacity of the wetlands concerned. Within the SPS WCP, there will be 253 ha of ecologically enhanced fishponds compensating for pond habitat loss, 35 ha of enhanced freshwater wetland habitat compensating for other freshwater wetland habitat loss, 40 ha of enhanced fishponds compensating for fisheries loss, and about 10 ha reserved for other supporting facilities. The impact on these wetlands concerned are provided in **Section 10.8**, while the derivation of the enhancement area is further elaborated under **Section 10.11.3** and **Section 11**.

Mai Po Inner Deep Bay Ramsar Site, and Ramsar Site Priority Site for Enhanced Conservation

10.4.1.2 An extensive area of wetland habitats in the Mai Po and Inner Deep Bay area was designated as a Ramsar Site in 1995 under the Ramsar Convention, covering a mosaic of habitats such as intertidal mudflat, mangroves, tidal shrimp ponds, fishponds, and reedbed. Mangrove habitat within this Ramsar Site was considered to be the largest in Hong Kong, while the reedbed habitat was considered to be the largest across Hong Kong and Guangdong Province (AFCD, 2021b). Considering the international ecological importance of this area, it was further identified as a Priority Site for Enhanced Conservation under the New Nature Conservation Policy in 2004 (AFCD, 2021c). This Ramsar Site is located outside the Project area, at the northwest of the Assessment Area (**Figure 10.1** refers).

Deep Bay Wetland outside Ramsar Site Priority Site for Enhanced Conservation

10.4.1.3 Another extensive area of fishponds adjacent to the Ramsar Site and along Shenzhen (SZ) River was also identified as a Priority Site for Enhanced Conservation (extending from Sam Po Shue towards northeast), with a focus on the waterbirds and other wildlife utilising the fishpond habitats (AFCD, 2021c). Part of this Priority Site is situated within the Project area, mainly including the fishponds within San Tin area (**Figure 10.1** refers).

Mai Po Village Site of Special Scientific Interest (SSSI)

10.4.1.4 An area of the wooded habitats to the south of a junction between Tam Kon Chau Road and Castle Peak Road (Mai Po section), where the Mai Po Village SSSI is located, is zoned as “SSSI” zone under the Approved Mai Po and Fairview Park Outline Zoning Plan (OZP) No. S/YL-MP/6. The “SSSI” zone forms part of the Mai Po Inner Deep Bay Ramsar Site and Priority Site for Enhanced Conservation, and this “SSSI” zone was designated with a general presumption against development, and to conserve the undisturbed woodland that support the community of nesting and breeding ardeids at Mai Po Village Egretry, further described below at **Section 10.4.2.4**. A small corner of this “SSSI” zone (comprising some structures) is partially encroached within Project area, and will be re-zoned (**Figure 10.1** refers).

Wetland Conservation Area (WCA) and Wetland Buffer Area (WBA)

10.4.1.5 To further conserve the ecological value of the Mai Po Inner Deep Bay Ramsar Site, a contiguous area of fishponds (including both active and abandoned) along the landward side of the Ramsar Site were designated as Wetland Conservation Area, conserving the fishpond habitats as an integral of the wetland ecosystem, where only developments to support ecological conservation or essential infrastructural projects shall be allowed. A principle of “no-net-loss in wetland” is adopted in considering development proposals in the Deep Bay area, including WCA and WBA, where wetland compensation and mitigation measures against disturbance would be necessary.

10.4.1.6 An approximate area of 500 m along the landward boundary of the WCA was designated as WBA to further support wetland conservation by protecting the ecological integrity of the fishpond and other wetland habitats in the vicinity and to prevent development that would have a negative indirect impact on the ecological value of the fishponds. Both WBA and WCA fall within the Project area, thus mitigation measures would be required for any identified potential ecological impacts. Furthermore, the development should not cause a net increase in pollution load to Deep Bay.

10.4.1.7 Among some 610 ha of proposed development area of San Tin Technopole, although 150 ha are located in the WCA and 97 ha in the WBA making a total of 247 ha, about 158 ha among them (64%) are already brownfield sites, filled fishponds and developed areas including traditional villages and the boundary control point. The remaining area of about 89 ha are fishponds proposed to be filled for development, and about half of them no longer have any fish farming activities or have been abandoned for years.

"Conservation Area" ("CA" zone)

10.4.1.8 Two adjoining Conservation Area ("CA" zone) were designated under the Approved San Tin OZP No. S/YL-ST/8 and Approved Mai Po and Fairview Park OZP No. S/YL-MP/6 to cover part of the fishpond and other wetland habitats north of San Tin near Deep Bay area, to conserve the wetland ecosystem and ensure the food supply for avifauna, including habitats for roosting and foraging waterbirds. A "no-net-loss in wetland" principle is adopted for any change in use in this area. "CA" zone under No. S/YL-ST/8 falls within the Project area while "CA" zone under No. S/YL-MP/6 falls within the Assessment Area but outside the Project area.

10.4.1.9 Another adjacent "CA" zone occur on the east along Lok Ma Chau (LMC) Meander (also known as Old Shenzhen River Meander), designated under the Approved Lok Ma Chau Loop OZP No. S/LMCL/2, to protect and maintain the natural landscape and ecological features of the meander and its riparian vegetation, which supports movement corridor for avifauna flight paths and Eurasian Otters, for conservation, educational and research purposes, and to separate sensitive natural environment from adverse effects of development. A small part of this "CA" zone falls within the Project area.

10.4.1.10 Part of Hadden Hill (Ki Lun Shan) and Kai Kung Leng was designated as "CA" zone under the Approved Ngau Tam Mei OZP No. S/YL-NTM/12. This "CA" zone was designated with the intention to protect and retain the existing natural landscape, ecological and topographical features of the area, and mainly covers hillside vegetated habitats. A small part of this "CA" zone falls within the Project area.

10.4.2 Other Ecologically Sensitive Resources

Inner Deep Bay and Shenzhen River Catchment Important Bird Area (IBA)

10.4.2.1 Mai Po Inner Deep Bay area and the vicinity around Shenzhen River Catchment was recognised as an IBA by BirdLife International, for its international significance in terms of the size and trend of bird population. The recognition was done as an effort to secure long-term conservation of areas that are important for birds and biodiversity. A mosaic of wetland habitats (total 3150 ha) was recognised for its global importance, and support to large number of passage and wintering waterbirds, including species of conservation importance and threatened species. Part of this IBA falls within the Project area.

Egretries

10.4.2.2 Two known egretries are identified within the 500 m Assessment Area, namely Mai Po Lung Village Egretry and Mai Po Village Egretry. Mai Po Lung Village Egretry, the third largest colony in Hong Kong (Anon, 2022), is located inside the Project area at San Tin next to Castle Peak Road (San Tin Section) (**Figure 10.1** refers). Little Egret (*Egretta garzetta*) and Chinese Pond Heron (*Ardeola bacchus*) were recorded utilising tree species *Ficus benjamina*, *Ficus microcarpa*, *Ficus virens*, *Litchi chinensis* and *Melaleuca leucadendra* as nesting substrates (Anon, 2022).

10.4.2.3 Mai Po Village Egretry is located within the Assessment Area but outside the western boundary of the Project area, and about 760 m west to the Mai Po Lung Village Egretry (**Figure 10.1** refers). This egretry also supports Little Egret and Chinese Pond Heron, with *Celtis sinensis* and *F. microcarpa* being the predominant nesting substrates (Anon, 2021a).

10.4.2.4 Previous records of nesting activities at these two egretries from 2018 to 2022 are presented in **Table 10.2**. Fluctuating number of nests were recorded at both egretries. It is probable that the breeding ardeids might have moved in-between these two colonies given their close proximity. The occasional decrease of nests at the egretries might be attributed to decline of condition of the tree substrates, such as the Mai Po Village Egretry after Typhoon Mangkhut that hit Hong Kong after the breeding season in 2018 (Anon, 2021a).

Table 10.2 Maximum Number of Nests Recorded at Mai Po Lung Village Egretry and Mai Po Village Egretry (2018 – 2022) (1)

Species	Mai Po Lung Village Egretry					Mai Po Village Egretry				
	2018	2019	2020	2021	2022	2018	2019	2020	2021	2022
Little Egret	14	41	34	41	45	99	91	70	54	73
Chinese Pond Heron	53	68	126	97	65	123	68	43	8	8
Total no. of nests	67	109	160	138	110	222	159	113	62	81

Source (1): Anon, 2018; 2020; 2021a; 2021b; 2022.

Roosting Sites of Ardeid and Great Cormorant

10.4.2.5 Some known roosting sites for ardeids and other waterbirds were identified within the Assessment Area and the vicinity (**Figure 10.1** refers). Various species of ardeids including Great Egret (*Ardea alba*), Little Egret, Chinese Pond Heron, Eastern Cattle Egret (*Bubulcus coromandus*) and Grey Heron (*Ardea cinerea*) and other waterbird species including Great Cormorant (*Phalacrocorax carbo*) and Black-faced Spoonbill (*Platalea minor*) were recorded roosting at the Lok Ma Chau Ecological Enhancement Area (LMC EEA), particularly at the pond at the southwest edge of the LMC EEA, just outside the Assessment Area (MTRC, 2021). This roosting site is named as "Sam Po Shue Night Roost" under this Project (**Figure 10.1** refers).

10.4.2.6 According to the surveys conducted by AFCD during winter 2019/20, the Lok Ma Chau Ardeid Night Roost (namely Sam Po Shue Night Roost under this Project) is the third largest roosting site in Hong Kong, with a total of 431 ardeid individuals being recorded at *F. microcarpa* and bare trees within the LMC EEA, outside the current Assessment Area. The ardeids mainly returned from fishponds in the vicinity and Shenzhen River (AFCD, 2020).

10.4.2.7 A high abundance of Great Cormorant also utilised the Sam Po Shue Night Roost as roost during winter, first recorded in 2014. More than 2,000 individuals of Great Cormorant were recorded each month between November and February in 2020 (MTRC, 2021).

10.4.2.8 Other daytime roosting sites of Great Cormorants, located south to Lok Ma Chau Loop (hereinafter referred to as "the Loop") near Ha Wan Tsuen Road, were observed during dry season under the EIA Study of Development of Lok Ma Chau Loop (CEDD & PlanD, 2013a). The day roost is located within the current Project area and named as "Lok Ma Chau Loop Day Roost" under this Project (**Figure 10.1** refers).

Lok Ma Chau Meander and San Tin Eastern Main Drainage Channel (STEMDC)

10.4.2.9 The LMC Meander is located on the northern part of the Assessment Area, around the Loop (**Figure 10.1** refers). The meander was originally part of Shenzhen River prior to training, and was restored to mitigate the loss of fishponds from training works and is now one of the largest semi-natural river sections remaining in Hong Kong. The LMC Meander was recorded to provide foraging ground and movement corridor for Eurasian Otter (*Lutra lutra*), as well as roosting areas for waterbirds (e.g. Little Grebe *Tachybaptus ruficollis*, Great Cormorant, and ardeids) and acts as flight path corridors for avifauna movement between nearby wetland habitats (CEDD & PlanD, 2013a). A small section of the LMC Meander is located within the Project area.

10.4.2.10 STEMDC is a drainage channel running along the eastern edge of Sam Po Shue and San Tin fishpond area, which is situated within the Project area (**Figure 10.1** refers). The channel flows northward into Shenzhen River, where tidal influence affects a short northern section of the STEMDC downstream to the inflatable dam. As part of a mitigation measure for a drainage improvement project (refer to **Section 10.4.2.12**), multiple compensation features including grasscrete lining, embankment planting and constructed wetland were incorporated into the STEMDC (TDD, 1999). Avifauna species, including waders such as Wood Sandpiper (*Tringa glareola*) and Black-winged Stilt

(*Himantopus himantopus*), waterfowls such as Eurasian Teal (*Anas crecca*) and Eurasian Wigeon (*Mareca penelope*), and juvenile Greater Painted-snipe (*Rostratula benghalensis*) were recorded utilising the channel (CEDD & PlanD, 2013a).

Mitigation Wetlands

10.4.2.11 Some mitigation / compensatory wetland habitats and features were proposed under various designated projects within the Assessment Area, as listed below and presented in **Figure 10.1**. Further descriptions of these habitats are provided in **Section 10.6**.

Mitigation Measures under STEMDC

10.4.2.12 The STEMDC was constructed under the "Main Drainage Channels and Poldered Village Protection Schemes for San Tin, NWNT", with loss of fishponds and other wetland habitats under the project. To compensate for the loss of these habitats, about 16 ha of mitigation habitats were created. This includes terrestrial and wetland habitats created along the east of STEMDC (hereafter referred to as "STEMDC wetland", which includes small ponds and shallow marsh habitat) (TDD, 1999). This STEMDC wetland is located within the Project area. In addition, the tidal channel, grasscrete-lined bottom and sides, and embankment planting along STEMDC were previously described as "other mitigation measures" to compensate for habitat loss under the STEMDC project (TDD, 1999).

10.4.2.13 Other mitigation measures were also proposed under the aforementioned Project, such as the management of water level and vegetation at Tsing Lung Tsuen drainage channel, also known as San Tin Western Main Drainage Channel (hereafter referred to as "STWMDC") and at a flood storage pond adjacent to San Tin Tsuen Road (TDD, 1999). The STWMDC is located within the Project area.

San Tin Constructed Wetland

10.4.2.14 Flood protection embankment and floodwater storage pond were constructed under a drainage works conducted near Tsing Lung Tsuen before the year 2000, which resulted in loss of fishponds. Landscape and ecological mitigation measures were undertaken for the loss of these ponds, where an artificial wetland was created, and planting of various wetland vegetation and shrub species was introduced at this San Tin Constructed Wetland. The San Tin Constructed Wetland was enclosed within Project area, located to the west of San Tin Tsuen Road (**Figure 10.1** refers).

Lok Ma Chau Ecological Enhancement Area and Clean-up Reedbed (LMC EEA)

10.4.2.15 To compensate for the habitat loss of fishponds, marsh and reedbed from the construction of Sheung Shui to LMC Spur Line, a Lok Ma Chau Ecological Enhancement Area and Clean-up Reedbed (hereafter referred to as "LMC EEA") was created to provide suitable habitats for fauna recorded near the footprint of LMC Spur Line and Station. The 32-hectare LMC EEA comprises managed freshwater wetland habitats and have been in operation since 2007. On the east of the LMC EEA, there is a 5-hectare clean-up reedbed for polishing effluent from the MTR LMC Station. Active management has been adopted in the LMC EEA since establishment, including fish stocking and pest management (MTRC, 2019). The compensatory area successfully attracted many species of conservation importance such as avifauna Black-faced Spoonbill, Falcated Duck (*Anas falcata*) and Yellow-breasted Bunting (*Emberiza aureola*), and mammals Eurasian Otter and Leopard Cat (*Prionailurus bengalensis*) (MTRC, 2021). The eastern portion of the LMC EEA is located within the Assessment Area but outside the Project area (**Figure 10.1** refers).

Development of Lok Ma Chau Loop – Ecological Area (LMC Loop EA)

10.4.2.16 To compensate for the loss of reedbed and freshwater marsh and minimise impacts on bird flight paths, an Ecological Area of about 12.8 ha is designated within the southern edge of the Loop, adjoining the LMC Meander (CEDD, 2019). A small portion of the Ecological Area is located within the northern end of the current Assessment Area outside Project area (**Figure 10.1** refers).

Mosaic of Wetland and Agricultural Habitats

10.4.2.17 Mosaic of agricultural land and wetland habitats were recorded at Shek Wu Wai San Tsuen (within the Project area) and Lok Ma Chau Tsuen (outside the Project area), comprising habitats such as active, inactive, and abandoned agricultural lands and ponds. Some of these habitats were also observed to transition into grassland and marsh habitats. Both agricultural areas in Shek Wu Wai San Tsuen and Lok Ma Chau Tsuen were included as part of a bird survey conducted by the Kadoorie Farm and Botanic Garden (KFBG) which focused on selected farmland habitats in the northern New Territories of Hong Kong, and the associated fauna diversity (KFBG, 2022; Zheng, et al., 2023). Description and evaluation of habitats within this area are provided in below sections.

Wildlife Corridor

10.4.2.18 Under the construction of Sheung Shui to Lok Ma Chau Spur Line, aside from the creation of LMC EEA, a wildlife corridor was also constructed to the east of the LMC EEA, to allow free movement of mammals underneath San Sham Road (EPD, 2015). This wildlife corridor comprises a series of structures (culvert, ramps, and underpass), and associated mammal barriers, to allow animal movement across San Sham Road and Lok Ma Chau Road, between STEMDC and Ha Wan Tsuen. The wildlife corridor is located within the Project area, presented in **Figure 10.10A**.

10.5 ECOLOGICAL BASELINE INFORMATION (LITERATURE REVIEW)

10.5.1 Literature Review

10.5.1.1 Relevant reports, studies, books, scientific papers and available information regarding the ecological characteristics of the assessment were collated and reviewed (see **Table 10.3**). The information collected was evaluated to identify any information gaps relating to the assessment of potential ecological impacts.

Table 10.3 Baseline Information on Ecological Resources in the Assessment Area

Relevant Literature	Habitat and Vegetation	Avifauna	Mammal	Herpetofauna	Butterfly and Odonate	Freshwater Community
Development of Lok Ma Chau Loop: Main Works Package 1 – Environmental Monitoring and Audit (EM&A) Report for October 2022 (CEDD, 2022)		✓	✓	✓		✓
Study on Phase One Development of the New Territories North – San Tin / Lok Ma Chau Development Node – Feasibility Study – Additional Services for Expanded Ecological Survey – Draft Ecological Baseline Survey Report (CEDD & PlanD, 2021a)	✓	✓	✓	✓	✓	✓
Proposed Interim Sewage Treatment Plant and Effluent Reuse Facility at Wo Shang Wai, Yuen Long (AEIAR-217/2018) (Profit Point Enterprises Ltd, 2018)	✓	✓	✓	✓	✓	✓
Development of Lok Ma Chau Loop – EIA Report (AEIAR-176/2013) (CEDD & PlanD, 2013a)	✓	✓	✓	✓	✓	✓
North East New Territories New Development Areas Planning and Engineering Study – Investigation – EIA Report (AEIAR-175/2013) (CEDD & PlanD, 2013b)	✓	✓	✓	✓	✓	✓
Hong Kong Section of Guangzhou-Shenzhen-Hong Kong Express Rail Link. EIA Report (AEIAR-143/2009) (MTRC, 2009)	✓	✓	✓	✓	✓	✓

Relevant Literature	Habitat and Vegetation	Avifauna	Mammal	Herpetofauna	Butterfly and Odonate	Freshwater Community
Construction of Cycle Tracks and the Associated Supporting Facilities from Sha Po Tsuen to Shek Sheung River – EIA Report (AEIAR-133/2009) (CEDD, 2008)	✓	✓	✓	✓		✓
Proposed Comprehensive Development at Wo Shang Wai, Yuen Long – EIA Report (AEIAR-120/2008) (Profit Point Enterprises Ltd, 2008)	✓	✓	✓	✓	✓	✓
Sheung Shui to Lok Ma Chau Spur Line – EIA Report (AEIAR-052/2002) (KCRC, 2002)	✓	✓	✓	✓	✓	✓
Main Drainage Channels and Poldered Village Protection Scheme for San Tin, NWNT – EIA Report (AEIAR-019/1999) (TDD, 1999)	✓	✓	✓	✓	✓	✓
Agriculture, Fisheries and Conservation Department's (AFCD) Website and Biodiversity Database (AFCD, 2021a)	✓	✓	✓	✓	✓	✓
AFCD Newsletter: Hong Kong Biodiversity Issue No. 26 (AFCD, 2020)		✓				
AFCD's Biodiversity Survey between 2002 and 2019 (AFCD, 2019)		✓	✓	✓	✓	✓
Mai Po Inner Deep Bay Ramsar Site Waterbird Monitoring Programme, Egretry Counts in Hong Kong, Summer Report 2018-2022 (Anon, 2018; 2020; 2021a; 2021b; 2022)		✓				
Mai Po Inner Deep Bay Ramsar Site Waterbird Monitoring Programme, Monthly Waterbird Monitoring (Anon, 2021c)		✓				
Mai Po Nature Reserve Management Plan: 2019-2024 (WWF, 2021)		✓				
Lok Ma Chau Habitat Creation and Management Plan (MTRC, 2019)	✓	✓	✓	✓	✓	
Bird Survey of Selected Farmlands in the Proposed Northern Metropolis, Hong Kong SAR: Interim Report (KFBG, 2022)	✓	✓				
The Hidden Oases of Hong Kong: High Ecological Value Farmlands in the Proposed Northern Metropolis (Zheng et al., 2023)	✓	✓		✓	✓	

Habitat and Vegetation

10.5.1.2 A total of 15 habitat types were previously identified within the 500 m Assessment Area, which include channelised watercourse, watercourse, pond, reed / marsh, mitigation wetland, agricultural land, seasonally wet grassland, grassland, grassland / shrubland, shrubland, secondary woodland, orchard, plantation, developed area, and wasteground (CEDD & PlanD, 2021a; CEDD & PlanD, 2013a). Most of these recorded habitats were also identified within the Project area, dominated by ponds, grassland / shrubland, and developed area. Flora species of conservation importance recorded from previous study are presented in **Table 10.22** and **Figure 10.4**.

General Description of Habitats within Project Area

10.5.1.3 An extensive area of fishponds was present in the northern part of the Project area at San Tin and Lok Ma Chau near Ha Wan Tsuen, as well as some scattered ponds near village areas. Vegetation recorded in this habitat were dominated by common grasses and herbs species along the pond bund. The ecological value of the ponds near San Tin and LMC were considered as of moderate value, while the scattered small ponds was considered of low to moderate ecological value (CEDD & PlanD, 2021a; CEDD & PlanD, 2013a). These ponds supported numerous waterbirds and wetland-dependent avifauna

species, including various species of conservation importance such as Black-faced Spoonbill and Great Egret.

10.5.1.4 Other wetland habitats previously recorded within the Project area include watercourses, channelised watercourses, and seasonally wet grassland (CEDD & PlanD, 2021a). These wetland habitats were relatively scattered within the Project area, such as channels and culverts (e.g. STEMDC, ditches between agricultural lands at Shek Wu Wai San Tsuen), some hillside natural watercourses, as well as small areas of wet grassland near village areas. While they supported relatively low diversity and abundance of flora and fauna, ecological and hydrological linkage between these habitats and ponds were observed. Ecological values of these habitats were evaluated to range from low to moderate (ibid.). The STEMDC is located within the Project area including the compensatory wetlands from previous project, as described in **Section 10.4.2.12**.

10.5.1.5 A large patch of agricultural land was recorded in Shek Wu Wai area, and some smaller patches near Ki Lun Tsuen and Chau Tau Tsuen. Most of the agricultural land recorded were dry, planted with vegetable or ornamental species (e.g. lettuce and gladiolus). A small area of active wet agricultural land was identified near Chau Tau Tsuen, mainly for vegetable farming. Both dry and wet agricultural lands were managed by regular farming practices, and considered to be of low and low to moderate ecological values respectively (CEDD & PlanD, 2021a; CEDD & PlanD, 2013a).

10.5.1.6 Another biodiversity study on agricultural areas in the northern New Territories included the agricultural areas in Shek Wu Wai San Tsuen and Lok Ma Chau Tsuen. Under the study, the agricultural area in Shek Wu Wai San Tsuen was reported to comprise dry farmland, abandoned farmland, and ponds; while Lok Ma Chau Tsuen was reported to include both dry and wet farmland, abandoned farmland, and ponds. The farmland in Shek Wu Wai was also surrounded by brownfield sites (KFBG, 2022; Zheng, et al., 2023).

10.5.1.7 Grassland and grassland / shrubland habitats were mainly found at the southern part of the Project area, near hillside areas around villages. These habitats mainly comprise common herb and shrub species. Ecological value of these habitats was considered to be low (CEDD & PlanD, 2021a). Small and fragmented areas of woodland, plantation, and orchard habitats were also identified near village areas within the Project area. Ecological values of the woodland and plantation were rated as low to moderate, while the orchard was of low value.

10.5.1.8 Urbanised habitats (e.g. developed area and wasteground) were scattered throughout the Project area. Developed area and wasteland consisted of villages (such as Chau Tau Tsuen, Mai Po Lung Tsuen, Shek Wu Wai San Tsuen and Ki Lun Tsuen), roads, open storage areas, garages and workshop. These habitats were often subjected to high level of human disturbance and dominated by exotic and ornamental vegetation. Ecological value of these urbanised habitats was considered to be very low (CEDD & PlanD, 2021a; CEDD & PlanD, 2013a).

10.5.1.9 Some flora species of conservation importance were recorded in the Assessment Area, including two species (Incense Tree (*Aquilaria sinensis*) and Luofushan Joint-fir (*Gnetum luofuense*)) recorded within the Project area, mainly south of Shek Wu Wai San Tsuen and near Mai Po Lung Tsuen (CEDD & PlanD, 2021a).

10.5.2 Fauna

10.5.2.1 A number of previous studies have been reviewed to establish the general ecological profile of the Assessment Area (**Table 10.3** refers). The Assessment Area was recorded to support a high diversity and abundance of wildlife species, in particular the avifauna community near ponds and adjacent wetland habitats on the north (e.g. near San Tin, Sam Po Shue, and LMC area). These wetland habitats also form a movement corridor for wildlife (e.g. corridor for terrestrial mammals and flight path for avifauna), as well as potential breeding and roosting ground. Fauna species of conservation importance recorded from previous studies are presented in **Table 10.22** and **Figure 10.4**.

Avifauna

10.5.2.2 The avifauna community in the vicinity of the Assessment Area mainly comprise waterbird and wetland-dependent species recorded near wetland habitats on the north of Assessment Area (e.g. pond and watercourse). A total of 75 avifauna species of conservation importance were recorded, but the exact locations of most recorded species were not available from previous studies (CEDD & PlanD, 2021a; CEDD & PlanD, 2013a).

10.5.2.3 Breeding behaviour of ardeids (Little Egret and Chinese Pond Heron) were recorded at Mai Po Village Egretry and Mai Po Lung Village Egretry (Anon,2018; 2020; 2021a; 2021b; 2022). Details of the egretries and the ardeids were described at **Section 10.6.2.48**. Roosting behaviour of ardeids and Great Cormorants were also recorded within the Assessment Area near LMC and the vicinity (AFCD, 2020; MTRC, 2021; CEDD & PlanD, 2021a), as described in **Section 10.6.2.53**.

10.5.2.4 Under the bird survey conducted by KFBG (from January 2021 to May 2022), Shek Wu Wai San Tsuen was recorded with a total 59 avifauna species, including 16 species of conservation importance (KFBG, 2022). On the other hand, the smaller farmland area in Lok Ma Chau Tsuen supported a relatively higher diversity of avifauna (71 avifauna species, and 28 species of conservation importance, including sightings of the Japanese Yellow Bunting and Greater Painted-snipe) (KFBG, 2022). The biodiversity survey conducted by KFBG (from December 2021 to November 2022) recorded 19 avifauna, one herpetofauna, four butterfly and two odonate species in Shek Wu Wai, all of which were species of conservation importance (Zheng et al., 2023). Meanwhile, 33 avifauna, one herpetofauna, two butterfly and one odonate species were also recorded in Lok Ma Chau Tsuen, all of which were also species of conservation importance, from the same biodiversity survey conducted by KFBG (Zheng, et al., 2023). The recorded composition of avifauna species aligns with the species recorded from recent surveys conducted under the current Assignment, presented in **Appendix 10.4**. Species of conservation importance recorded from the studies are included in **Table 10.22**. While exact locations of these species were not available from the study (KFBG, 2022; Zheng, et al., 2023), some of the species from the study were recorded in Shek Wu Wai, which will be directly affected by the Project.

10.5.2.5 Bird monitoring programmes were also conducted by HKBWS at the fishponds areas near San Tin, and Mai Po areas, and the monitoring findings were obtained to inform the current EIA Study. The fishpond areas under the monitoring programme were recorded with high diversity and abundance of avifauna (HKBWS, Unpublished Data). While exact locations of these recorded species were not available from the study, the diversity and richness of the avifauna community were taken into account to inform the impact assessment in later sections.

Mammal

10.5.2.6 Mammal species previously recorded within the Assessment Area include bats and non-flying terrestrial mammal species, and all of them were species of conservation importance. Four of these species were recorded within the Project boundary, including Japanese Pipistrelle and Pallas's Squirrel recorded throughout the Project site, and Leopard Cat and Red Muntjac, which were both recorded at the shrubland / grassland habitat at Kam Kwai Leng (**Figure 10.4** refers).

10.5.2.7 A highly restricted mammal species of conservation importance Eurasian Otter was previously recorded within the Assessment Area and in the vicinity. According to the EIA study of Development of Lok Ma Chau Loop, Eurasian Otter was recorded in the Loop and LMC EEA (CEDD & PlanD, 2013a). A recent study on the population size of Eurasian Otter in Hong Kong revealed that the territories of Eurasian Otter overlapped with the Assessment Area (San Tin – Sam Po Shue area, exact location is not available) and spraints (i.e., otter scats) of one individual were identified in Hoo Hok Wai, Sam Po Shue and mangrove in Mai Po during 2018 to 2019, indicating an ecological connection between these areas (McMillan et al., 2023). No sighting of otter was recorded in the Assessment Area of the FS stage of this Project (CEDD & PlanD, 2021a). The latest survey findings (including camera trap findings) from the regular Eurasian Otter

monitoring jointly conducted by WWF and KFBG was obtained in October 2022, which indicated that no signs of Eurasian Otter were identified within the Assessment Area of the current EIA Study (WWF and KFBG, pers. Comm.).

Butterfly

10.5.2.8 Previous records of butterfly species within the Assessment Area were mainly near vegetated habitats (e.g. grassland, marsh, agricultural land, and plantation), including a total of 18 species of conservation importance (CEDD & PlanD, 2021a). Some hill-topping butterfly species of conservation importance were previously recorded in uphill grassland. Among the recorded butterfly species of conservation importance, nine species were recorded within the Project boundary and subject to potential direct impact, including Broad Spark, Common Awl, Common Rose, Danaid Egg-fly, Grass Demon, Forget-me-not, Metallic Cerulean, Small Cabbage White, and Swallowtail, mostly recorded in low-lying area such as agricultural land and developed area around Shek Wu Wai, as well as plantation and shrubland habitats.

Odonate

10.5.2.9 Majority of the odonate species previously recorded within the Assessment Area were recorded near lowland wetland habitats (e.g. marsh, pond, watercourse, agricultural land), including five species of conservation importance (CEDD & PlanD, 2021a; CEDD & PlanD, 2013a; CEDD & PlanD, 2013b). Among the previously recorded species of conservation importance, Blue Chaser and Ruby Darter were recorded at low-lying wetland habitats (e.g. ponds, watercourses, and seasonally wet grassland) in Shek Wu Wai (CEDD & PlanD, 2021a), while Emerald Cascader and Scarlet Basker were recorded at Pang Loon Tei and Chau Tau respectively (CEDD & PlanD, 2013a; CEDD & PlanD, 2013b). These species were encroached within the Project boundary and would be subject to potential impact.

Herpetofauna

10.5.2.10 Herpetofauna (amphibian and reptile) species were previously recorded in agricultural land, marsh, pond, and developed area within the Assessment Area, including two amphibian and six reptile species of conservation importance (CEDD & PlanD, 2021a; CEDD & PlanD, 2013a). Some of these species were recorded within the Project boundary and subject to potential impact, such as Chinese Bullfrog, Spotted Narrow-mouthed Frog, Banded Stream Snake, Common Rat Snake, Copperhead Racer, Indo-Chinese Rat Snake, and Taiwan Kukri Snakes, in low-lying habitats such as watercourses and channels, agricultural lands, and developed area / wasteland, located near Shek Wu Wai and Chau Tau.

Freshwater Community

10.5.2.11 Freshwater habitats within the Assessment Area were observed with various extents of pollution from the previous study (CEDD & PlanD, 2021a). The freshwater communities were dominated by pollution-tolerant species such as gastropods (e.g. Apple Snail and Planorididae) and Nile Tilapia. Two endemic crustacean species of conservation importance (*Cryptopotamon anacoluthon* and *Somanniathelphusa zanklon*) were recorded in watercourses in Chau Tau and Pang Loon Tei within the Project area (CEDD & PlanD, 2021a; CEDD & PlanD, 2013a), and would be subject to potential impact under this Project.

10.5.2.12 Another freshwater fish species of conservation importance Rose Bitterling (*Rhodeus ocellatus*) was also recorded from the EIA Study and the EM&A report conducted for the Development of Lok Ma Chau Loop (CEDD, 2022; CEDD & PlanD, 2013a). Under the EM&A Report, low occurrence of Rose Bitterling was recorded at only one monitoring location near Lok Ma Chau Tsuen (**Figure 10.4** refers).

10.5.3 Other Ecological Resources

LMC EEA & Habitat Creation and Management Plan (HCMP)

10.5.3.1 The LMC EEA was created to provide suitable wetland habitats (e.g., fishponds, marsh and reedbed) for fauna recorded near the footprint of LMC Spur Line and Station. Management and monitoring strategy of LMC EEA were provided in the LMC HCMP for mitigating the ecological impacts arising from the operation of the LMC Spur Line and to further enhance the ecological opportunities of LMC EEA. Habitat management and monitoring are target species oriented (mostly species of conservation importance), which includes 32 avifauna species, two mammal species, four herpetofauna species and all dragonfly species recorded from their previous study (MTRC, 2019). With the implementation of the LMC HCMP, higher occurrence of species of conservation importance and better habitat quality is expected within LMC EEA.

Flight Path

10.5.3.2 Flight paths of avifauna above LMC and Hoo Hok Wai were surveyed in June 2009 to May 2010 (CEDD & PlanD, 2013a). A total of 9,155 bird-flights were recorded, while a seasonal pattern was recorded (with more bird-flights recorded during dry season). In summary, majority of birds in flight were following a main path which were observed along Ha Wan Tsuen, LMC Meander and toward Hoo Hok Wai. Historic flight paths recorded were compared with findings from the current survey to provide supplement information for the Project planning in order to preserve the major flight paths.

10.6 ECOLOGICAL BASELINE INFORMATION (SURVEY FINDINGS)

10.6.1 Overview of Ecological Baseline Conditions

10.6.1.1 A total of 16 habitats were identified within the Assessment Area, with wetland habitats including mitigation wetland, pond (includes fishponds), marsh / reed, natural watercourse, modified watercourse, semi-natural watercourse, seasonally wet grassland, wet agricultural land, and non-wetland habitats including dry agricultural land, woodland, mixed woodland, plantation, shrubland, grassland, village / orchard, and developed area / wasteland. Ecological resources within the Assessment Area are presented in the following sections. The Assessment Area is separated along Fanling Highway and San Tin Highway, into the northern portion (e.g. San Tin, Sam Po Shue, Lok Ma Chau, and Chau Tau), and the southern portion (e.g. Shek Wu Wai, Ki Lun Tsuen, Ngau Tam Mei and Pang Loon Tei). A summary of all habitats identified within the Assessment Area is presented in **Table 10.4**.

Table 10.4 Summary of Habitats identified within the Assessment Area (Overall)

Habitat Types	Overall			
	Project Site (ha)	Percentage	**Assessment Area (ha) ***	Percentage
Mitigation Wetland	**4.93**	0.81%	**22.77**	1.53%
Pond	**94.98**	15.59%	**222.83**	15.01%
Marsh / Reed	**8.02**	1.32%	**14.25**	0.96%
Natural Watercourse	**0.2** (0.40 km)	0.03%	**5.95** (1.47 km)	0.40%
Modified Watercourse	**9.46** (17.97 km)	1.55%	**24.29** (21.32 km)	1.64%
Semi-Natural Watercourse	**6.54** (8.99 km)	1.07%	**11.16** (13.56 km)	0.75%
Seasonally Wet Grassland	**0.1**	0.02%	**0.23**	0.02%
Wet Agricultural Land	**0.2**	0.03%	**0.2**	0.01%
Dry Agricultural Land	**10.36**	1.7%	**13.69**	0.92%
Woodland	**5.24**	0.86%	**31.88**	2.15%
Mixed Woodland	**29.86**	4.90%	**97.43**	6.56%
Plantation	**26.08**	4.28%	**64.5**	4.35%
Shrubland	**16.82**	2.76%	**109.48**	7.38%
Grassland	**17.62**	2.89%	**207.44**	13.97%
Village / Orchard	**34.7**	5.69%	**78.77**	5.31%
Developed Area / Wasteland	**344.36**	56.5%	**579.56**	39.04%
Total	**609.47**	100%	**1484.43**	100%

* Note: The value shown indicates the total area within the Assessment Area (i.e. the sum of area within and outside the Project site)

Table 10.4A Summary of Habitats identified within the Assessment Area (Northern Portion)

Habitat Types	Northern Portion			
	Project Site (ha)	Percentage	**Assessment Area (ha) ***	Percentage
Mitigation Wetland	**4.93**	1.63%	**22.77**	3.03%
Pond	**91.88**	30.37%	**217.09**	28.89%
Marsh / Reed	**4.82**	1.59%	**10.36**	1.38%
Natural Watercourse	**0.20** (0.40 km)	0.07%	**5.84** (1.22 km)	0.78%
Modified Watercourse	**7.05** (14.44 km)	2.33%	**21.49** (17.23 km)	2.86%

Habitat Types	Northern Portion			
	Project Site (ha)	Percentage	**Assessment Area (ha) ***	Percentage
Semi-Natural Watercourse	**4.93** (5.05 km)	1.63%	**9.26** (9.16 km)	1.23%
Seasonally Wet Grassland	**-**	-	**0.13**	0.02%
Wet Agricultural Land	**-**	-	**-**	-
Dry Agricultural Land	**0.85**	0.28%	**3.00**	0.40%
Woodland	**4.40**	1.45%	**17.72**	2.36%
Mixed Woodland	**4.27**	1.41%	**17.17**	2.28%
Plantation	**5.37**	1.78%	**15.20**	2.02%
Shrubland	**-**		**11.93**	1.59%
Grassland	**5.53**	1.83%	**64.36**	8.57%
Village / Orchard	**4.91**	1.62%	**14.12**	1.88%
Developed Area / Wasteland	**163.43**	54.01%	**320.89**	42.71%
Total	**302.57**	100%	**751.33**	100%

* Note: The value shown indicates the total area within the Assessment Area (i.e. the sum of area within and outside the Project site)

Table 10.4B Summary of Habitats identified within the Assessment Area (Southern Portion)

Habitat Types	Southern Portion			
	Project Site (ha)	Percentage	**Assessment Area (ha) ***	Percentage
Mitigation Wetland	**-**	-	**-**	-
Pond	**3.10**	1.01%	**5.74**	0.78%
Marsh / Reed	**3.20**	1.04%	**3.89**	0.53%
Natural Watercourse	**-**	-	**0.11** (0.25 km)	0.02%
Modified Watercourse	**2.41** (3.53 km)	0.79%	**2.80** (4.09 km)	0.38%
Semi-Natural Watercourse	**1.61** (3.94 km)	0.52%	**1.90** (4.40 km)	0.26%
Seasonally Wet Grassland	**0.10**	0.03%	**0.10**	0.01%
Wet Agricultural Land	**0.20**	0.07%	**0.20**	0.03%
Dry Agricultural Land	**9.51**	3.10%	**10.69**	1.46%
Woodland	**0.84**	0.27%	**14.16**	1.93%
Mixed Woodland	**25.59**	8.34%	**80.26**	10.95%
Plantation	**20.71**	6.75%	**49.30**	6.72%
Shrubland	**16.82**	5.48%	**97.55**	13.31%
Grassland	**12.09**	3.94%	**143.08**	19.52%
Village / Orchard	**29.79**	9.71%	**64.65**	8.82%
Developed Area / Wasteland	**180.93**	58.95%	**258.67**	35.28%
Total	**306.9**	100%	**733.1**	100%

* Note: The value shown indicates the total area within the Assessment Area (i.e. the sum of area within and outside the Project site)

10.6.2 Northern Portion

Habitat and Vegetation

Mitigation Wetland

Mitigation Measures under STEMDC

10.6.2.1 As described in **Section 10.4.2.12**, a series of mitigation measures were proposed from the construction of STEMDC, including wetland and terrestrial habitats created adjacent to the STEMDC along the east (STEMDC wetland). As the STEMDC wetland was created upon the construction of the STEMDC, it was of relatively young age. Two pond structures were also created in the STEMDC wetland, mainly comprising aquatic and riparian vegetation such as Common Reedgrass (*Phragmites australis*) and Giant Alocasia (*Alocasia macrorrhizos*). Vegetation at this mitigation wetland mainly comprise tree species such as Cuban Bast (*Hibiscus tiliaceus*), Myrobalan (*Phyllanthus emblica*), and the invasive tree species White Popinac (*Leucaena leucocephala*). Limited human activities were observed within the STEMDC wetland, but it was also observed with some fragmentation due to the presence of fencing along both the east and west side of the STEMDC wetland and disturbance from the adjacent Lok Ma Chau Boundary Control Point (LMC BCP).

10.6.2.2 Other components of mitigation features along the STEMDC include the minimisation of riparian vegetation cutting and minimisation of maintenance dredging along the riverbank and riverbed of STEMDC (TDD, 1999). Description of the STEMDC (i.e. watercourse WC-N3) was further provided at **Section 10.6.2.22**.

10.6.2.3 Outside the STEMDC, other mitigation features proposed under TDD (1999) includes recommendation of management measures at the flood storage pond adjacent to San Tin Tsuen Road, including the maintenance of minimum bottom water level, allowing sedimentation and natural colonisation of vegetation and fish at the pond. The current vegetation at the pond was observed to be dominated by the invasive White Popinac, and sparse occurrence of other tree species such as Chinese Hackberry (*Celtis sinensis*) and ornamental species such as Pink Powder Puff (*Calliandra haematocephala*).

10.6.2.4 Under TDD (1999), maintenance measure was also proposed at the STWMDC to minimise vegetation cutback at the grasscrete areas near San Tin Highway. The STWMDC was currently observed to structurally and functionally form part of the modified watercourse WC-N8a, with concrete-lined embankment and riparian grasscrete. As no other mitigation features were introduced in STWMDC (TDD, 1999), this section of STWMDC will be assessed as part of the modified watercourse WC-N8a at **Section 10.6.2.24**.

San Tin Constructed Wetland

10.6.2.5 San Tin Constructed Wetland comprised open water area with Reedgrass (*Phragmites* sp.) and other aquatic plants Indian Lotus (*Nelumbo nucifera*), while other tree species such as Pop-gun Seed (*Bridelia tomentosa*) were also observed along the riparian zone. San Tin Constructed Wetland is relatively small and isolated, located next to a traffic road (San Tin Tsuen Road) and received regular human disturbance such as residents from nearby villages and visitors (DSD, 2020).

Lok Ma Chau Ecological Enhancement Area and Clean-up Reedbed (LMC EEA)

10.6.2.6 The 32-hectare LMC EEA comprises managed freshwater wetland habitats and have been in operation since 2007. Ongoing management processes are conducted at this LMC EEA. As described in **Section 10.4.2.15**, the LMC EEA was reported to attract various species of conservation importance including avifauna and mammal species. Limited accessibility was available at this LMC EEA as part of the management regime to reduce access and disturbance from humans and dogs. Baseline conditions of this mitigation wetland were made reference to existing studies and monitoring of the LMC EEA.

Development of Lok Ma Chau Loop – Ecological Area (LMC Loop EA)

10.6.2.7 As described in **Section 10.4.2.16**, an Ecological Area of about 12.8 ha is designated along the southern edge of the Loop, adjoining the LMC Meander (CEDD, 2019). Vegetation was introduced and has been established at the LMC Loop EA. Nonetheless, due to its recent establishment, its location within the project site of Lok Ma Chau Loop Development, and disturbance from ongoing construction activities, vegetation coverage and wildlife usage of this LMC Loop EA were not prominent from recent surveys.

Pond

10.6.2.8 Pond was the second largest habitat type in the northern portion of the Assessment Area. Two major contiguous pond areas were recorded adjacent to LMC Meander and San Tin – Sam Po Shue area, located on the east and west side of San Sham Road and the STEMDC respectively (**Figure 10.3** refers). Despite the physical continuity of the pond habitat, ponds showed different ecological conditions and were subject to different level of disturbance, resulting in varying ecological functions over the wide area of pond habitat. For instance, disturbance on pond habitat was observed from adjacent open storage and workshop areas on the north of Castle Peak Road (San Tin section), while construction activities were observed along Ha Wan Tsuen East Road (southwest of the Loop). These areas are observed with prominent human activities and traffic, resulting in intensive disturbance (e.g. dust emission, noise disturbance, light and glare, and visual disturbance from the anthropogenic activities). Ponds adjacent to these disturbed areas have been observed to support lower diversity and abundance of avifauna and other wildlife (including lower occurrence of species of conservation importance). Fragmentation was also observed at these ponds, particular at ponds on the north of Castle Peak Road (San Tin section) and west of San Tin Tsuen Road, where some of the ponds were surrounded by developed area and open storage areas. These factors contribute to an edge effect on areas of habitat that are close to disturbance, where ecological conditions (e.g. microclimate, carrying capacity, mortality rate) are suboptimal (Laurance et al., 2007).

10.6.2.9 Therefore, the contiguous ponds in northern portion of Assessment Area were further divided to sub-zones (Lok Ma Chau, San Tin Zone A, B, C, Sam Po Shue Zone A, B, C) for more representative evaluation (**Figure 10.5** refers). Majority of ponds recorded were either active or inactive / abandoned fishponds. Active fishponds were managed for fishery production, where activities such as fish harvesting, feeding, operating aerator, and regular maintenance works (such as draining, ploughing, and grass-trimming along the pond bunds) were observed. Very limited illumination was provided in the contiguous pond landscape at night. Low abundance of vegetation was observed at these active fishponds, mainly limited to herbaceous species along the pond bund. Inactive / abandoned fishponds were open-water ponds which lack of management, and vegetation in water and along the bunds started overgrowing. Further descriptions on the statues of fishery activities at these ponds are presented in **Section 11**.

10.6.2.10 *Lok Ma Chau*: Majority of the ponds at Lok Ma Chau area were located along LMC Meander, while some other ponds were located near Ha Wan Tsuen. Small village houses were located adjacent to the ponds. While this pond area mainly consists of open water, some vegetation was observed along the bunds, which were dominated by common tree species such as White Popinac and Elephant's Ear (*Macaranga tanarius* var. *tomentosa*), and common herb species such as Ciliate Microstegium (*Microstegium ciliatum*), Blunt Signal-grass and Guinea Grass (*Panicum maximum*). Some disturbance was observed in this area from existing construction activities such as a new connection road to the Loop, and road widening works along Ha Wan Tsuen East Road, which runs along north to south, connecting to the Loop. Disturbance from human activities such as adjacent village settlement and construction activities was prominent in this area. Wildlife was mostly recorded from the pond habitat adjacent to the LMC meander which are relatively intact and subject to less disturbance.

10.6.2.11 *San Tin*: Ponds recorded in San Tin – Sam Po Shue area were closely linked fishponds which formed a large contiguous ponds landscape (**Figure 10.5** refers). In San Tin Zone A, majority of ponds recorded were active fishponds with regular fishery operation

observed. This area of fishpond is the most intact and distant from existing disturbance compared to other zones. A small area of pond in San Tin Zone B was observed on the southeast of San Tin Tsuen Road, directly adjacent to village areas. Human activities and disturbance (e.g. residential usage and traffic) are more prominent in San Tin Zone B. Majority of ponds in San Tin Zone C were surrounded by developed area, inactively managed and subject to higher level of disturbance such as traffic with heavy vehicles, operation of adjacent open storage, brownfields, and human settlement. Ponds in San Tin Zone B and Zone C were subject to minor fragmentation, separated from Zone A with roads and village settlement areas, while some of the ponds in San Tin Zone B and Zone C were also observed with bird-deterrent measures (e.g. presence of bird-deterring nets or flagged lines above the ponds).

10.6.2.12 *Sam Po Shue*: The majority of ponds in Sam Po Shue were either inactive or abandoned fishponds, where overgrown vegetation was observed along bunds and within some of the ponds. During the course of the ecological surveys, new fencing around the ponds in Sam Po Shue was erected, and heavy vehicles were often observed, transporting and stockpiling materials within the fenced area. Sam Po Shue Zone A was adjacent to the LMC EEA mitigation wetland where high abundance of waterbirds was observed. This area was observed with relatively less disturbance than the other sub-zones. Sam Po Shue Zone B and C were both subject to higher level of disturbance, such as heavy vehicles operating along the pond bunds within the areas, as well as adjacent human activities, brownfield, and traffic along the west of STEMDC. Common grass species such as Blunt Signal-grass and Guinea Grass (*Panicum maximum*) were dominant species observed along the pond bunds.

10.6.2.13 One individual of flora species of conservation importance, Incense Tree (*Aquilaria sinensis*), was recorded on pond bund in Lok Ma Chau in northern portion of Assessment Area, near Ha Wan Tsuen East Road (**Figure 10.3E** refers).

Marsh / Reed

10.6.2.14 In Lok Ma Chau area, marshes derived from abandoned farmlands and abandoned fishponds were identified in Lok Ma Chau Tsuen (**Figure 10.3E** refers). Marsh / reed was likely developed through natural succession at these abandoned habitats. Vegetation species in the former was dominated by wetland dependent herbs such as Interrupted Tri-vein Fern (*Cyclosorus interruptus*), Blunt Signal-grass (*Brachiaria mutica*) and Taro (*Colocasia esculenta*). The latter was linked to adjacent ponds and dominant by reed species such as Common Reedgrass (*Phragmites australis*), Reed (*Phragmites vallatorius*) and Narrow-leaved Cat-tail (*Typha angustifolia*). Vegetation structure was relatively simple, mainly comprising herbaceous and aquatic species. These marshes were subject to human disturbance such as traffic and agricultural activities nearby.

10.6.2.15 A small patch of marsh was identified between the STEMDC wetland and Sai Kwo Road (**Figure 10.3F** refers). This patch of marsh was observed to occur within a water body with concretised sides, which was likely created as drainage channel but has since been overgrown and transitioned into a marshy habitat. Low diversity of aquatic plant was observed in the marsh, dominated by the marsh species *Phragmites* sp. and grass species Guinea Grass (*Panicum maximum*). Plantation tree species such as Flame Tree (*Delonix regia*) and Chinese Hackberry (*Celtis sinensis*) were recorded on the side. Water quality was observed to be relatively stagnant, with slight pollution observed (e.g. odour and foam on the surface), potentially from nearby developed area.

10.6.2.16 In San Tin area, several small patches of marshes derived from abandoned fishponds and abandoned farmlands were recorded (around Lin Barn Tsuen and nearby fishpond, and along Castle Peak Road – San Tin section). Most of these small marshes were recorded within the Project site (**Figure 10.3B** refers). These marshes shared similar flora composition with the marsh / reed in Lok Ma Chau area (as described in **Section 10.6.2.14**), including simple floristic structure and mainly comprising Common Reedgrass (*Phragmites australis*) and Reed (*Phragmites vallatorius*).

10.6.2.17 No flora species of conservation importance was recorded in marsh / reed habitat in the northern portion of the Assessment Area.

Natural Watercourse

10.6.2.18 WC-N2 (LMC Meander) was the largest natural watercourse in the northern portion of Assessment Area. WC-N2 was originally part of Shenzhen River before diversion and was restored to mitigate the loss of fishponds from training of the Shenzhen River. The whole LMC Meander was approximately 2.67 km long, and 0.94 km of it (5.76 ha) was included in the Assessment Area as WC-N2, which ranged from 40 m to 80 m wide. A small area along the bank of the LMC meander (0.2 ha) was encroached within the Project boundary (**Table 10.4** and **Figure 10.3E** refer), but there would be no construction activities and direct loss along this natural watercourse. WC-N2 flows into Shenzhen River, and received freshwater discharged from adjacent lowland watercourses (e.g. WC-N2a and WC-N2b) and therefore the water quality was appeared to less polluted compared to Shenzhen River. Some tidal influence was observed. Riparian vegetation was dominated by common grass and herb species such as Blunt Signal-grass, Diffuse Day-flower (*Commelina diffusa*), Malacea Galingale (*Cyperus malaccensis*) and Guinea Grass (*Panicum maximum*). Shrubs and trees (e.g. Opposite-leaved Fig (*Ficus hispida*), Elephant's Ear (*Macaranga tanarius* var. *tomentosa*) and Lantana (*Lantana camara*) were recorded along the riverbank.

10.6.2.19 WC-N2a was considered as a semi-natural watercourse, described below in **Section 10.6.2.28**. WC-N2b was a small natural stream originated from hillside of Lok Ma Chau Tsuen and leads northward to LMC Meander (**Figure 10.3E** refers). It was about 1 m wide and 0.2 m deep, with fast running and clear water observed. The substrate was mainly rocky. This watercourse runs through various habitats such as woodland, marsh, between ponds, and was shaded by trees e.g. Elephant's Ear (*Macaranga tanarius* var. *tomentosa*) and Lance-leaved Sterculia (*Sterculia lanceolata*). Dense riparian vegetation such as Blunt Signal-grass and Diffuse Day-flower were observed.

10.6.2.20 No flora species of conservation importance was recorded in any natural watercourse in the northern portion of Assessment Area.

Modified Watercourse

10.6.2.21 WC-N1 (Shenzhen River) was a major modified watercourse in the northern portion of Assessment Area, which flows westward into Deep Bay. It was modified and concrete-lined, as previous training works such as straightening and deepening were carried out in Shenzhen River to prevent flooding. Approximately 1.5 km (13.9 ha) of Shenzhen River was within the Assessment Area. Vegetation along the watercourse was limited to sparse occurrence of small trees and herbs along the riverbank, dominated by Reedgrass (*Phragmites* sp.). Tidal influence occurs along the Shenzhen River. The water in Shenzhen River is highly polluted and eutrophic, which limited its capacity to support flora and fauna.

10.6.2.22 WC-N3 (STEMDC) was a drainage channel of about 2.2 km long and 15 – 20 m wide, running along the west of San Sham Road and flowed northward into Shenzhen River. Turbid water and the presence of garbage were observed during the survey period, the water quality is regarded as poor to moderate. Common herbs species such as Guinea Grass (*Panicum maximum*) and Lalang Grass (*Imperata cylindrica* var. *major*) were recorded along the grasscrete lining. Accumulation of overgrown exotic Water Hyacinth (*Eichhornia crassipes*) was observed downstream of this channel. An inflatable dam was observed near the end of channel, while water level downstream (north) of the inflatable dam was usually shallow, with the muddy estuarine substratum often exposed.

10.6.2.23 WC-N4 was a drainage channel along Lok Ma Chau Road that flows northwest into WC-N3 (**Figure 10.3E** refers). It has concrete banks and bottom, and was approximately 3 – 7 m wide and 1 km long. Average water clarity was observed during the survey period. Deposit of muddy sediment was observed in the upstream section of WC-N4, while herbs such as Blunt Signal-grass (*Brachiaria mutica*) and Diffuse Day-flower (*Commelina diffusa*) and exotic tree White Popinac (*Leucaena leucocephala*) were recorded at the riverbank at the upstream section along pond bund. Limited vegetation was recorded at the rest of WC-N4.

10.6.2.24 WC-N8a and WC-N8b were the upper sections of WC-N8 located near Castle Peak Road - San Tin Section (**Figure 10.3G** refers). They were modified channels of about 13 m and 6 m in width respectively, both with steady water flow. Water depth was around 20 cm. Concrete riverbank with limited vegetation was recorded, only few seeding of Chinese Banyan (*Ficus microcarpa*) was recorded along WC-N8a, while riparian vegetation along WC-N8b includes more mature individuals of *Ficus* spp. as well as White Popinac. Water quality of both WC-N8a and WC-N8b were poor because of residential sewage discharged from Shek Wu Wai area. Deposit of muddy sediment was observed.

10.6.2.25 WC-N14 was a short, modified watercourse northeast of San Tin Stormwater Pumping Station, flowing towards the west into an underground culvert adjacent to the Stormwater Pumping Station (**Figure 10.3F** refers). The width of WC-N14 ranged between 15 m and 30 m. It was stagnant and with inferior water quality, subject to discharge and runoff from nearby village areas, observed with polluted and odorous water and trash. Limited vegetation and wildlife were observed at the watercourse, with common plantation species such as Taiwan Acacia (*Acacia confusa*) and Powder Puff (*Calliandra haematocephala*) recorded along the bank.

10.6.2.26 Other modified watercourses recorded were generally narrow and highly concretised drainage channels which shared similar features, conditions, and level of disturbances. Majority of them were situated within developed area. Some of them were deposited with sand and mud. WC-N6a – WC-N6f were a network of drainage channel system in Chau Tau (**Figure 10.3F** refers), flowing to STEMDC via WC-N6. Their widths vary between 0.5 m to 5 m, with generally muddy and silty sediment deposition at the bottom observed. Water quality was generally inferior. Another narrow and highly concretised channel includes WC-15a, which was a drainage channel along San Tin Tsuen Road, east of the San Tin Constructed Wetland (**Figure 10.3G** refers). Its width was about 1 m, observed with slow-flowing water flowing towards the north and appeared polluted. These channels were mostly recorded with common flora species along the bankside, such as Giant Alocasia (*Alocasia macrorrhizos*), *Wedelia trilobata*, Blunt Signal-grass (*Brachiaria mutica*), Diffuse Day-flower (*Commelina diffusa*) and Chinese Banyan (*Ficus microcarpa*).

10.6.2.27 No flora species of conservation importance was recorded in any modified watercourse in the northern portion of Assessment Area.

Semi-Natural Watercourse

10.6.2.28 WC-N2a (approximately 650 m long) was one of the upstream tributaries of LMC Meander, located near Lok Ma Chau Tsuen, flowing through marsh, agricultural land, and through ponds and discharging into LMC Meander (**Figure 10.3E** refers). Some modifications were observed, such as modified or concretised banks and short sections of culvert crossing traffic road. WC-N2a was approximately 0.5 m to 2 m wide, water depth was around 0.2 m and waterflow was slow. The substrate was muddy. Signs of pollution were observed, including domestic sewage and runoff from agricultural land in Lok Ma Chau Tsuen. Common grass species such as Umbrella Plant (*Cyperus involucratus*) and Guinea Grass (*Panicum maximum*) was observed overgrown along the bank.

10.6.2.29 WC-N5 (approximately 440 m long) was present west of Ha Wan Fisherman San Tsuen, between ponds and village areas, flowing towards southwest into STEMDC through underground culvert (**Figure 10.3F** refers). It was approximately 1.5 m wide with water depth of about 0.1 m. The substrate was mainly sandy, with moderate water flow. Water quality was relatively unpolluted. Herb species were recorded along the bankside such as Giant Alocasia (*Alocasia macrorrhizos*) and *Praxelis clematidea*.

10.6.2.30 WC-N6 (approximately 260 m long) was the convergence of modified watercourses in Chau Tau (**Figure 10.3F** refers). It was approximately 10 m wide with water depth of about 0.3 m. The riverbank was concretized while the deposition of mud at the bottom provided substrate for some vegetation growth. The water quality was poor, observed with discharge and runoff from adjacent open storage and workshop areas, and had moderate flow rate. Herb species such as Common Lophantherum (*Lophatherum gracile*)

and *Wedelia trilobata* were recorded along the bank. WC-N6 was shaded by trees such as Chinese Banyan.

10.6.2.31 Several semi-natural watercourses sharing similar characteristics were recorded among the contiguous fishponds in San Tin and Mai Po (**Figures 10.3A, 10.3B, 10.3F, and 10.3G** refer). WC-N7, WC-N8, WC-N9 and WC-N12 were man-made watercourses formed during the formation of fishponds in San Tin and Mai Po, while all flows towards the northwest into Shenzhen River. Instead of concretised riverbank, natural vegetated riverbank was observed along these watercourses. Their width ranged between 4 m to 10 m and poor water quality was generally recorded. The flow rate was slow to moderate. While connected to Shenzhen River, the downstream of them were subject to tidal influence. Riparian flora species such as Water Spinach (*Ipomoea aquatica*), Common Reedgrass (*Phragmites australis*), Blunt Signal-grass (*Brachiaria mutica*) were recorded. Exotic mangrove tree *Sonneratia caseolaris* were recorded at downstream sections near Shenzhen River.

10.6.2.32 WC-N10 situated in Lin Barn Tsuen was approximately 680 m long. It was widest at the upper end (25 m wide) and became narrower toward Shenzhen River (3 m – 5 m wide) (**Figure 10.3B** refers). The upstream were surrounded by human settlement, with housing established adjacent to and along the bank. The downstream were relatively natural. Moderate flowing water was observed. Pollution induced by nearby resident were recorded, such as runoff and discharge from the houses observed, while water quality was moderate to poor. Riparian vegetation composition was similar to those described in **Section 10.6.2.31**.

10.6.2.33 WC-N11 was a semi-natural watercourse about 0.5 - 1 m wide and 790 m long, located southeast of Lin Barn Tsuen leading to WC-N10 (**Figure 10.3B** refers). Some parts of WC-N11 were culverted. Slow waterflow and inferior water quality was observed during the survey period. Its upper section was situated along open-storage area and the lower section was situated between densely vegetated abandoned fishpond and succession of plant such as Giant Alocasia (*Alocasia macrorrhizos*), Montane Kudzu (*Pueraria lobata* var*. montana*) and Gairo Morning Glory (*Ipomoea cairica*) were observed.

10.6.2.34 WC-N15 was semi-natural watercourse connecting to the flood storage pond next to San Tin Tsuen Road (**Figure 10.3G** refers). It was around 1 - 4 m wide, with moderate flow rate and inferior water quality. Accumulation of muddy sediment was observed. Riparian vegetation similar to WC-N11 were recorded (**Section 10.6.2.33** refers).

10.6.2.35 No flora species of conservation importance was recorded in any semi-natural watercourse in the northern portion of Assessment Area.

Seasonally Wet Grassland

10.6.2.36 A small patch of seasonally wet grassland was situated near Mai Po Tsuen outside the Project site, within Mai Po Village SSSI at the fringe of the woodland (**Figure 10.3C** refers). It was derived from poorly drained area which became waterlogged during wet season. Sporadic patches of wetland-associate flora species were recorded such as Interrupted Tri-vein Fern (*Cyclosorus interruptus*) and Reed (*Phragmites vallatorius*). No flora species of conservation importance were recorded.

Dry Agricultural Land

10.6.2.37 Dry agricultural lands were recorded in Lok Ma Chau Tsuen and Chau Tau Tsuen (**Figures 10.3E** and **10.3F** refer). This habitat was mostly observed to be dry throughout the survey period. They were actively managed and dryland crops species were cultivated such as Lettuce (*Lactuca sativa*) and Welsh Onion (*Allium fistulosum*). No flora species of conservation importance were recorded at this habitat. No wet agricultural land was observed from the northern portion of the Assessment Area.

Woodland

10.6.2.38 Few patches of scattered and isolated woodlands were recorded in Lok Ma Chau Tsuen, Ha Wan Tsuen, along Lok Ma Chau Road, and east of Mai Po Tsuen (partly within Mai

Po Village SSSI) (**Figures 10.3C, 10.3E** and **10.3F** refer). The woodlands in the northern portion had similar composition, where canopy was semi-closed and approximately 5 to 7 m tall. These woodlands were relatively young, and separation of understory and canopy were unclear. The canopy was dominated by mature native trees species such as Camphor Tree (*Cinnamomum camphora*), Common Red-stem Fig (*Ficus variegata*) and Microcos (*Microcos nervosa*). The understory comprised common native shrub species and immature small trees such as Desmos (*Desmos chinensis*), Wild Coffee (*Psychotria asiatica*) and Oriental Blechnum (*Blechnum orientale*). Majority of these woodlands were in small patches and are fragmented or isolated by developed area, except the strip of woodland southeast of Lok Ma Chau Tsuen which was connected to the hillside shrubland and grassland. One flora species of conservation importance, Incense Tree (*Aquilaria sinensis*), was recorded in several locations at the woodland northwest of Chau Tau Tsuen.

Mixed Woodland

10.6.2.39 Few patches of mixed woodland were recorded in the north of Chau Tau Tsuen, west of San Tin and Mai Po Lung (**Figures 10.3C, 10.3G,** and **10.3K** refer). Canopy of mixed woodland comprised exotic trees e.g. Longan (*Dimocarpus longan*) and Taiwan Acacia, and native trees such as Elephant's Ear (*Macaranga tanarius* var. *tomentosa*) and Microcos (*Microcos nervosa*). Common exotic and native shrubs such as Desmos (*Desmos chinensis*), Pop-gun Seed (*Bridelia tomentosa*) and Wild Coffee (*Psychotria asiatica*) were recorded in the understory. The mixed woodland in Chau Tau and San Tin area were small and surrounded by urbanized area, with the canopy about 3 – 5 m tall. Burial grounds were recorded along the edge of the mixed woodland in San Tin area.

10.6.2.40 Two patches of mixed woodland were recorded in Mai Po Lung area where canopy was 5 – 8 m tall (**Figure 10.3C** refers). The larger mixed woodland comprised exotic plantation tree species such as Paper-bark Tree (*Melaleuca cajuputi* subsp. *cumingiana*) and Horsetail Tree (*Casuarina equisetifolia*) and native tree species such as Lance-leaved Sterculia (*Sterculia lanceolata*) and Common Red-stem Fig (*Ficus variegata*). It was linked to the adjacent woodland in Mai Po Village SSSI and the plantation along San Tin Highway. The smaller mixed woodland was the remanent mixed woodland within Mai Po Lung surrounded by developed area / wasteland. The canopy comprised mature native trees such as Camphor Tree (*Cinnamomum camphora*) and Elephant's Ear (*Macaranga tanarius* var. *tomentosa*) and exotic fruit trees such as Longan (*Dimocarpus longan*).

10.6.2.41 No flora species of conservation importance was recorded in mixed woodland habitat in the northern portion of Assessment Area.

Plantation

10.6.2.42 Strips of roadside plantation were recorded throughout the Assessment Area (e.g. along Lok Ma Chau Road, San Tin Highway and Fanling Highway), comprising plantation species such as Paper-bark Tree (*Melaleuca cajuputi* subsp*. Cumingiana*) and Horsetail Tree. A patch of hillside plantation was identified near Tit Hang at the northeast edge of the Assessment Area (**Figure 10.3J** refers), where open canopy of about 3 – 5 m comprised of Taiwan Acacia and Paper-bark Tree were recorded. The understory consisted of native herb such as Oriental Blechnum (*Blechnum orientale*), Dichotomy Forked Fern (*Dicranopteris pedata*) and Rose Myrtle (*Rhodomyrtus tomentosa*), and immature native trees species such as Acronychia (*Acronychia pedunculata*) and Opposite-leaved Fig (*Ficus hispida*). This hillside plantation was connected to the surrounding hillside grassland habitat.

10.6.2.43 No flora species of conservation importance was recorded in plantation habitat in the northern portion of Assessment Area.

Shrubland

10.6.2.44 Shrubland habitat in the northern portion of Assessment Area were found in hillside east of Lok Ma Chau Tsuen and northeast of Chau Tau Tsuen (**Figures 10.3E** and **10.3J**

refer). Vegetation composition was similar which common shrubs and small trees species such as Sumac (*Rhus chinensis*), Myrobalan (*Phyllanthus emblica*) and Pop-gun Seed (*Bridelia tomentosa*) were recorded. Herb species such as Burma-reed (*Neyraudia reynaudiana*) and Dichotomy Forked Fern (*Dicranopteris pedata*) were often recorded. Shrubland in Lok Ma Chau area were located between woodland and hillside grassland where some minor human disturbance such as burial ground and human settlement were observed. Shrubland northeast of Chau Tau Tsuen were closer to village areas and comparatively more disturbed, utilized by locals for burial ground. No flora species of conservation importance were recorded.

Grassland

10.6.2.45 Grassland in the northern portion of Assessment Area was either natural hillside grassland or low-lying grassland as the result of natural succession from abandoned farmland, fishpond and wasteland. Hillside grassland was recorded north of Chau Tau Tsuen (**Figures 10.3E** and **10.3J** refer), while common herb species such as Dichotomy Forked Fern (*Dicranopteris pedata*) were dominant at this habitat. Human induced hill fire and burial ground were major disturbance to the recorded hillside grassland. Patches of low-lying grassland were recorded in Chau Tau Tsuen, San Tin and Mai Po area (**Figures 10.3B** and **10.3F** refer). Pioneer species and ruderal herb species such as *Bidens alba* and Burma-reed (*Neyraudia reynaudiana*) were recorded. No flora species of conservation importance were recorded.

Village / Orchard

10.6.2.46 The village / orchard habitat refers to rural area with low-density village housing and planting of fruit trees. This habitat in the northern portion included various village areas (e.g. Pak Shek Au area, Chau Tau Tsuen, Lok Ma Chau Tsuen, Ha Wan Tsuen). Fruit tree species were frequently recorded such as Longan (*Dimocarpus longan*), Lychee (*Litchi chinensis*) and Wampi (*Clausena lansium*). Some village / orchard habitats were adjoining farmlands and ponds which were all under active management and subject to similar level of human disturbance. No flora species of conservation importance were recorded.

Developed Area / Wasteland

10.6.2.47 Developed area / wasteland was the largest habitat type in the northern portion. It included highly urbanized housing area, brownfield, traffic roads, open storage area, construction site (e.g. the Loop). Limited vegetation was recorded in this habitat, mainly comprising greening species were recorded along road, and ornamental species at developed area such as *Bauhinia* spp., China-berry (*Melia azedarach*) and Paper-bark Tree (*Melaleuca cajuputi* subsp. *cumingiana*). Overgrowth of invasive tree, White Popinac (*Leucaena leucocephala*), and exotic herb species such as *Wedelia trilobata*, *Bidens alba* and *Asystasia micrantha* were observed in brownfield abandoned for a long time, which was regarded as highly disturbed wasteland with limited carrying capacity for other ecological resources. One flora species of conservation importance, Incense Tree (*Aquilaria sinensis*), was recorded in wasteland along Lok Ma Chau Road, which was an abandoned wasteland, and subject to disturbances from current construction activities along Ha Wan Tsuen East Road (**Figure 10.3E** refers).

Fauna

Egretries

10.6.2.48 Based on the existing waterbird monitoring programme conducted by HKBWS, two egretries were identified within the northern portion of the Assessment Area (Anon, 2022), with descriptions in the following sections.

Mai Po Lung Village Egretry

10.6.2.49 Nests of Chinese Pond Heron and Little Egret were recorded at Mai Po Lung Village (MPLV) Egretry, which was recorded within the Project boundary. A peak count of 86 nests were recorded from ecological surveys. The nesting and breeding activities of the ardeids were recorded on various tree species along the junction of Shek Wu Wai Road and Castle Peak Road (San Tin section) (refer to **Figure 10.6A**), such as Yellow Poinciana (*Cassia fistula*), Weeping Fig (*Ficus benjamina*), Chinese Banyan, and Big-leaved Fig (*Ficus virens*). The majority of nests were recorded on the Big-leaved Fig and Chinese Banyan along the west of the Shek Wu Wai Road. Heavy traffic and human disturbance were recorded adjacent to the egretry. Details of breeding ardeids and the numbers of nests are presented at **Appendix 10.5**.

10.6.2.50 During flight path surveys, seven key flight paths were identified, mainly towards north to northwest, to the direction of the ponds at San Tin and Sam Po Shue (refer to **Figure 10.6A** and **Appendix 10.5**). More than half of the ardeids flew northwest, using Flight Paths 1, 2, and 5 (38.9%, 22.4%, and 7.6% of the ardeids respectively); while some of the ardeids flew north using Flight Paths 3 and 4 (about 12.9% and 13.8% respectively). A small proportion of ardeids (3.8%) were also recorded flying westward along Castle Peak Road (San Tin section), potentially travelling towards Mai Po or the Mai Po Village Egretry (refer to **Figure 10.6A**), and towards southwest (0.6%), along San Tin Highway or across the highway to the southern portion of the Assessment Area. Most of these ardeids were recorded flying under 20 m from the egretry. Details of the recorded flight paths and flight heights are presented in **Appendix 10.5**.

Mai Po Village Egretry

10.6.2.51 Nests of Chinese Pond Heron and Little Egret were recorded at Mai Po Village (MPV) Egretry, which adjoins the western edge of the Project boundary. While previous records of the MPV Egretry (between 2012 and 2021) were recorded within the footprint of Project boundary, the latest recorded extent of the MPV Egretry occurs just outside the boundary (refer to **Figure 10.6A**). No breeding activities of the MPV Egretry was observed within the Project boundary. A peak count of 84 nests were recorded from ecological surveys. The nesting and breeding activities were recorded at the canopy of Lebbeck Tree (*Albizia lebbeck*), Candlenut Tree (*Aleurites moluccana*) and Elephant's Ear (*Macaranga tanarius* var. *tomentosa*), with majority of the nests recorded at the Lebbeck Tree. These trees are located at the junction of Tam Kon Chau Road, Castle Peak Road (Mai Po section) and Castle Peak Road (San Tin section). Heavy traffic and human disturbance were recorded adjacent to the egretry. Details of breeding ardeids and the numbers of nests are presented at **Appendix 10.5**.

10.6.2.52 During flight path surveys, six major flight paths were identified. Most of the ardeids flew towards north, northwest, and west directions (more than 80% of the breeding ardeids using Flight Paths 1, 3, 4, and 5), likely traveling towards to ponds at Mai Po, San Tin, and Sam Po Shue. A proportion of ardeids flew into the Project boundary (about 22.4% along Flight Path 5, and 3.7% at Flight Path 6), (refer to **Figure 10.6A**). Most of these ardeids were recorded flying under 20 m from the egretry, with some flying at 21 – 30 m, potentially over a longer distance. Details of the recorded flight paths and flight heights are presented in **Appendix 10.5**.

Night Roosts

10.6.2.53 Two active ardeid night roosting sites (in Sam Po Shue and Tam Kon Chau) were identified outside the Assessment Area based on a territory-wide study conducted under Agriculture, Fisheries and Conservation Department (AFCD, 2020). Aside from these two known roosting sites, other night roosting sites were recorded within the Assessment Area from recent surveys. This includes the San Tin Open Storage Area Night Roost and Ha Wan Tsuen Night Roost recorded within the Project boundary, and Lin Ban Tsuen Night Roost recorded partially within the Assessment Area. These night roosting sites for both ardeids and Great Cormorants are presented in the following sections.

San Tin Open Storage Area Night Roost (Overwintering)

10.6.2.54 A night roost near open storage areas in San Tin was first identified within the Project area in December 2022 (**Figure 10.6B** refers). This night roost was not reported in previous studies. The night roost comprised of a single moderately-sized India-rubber Tree (*Ficus elastica*) situated on a pond bund. Ardeids including Little Egret, Chinese Pond Heron and Great Egret were recorded at this night roost in low abundance (peak count of 53 ardeids individuals), and no individuals of Great Cormorants were recorded. The night roost was observed to be seasonal, only active during dry season. Most of the flight paths at the night roost was recorded towards the north and northwest (Flight Paths 1 and 2, about 41.5%) and to the east (Flight Path 5, about 22.5%), and was mainly recorded flying at a low height (0 – 10 m). Details of the flight paths are presented in **Appendix 10.5**.

Ha Wan Tsuen Night Roost (Overwintering)

10.6.2.55 A night roost in Ha Wan Tsuen was firstly identified in January 2022 during ecological surveys. The night roost was located within the Project boundary, between San Sham Road and the Loop (refer to **Figures 10.6C** and **10.6D**). The night roost mainly supported ardeids (e.g. Chinese Pond Heron, Eastern Cattle Egret, Little Egret, Great Egret, Grey Heron) and Great Cormorant on the canopy of trees located along a pond bund between San Sham Road and the Loop. Some Great Cormorants and a few ardeids were observed to remain perching during daytime. A seasonal pattern was observed at this night roost, supporting a high abundance of Great Cormorants (a peak count of 143 individuals in January 2022) and moderate amount of ardeids (a peak count of about 56 individuals in February 2022). The night roost was no longer active during the majority of the wet season (from April to August 2022) with no ardeids nor Great Cormorants observed. Low numbers of ardeids were observed again in September and October 2022. Day roosting individuals of Black-crowned Night Heron was recorded in October 2022 in low abundance (nine individuals), but was not observed in other months during the course of the ecological surveys.

10.6.2.56 Flight paths of these ardeids and Great Cormorants were mainly observed eastward from the night roost, towards the Loop and nearby ponds (refer to **Figures 10.6C** and **10.6D**). Compared to the ardeids, the cormorants were more sporadic with their flight behaviour, with some individuals observed to stay in the roost without flying away during the course of the flight path survey. Details of the recorded flight paths and flight heights are presented in **Appendix 10.5**.

Lin Barn Tsuen Night Roost (Overwintering)

10.6.2.57 A night roost in Lin Barn Tsuen was firstly identified in January 2022 during ecological surveys partially within the Assessment Area, about 440 m northwest from the Project boundary (**Figure 10.6E** refers). This night roost was not reported in previous studies. Only ardeids were recorded at this night roost in low abundance, with a peak count of 25 ardeids individuals recorded, and no individuals of Great Cormorants. The night roost was observed to be seasonal, only to be active during dry season. Most of the flight paths at the night roost was recorded towards the northeast and southeast (Flight Paths 1 and 2, about 85%), and was mainly recorded flying at a low height (0 – 10 m). Details of the flight paths are presented in **Appendix 10.5**.

Sam Po Shue Night Roost

10.6.2.58 Sam Po Shue Night Roost was recorded outside the Assessment Area, about 670 m northwest from the Project boundary (**Figure 10.6** refers). While direct impact on the night roost is not anticipated, flight paths from the night roost may be subject to indirect impacts from the proposed development. Ecological survey on this night roost was conducted, with particular focus on the flight paths associated with the night roost to facilitate assessment of potential indirect impacts on the flight paths arising from the proposed development.

10.6.2.59 According to the territory-wide study on ardeid night roosts, this Sam Po Shue Night Roost (also known as "Lok Ma Chau Night Roost") was the third largest ardeid night roost in Hong Kong, with up to 431 ardeid individuals recorded. This night roost was also reported to support the highest diversity of ardeid species (AFCD, 2020). From recent surveys conducted under the current Assignment, roosting ardeids were recorded in both wet and dry seasons, while the abundance was significantly higher in dry season. In addition, roosting Great Cormorants were recorded in dry season only. A peak count of 310 ardeids and 795 Great Cormorants individuals were recorded from the night roost. Large proportion of the flight paths at the night roost was recorded towards the northeast direction (Flight Paths 1 and 2, about 32%) and the southeast (Flight Paths 3 and 4, about 37%) (**Figure 10.6E** refers). Most of the recorded flight paths were flying at a height of 0 – 20 m. During the course of the survey, most of the individuals were recorded travelling long distances when they return to the night roost, while a small proportion of the ardeids were recorded using nearby wetland habitats. Details of the night-roosting individuals and the associated flight paths are presented in **Appendix 10.5**.

Tam Kon Chau Night Roost (Overwintering)

10.6.2.60 Tam Kon Chau Night Roost was recorded outside the Assessment Area, about 610 m west from the Project boundary (**Figure 10.6F** refers). While direct impact on the night roost is not anticipated, flight paths from the night roost may be subject to indirect impacts from the proposed development. Ecological survey on this night roost was conducted, with particular emphasis on the flight paths associated with the night roost to facilitate assessment of potential indirect impacts on the flight paths arising from the proposed development.

10.6.2.61 According to the territory-wide study on ardeid night roosts, the Tam Kon Chau Night Roost was observed to be active in the year 2019 and 2020 and supported up to 228 ardeid individuals (AFCD, 2020). From recent surveys conducted under the current Assignment, a peak count of 232 ardeids individuals were recorded from the night roost, while Great Cormorants were not recorded roosting at this night roost. Large proportion of the flight paths at the night roost was recorded from the northeast (Flight Path 2, about 28%) and the south (Flight Path 5, about 29%), followed by east and southeast (Flight Paths 3 and 4, both with about 10% usage (**Figure 10.6F** refers). Flight height of the ardeids ranged from 0 to 30 m. Details of the night-roosting ardeids and the associated flight paths are presented in **Appendix 10.5**.

Overall Flight Paths from Egretries and Night Roosts

10.6.2.62 Overall flight paths from the two egretries are mostly towards the direction of ponds habitats. The majority of the flight paths from both MPLV and MPV Egretry were towards a generally north to northwest direction, as described in **Sections 10.6.2.50** and **10.6.2.52**. Ardeids from both egretries were recorded to fly at generally low heights, mostly under 20 m. Only a small portion of the ardeids were observed to land within the Assessment Area (mostly Chinese Pond Herons), while the majority of the ardeids were observed to fly over a long distance, landing at areas outside the observable distance.

10.6.2.63 Aside from the two egretries, five other night roosts were identified (**Figure 10.6** refers), which were located amongst the mosaic of pond habitats. Varying flight patterns were observed from each of these night roosts, as described in sections above. On a wider scale, the overall flight paths collectively form an east to west flight corridor along the mosaic of wetland habitats along San Tin and Lok Ma Chau area. Some of the ardeids and Great Cormorants individuals were observed to cover a long distance, potentially travelling as far as Mai Po and along Deep Bay (towards the west), or to Lo Wu (towards the east). In particular, some major flight paths along this east to west flight corridor was observed within the Project site, further described below.

Other Major Flight Paths

10.6.2.64 Notable flight paths were also observed across Lok Ma Chau Boundary Control Point (LMC BCP), Ha Wan Tsuen and some over the Loop, generally in an east-west direction. These flight paths were used by various avifauna in the wider area (e.g. night roosts from

further away), and have excluded flight paths of roosting cormorants and ardeids from Ha Wan Tsuen night roost, which were presented separately above in **Section 10.6.2.55**. Higher flight usage was observed during the dry season (Flight Paths A – F), while slightly lower abundance of avifauna was observed in wet season (Flight Paths G – J) (**Figure 10.6C** and **10.6D**). Majority of commuting waterbirds were recorded along Flight Paths B, C and D (**Figure 10.6C** refers). These flight paths were generally observed at a greater flight height, with around one third of the flight paths being above 20 m. Bird individuals along these flight paths were also observed to cover a relatively long distance over and across the LMC BCP (**Appendix 10.5** refers). A seasonal pattern of the flight direction and the abundance was also observed at these flight paths, with a much higher abundance of bird usage during dry season. Further details on the usage and the heights of the flight paths are presented in **Appendix 10.5**.

Day Roost

San Tin Open Storage Area Day Roost

10.6.2.65 A small colony of Black-crowned Night Herons were recorded roosting at San Tin Open Storage Area, mainly roosting on the trees Elephant's Ear (*Macaranga tanarius* var. *tomentosa*) along the pond bund, and was surrounded by open storage areas with heavy traffic and human disturbance (**Figure 10.6A** refers). A fluctuating usage was observed at the day roost, with a peak count of 20 ardeid individuals in December 2021, decreasing to nine individuals in April 2022, and no individuals of the Black-crowned Night Heron were recorded since May 2022.

Lok Ma Chau Loop Day Roost

10.6.2.66 Several ponds south of the LMC meander, near Lok Ma Chau Tsuen, was previously reported to support some roosting individuals of Great Cormorants (CEDD & PlanD, 2013a). During the recent surveys conducted under the current Assignment, some individuals of Great Cormorants were recorded perching on the power lines along the pond bund from December 2021 to March 2022 during day-time, while the cormorants were not observed roosting in this area during night-time. Fluctuating abundance was observed, with a peak count of 15 individuals. Seasonal pattern of this species was observed, with no more cormorants since April 2022. The cormorants were not observed to return during the dry season (October 2022), likely due to construction activities along Ha Wan Tsuen East Road (i.e. Western Connection Road for the Development of Lok Ma Chau Loop).

Avifauna

10.6.2.67 A total of 152 avifauna species (with 68 avifauna species of conservation importance) were recorded across the Assessment Area. Among these recorded species, 133 avifauna species were recorded in the northern portion of the Assessment Area (including 65 species recorded in the northern portion only, and 68 species recorded in both northern and southern potions). Of the 133 avifauna species in the northern portion, there were 60 species of conservation importance (including 44 species recorded in the northern portion only, and 16 species recorded in both northern and southern potions) (**Appendix 10.4A** refers). Most avifauna species including species of conservation importance recorded were migrant waterbirds and wetland-dependent species, common residential generalist species were also frequently recorded. Abundance and species diversity of avifauna were high in the contiguous wetland habitat in San Tin – Sham Po Shue area and Lok Ma Chau area comprised of pond, marsh / reed, mitigation wetland and watercourse habitats. Some scarce avifauna species (e.g. Eurasian Spoonbill (*Platalea leucorodia*), Pied Harrier (*Circus melanoleucos*) and Northern Lapwing (*Vanellus vanellus*)) and rare species (e.g. Little Stint (*Calidris minuta*)) were recorded at the pond habitats within the Assessment Area.

10.6.2.68 High diversity of waterbirds and wetland-dependent species (e.g. waders, waterfowls, ardeids, seabirds (terns and gulls), kingfishers and raptors, etc.) were recorded foraging in the contiguous ponds and mitigation wetland adjacent to Lok Ma Chau Station. High density of waders and ardeids (e.g. Pied Avocet (*Recurvirostra avosetta*), Temminck's

Stint (*Calidris temminckii*) and Little Egret (*Egretta garzetta*)) was recorded foraging in drained ponds as a result of active management of fishponds. Waterfowls such as Tufted Duck (*Aythya fuligula*) and Northern Pintail (*Anas acuta*) were recorded scattered in ponds with relatively low disturbance. Pond bunds were also often observed to support foraging, perching and roosting waterbirds and other generalist species were often observed. Wetland-depended raptors such as Peregrine Falcon (*Falco peregrinus*), Eastern Marsh Harrier (*Circus spilonotus*) and Western Osprey (*Pandion haliaetus*) were occasionally recorded soaring above the ponds. At night, some diurnal waterbirds were observed roosting in ponds and pond bunds, nocturnal avifauna species (e.g. Black-crowned Night Heron (*Nycticorax nycticorax*) and Savanna Nightjar (*Caprimulgus affinis*)) were observed foraging and flying across ponds. The contiguous pond habitat supports an east – west flight corridor of waterbirds, supporting high waterbird usage, especially during the dry season.

10.6.2.69 As described in **Section 10.6.2.8**, the contiguous pond habitat in the northern portion of Assessment Area were further divided into sub-zones based on their condition and disturbance, which also affects the diversity and abundance of avifauna recorded in each sub-zone. Highest diversity and abundance of avifauna species of conservation importance were recorded in San Tin Zone A where fishery activities were observed at majority of the ponds. Sam Po Shue Zone A and Sam Po Shue Zone B also had relatively high diversity of avifauna species of conservation importance considering the high species richness and area ratio. Other sub-zones had moderate avifauna species of conservation importance diversity, potentially because of higher disturbance in the surrounding developed area and human activities. Composition of avifauna species of conservation importance in each pond habitat sub-zone was indicated in **Figure 10.5**.

10.6.2.70 Some of the avifauna were also observed to exhibit breeding / nesting behaviour within the Assessment Area. Breeding of White-shouldered Starling (*Sturnia sinensis*) was recorded, nests were found in electric distribution boxes attached to electric pole located on pond bund (in Lok Ma Chau and San Tin Zone A). Breeding and nesting behaviour of Little Ringed Plover were recorded in a drained pond (in San Tin Zone A) during March 2022, with eggs and nesting individuals observed. A pair of Greater Painted-snipe was observed at the semi-natural watercourse WC-N8 (**Figure 10.3B** refers). While no eggs or chicks of the species was observed, the presence of the male-female pair for continuous months (around April to June 2022) suggest that the semi-natural watercourse and nearby wetland may support some extent of courtship or breeding behaviour for the species.

Mammal

10.6.2.71 A total of 19 mammal species were recorded in the northern portion of the Assessment Area, 14 of them are of conservation importance including 10 species of bat (**Appendix 10.4C** refers). Bat species were commonly recorded flying in developed area / wasteland and village / orchard in Lok Ma Chua and Chau Tau.

Bats and Bat Roosts

10.6.2.72 High abundance of bats was recorded flying near watercourses and ponds area in San Tin. A roost of Himalayan Leaf-nosed Bats (*Hipposideros armiger*) was recorded in Mi Tak Study Hall (Lok Ma Chau Tsuen), with a peak count of 40 individuals in wet season during the period of recent ecological surveys (**Figure 10.3E** refers). Himalayan Leaf-nosed Bats were not recorded at the study hall during dry season. Approximately ten individuals of Japanese Pipistrelle (*Pipistrellus abramus*) and an individual of Chinese Noctule (*Nyctalus plancyi*) were recorded to emerge from the abandoned Koon Ying School (Mai Po Tsuen) during wet season, likely using the abandoned school as a roosting site (**Figure 10.3C** refers).

10.6.2.73 While Short-nosed Fruit Bats (*Cynopterus sphinx*) were previously recorded in Chau Tau Tsuen (CEDD & PlanD, 2021a; KCRC, 2002), such record was made more than 20 years ago, and bat roost of this species were no longer recorded at Chau Tau Tsuen during recent ecological surveys. This species of fruit bat species was known to use alternate roosts over a range of area (Storz et al., 2000). The previously recorded bat roost was

potentially abandoned. Some other Chinese Fan-Palm (*Livistona chinensis*) trees within the Project site was also observed with evidence of previous usage by Short-nosed Fruit Bats (e.g., bite marks on the fronds of Chinese Fan-Palm along Castle Peak Road – San Tin section), but no individuals were directly observed to be roosting at the trees from recent surveys (**Figure 10.3B** refers).

Non-Flying Mammal Species

10.6.2.74 Other mammal species of conservation importance such as Leopard Cat (*Prionailurus bengalensis*), Small Indian Civet (*Viverricula indica*), Small Asian Mongoose (*Herpestes javanicus*) and Pallas's Squirrel (*Callosciurus erythraeus styani*) were recorded, mainly by camera traps. Leopard Cat was recorded in woodland within Mai Po Village SSSI. Small Indian Civet was commonly recorded in developed area / wasteland, pond bund, mitigation wetland, watercourses (WC-N2, WC-N4) and woodland in Lok Ma Chau and San Tin. Small Asian Mongoose was recorded in developed area / wasteland adjacent to pond bund and WC-N4 in Lok Ma Chau and Sam Po Shue. However, construction activities were observed to commence in August 2022 at the pond east of WC-N4. Pallas's Squirrel was recorded in developed area / wasteland, marsh / reed and woodland habitats.

10.6.2.75 While Eurasian Otters (*Lutra lutra*) were reported from previous studies, no individual of this species was recorded from recent surveys conducted under the current Assignment. As described in **Section 0** above, no individuals of this species were recorded within the Assessment Area from recent studies (WWF and KFBG, pers. comm.).

10.6.2.76 The wildlife corridor (underpass) constructed under Sheung Shui to Lok Ma Chau Spur Line was connecting STEMDC and Ha Wa Tsuen (EPD, 2015). It allows animal (targeted mammal) movement across San Sham Road and Lok Ma Chau Road. Camera trap was deployed during recent surveys at the entrance of the wildlife corridor, but only Domestic Cats (*Felis catus*) were recorded using the wildlife corridor during survey period, with no other wildlife recorded.

Herpetofauna

10.6.2.77 A total of 12 species of reptile and 10 species of amphibian were recorded in the northern portion of the Assessment Area (**Appendix 10.4I** refers). Out of the recorded herpetofauna species, seven species were of conservation importance, including Chinese Bullfrog (*Hoplobatrachus rugulosus*), Spotted Narrow-mouthed Frog (*Kalophrynus interlineatus*), Chinese Cobra (*Naja atra*), Common Rat Snake (*Ptyas mucosus*), Four-clawed Gecko (*Gehyra mutilata*), Indian Forest Skink (*Sphenomorphus indicus*) and Taiwan Kukri Snake (*Oligodon formosanus*). These species were recorded in various habitats within the Assessment Area such as developed area / wasteland, dry agricultural land, mixed woodland, modified watercourse, plantation, pond, semi-natural watercourse, village / orchard and woodland habitats, but were only observed from sparse sightings, and no breeding / roosting behaviour of these species were identified.

Butterfly

10.6.2.78 A total of 65 species of butterfly were recorded in the northern portion of the Assessment Area (**Appendix 10.4E** refers). A total of six butterfly species of conservation importance were recorded, including Danaid Eggfly (*Hypolimnas misippus*), Forget-me-not (*Catochrysops strabo strabo*), Lesser Band Dart (*Potanthus trachala trachala*), Metallic Cerulean (*Jamides alecto alocina*), Small Cabbage White (*Pieris rapae crucivora*) and Swallowtail (*Papilio xuthus xuthus*). Majority of the recorded species were generalist species which are common and widely distributed in Hong Kong such as Common Mormon (*Papilio polytes polytes*) and Great Egg-fly (*Hypolimnas bolina kezia*). Species of conservation importance were recorded in low-lying habitats such as developed area / wasteland, dry agricultural land, marsh / reed, pond, semi-natural watercourse and village / orchard.

Odonate

10.6.2.79 A total of 37 species of odonate species were recorded in the northern portion of the Assessment Area including four species of conservation importance (**Appendix 10.4G** refers). Most of the recorded species were common and widespread in Hong Kong. Species of conservation importance such as Blue Chaser (*Potamarcha congener*), Coastal Glider (*Macrodiplax cora*), Mangrove Skimmer (*Orthetrum poecilops*) and Scarlet Basker (*Urothemis signata signata*) were recorded in dry agricultural land, modified watercourse and pond habitat.

Freshwater Communities

10.6.2.80 A total of 31 aquatic fauna species were recorded in the northern portion of the Assessment Area (**Appendix 10.4K** refers). The freshwater community was mainly dominated by snails and fish species, mainly recorded from channelised watercourses. Low diversity and abundance of other macroinvertebrates were recorded. Two species of conservation importance including a fish species Rose Bitterling (*Rhodeus ocellatus*) and a crab species (*Somanniathelphusa zanklon*) were recorded in pond west of Ha Wan Fisherman San Tsuen, and modified watercourse in Chau Tau respectively. Majority of other freshwater fauna recorded were common species such as invasive Apple Snail (*Pomacea canaliculata*) and Nile Tilapia (*Oreochromis niloticus*) occupying modified watercourse and semi-natural watercourse.

10.6.2.81 The fish species Rose Bitterling (*Rhodeus ocellatus*) was recorded in an inactive / abandoned fishpond adjacent to Lok Ma Chau Road. High abundance of the species was estimated at the pond, and the population is likely a stable community at the pond and connected watercourses, considering the species was also recorded from previous studies (**Section 10.5.2.12** refers). Rose Bitterling (*Rhodeus ocellatus*) has a spawning symbiosis relationship with Chinese Pond Mussel (*Anodonta woodiana*), relying on the mussel species for reproduction. The pond was within Project area and therefore the whole population will subject to direct impact, further assessed in **Section 10.8** below.

10.6.3 Southern Portion

Habitat and Vegetation

Marsh / Reed

10.6.3.1 Scattered patches of marsh / reed of various sizes were recorded both within and outside the Project site. Three prominent clusters of marsh (MA-S1, MA-S2 and MA-S3) and other smaller marshes were located in Shek Wu Wai (SWW), scattered between two watercourses WC-S5 and WC-S6 (**Figures 10.3G** and **10.3H** refer). Smaller and isolated pieces of marsh / reed was also recorded, near Ki Lun Tsuen (within Project area) (**Figures 10.3G** and **10.3K** refer), and two patches of marsh in Ngau Tam Mei (outside the Project area) (**Figure 10.3I** refers). This habitat was likely derived from abandoned agricultural land and fishponds. This habitat was waterlogged and supported aquatic and wetland flora species, including *Ludwigia perennis* and the marsh fern Interrupted Tri-vein Fern (*Cyclosorus interruptus*). In addition, Ginger Lily (*Hedychium coronarium*) was often observed and probably the remnant of previous cultivation. Small patches of Common Reedgrass (*Phragmites australis*) were also commonly observed in this habitat. Due to the patchy distribution of reeds in marshes, the two habitats were not treated separately. No flora species of conservation importance was recorded at this habitat.

Pond

10.6.3.2 A number of ponds of various sizes were recorded within the Project site in SWW area, which were mainly small and scattered in the area between the watercourses WS-S5 and WS-S6 (**Figures 10.3G** and **10.3H** refers). Moreover, some smaller, isolated ponds were scattered throughout the Project area in Pang Loon Tei, adjacent to village areas. Outside the Project site, some noticeable ponds were recorded in Ngau Tam Mei. This habitat was mostly open water, with little to no vegetation observed along the pond bund,

and no flora species of conservation importance was recorded. Most of these ponds were located near village areas and were not observed with fisheries production. Ponds recorded in Ngau Tam Mei area were observed to be potentially used for recreational fishing. Further descriptions on the statues of fishery activities in ponds are presented in **Section 11**.

Natural Watercourse

10.6.3.3 The majority of the watercourses within the Assessment Area have been modified or channelised. Only two sections of natural watercourses were identified. WC-S1a is a very short section of natural watercourse (about 50 m in length), which flowed towards the southwest, located on the hillslope of Hadden Hill in the Ki Lun Tsuen (KLT) area (**Figure 10.3L** refers). This watercourse was the upstream section of the semi-natural watercourse WC-S1. Limited vegetation was recorded along this section of watercourse, with no flora species of conservation importance recorded.

10.6.3.4 WC-S3c was located on the south of Pang Loon Tei, and flowed towards the north, in close proximity outside the Project boundary, adjacent to village / orchard areas and the woodland behind San Tin Barracks (**Figure 10.3H** refers). This section was the upstream stretch of WC-S3 (STEMDC). This section was relatively natural, with sandy substratum interspersed with rocks. The water depth was about 0.2 m, observed with good water quality (clear water with no observable pollution) and moderate water velocity. Riparian vegetation included, for example, Virid-leaved Boehmeria (*Boehmeria nivea* var. *tenacissima*), Hainan Galangal (*Alpinia hainanensis*), Ciliate Microstegium (*Microstegium ciliatum*) and Giant Alocasia (*Alocasia macrorrhizos*). No flora species of conservation importance was recorded.

Modified Watercourse

10.6.3.5 WC-S3 (STEMDC) was a drainage channel, connecting the modified WC-S2 and semi-natural WC-S3a in its upstream stretch to WC-N3 in its downstream stretch (**Figure 10.3G** refers). As described in **Section 10.4.2.10**, the bank of part of this watercourse was covered with grasscrete that supported perennial vegetation, such as Dhaincha (*Sesbania cannabina*). The water along WC-S3 had varying depths of about 0.1 – 0.5 m, with inferior to average water quality and slow to moderate velocity. Recorded riparian vegetation included White Popinac (*Leucaena leucocephala*) and Guinea Grass (*Panicum maximum*). No flora species of conservation importance was recorded.

10.6.3.6 WC-S4 was a short section of watercourse. It was northwest-flowing and ran through the developed area and village area in the SWW area (**Figure 10.3G** refers). The riparian zone was dominated by Giant Alocasia (*Alocasia macrorrhizos*), Opposite-leaved Fig (*Ficus hispida*) and Wood-fern (*Cyclosorus parasiticus*). No flora species of conservation importance was recorded.

10.6.3.7 WC-S5 was located between the agricultural area in SWW area (**Figure 10.3G** refers). The watercourse was north-flowing, and observed to converge with WC-S6 near San Tin Highway, which then flows further up north and discharge into the Deep Bay area. This watercourse was channelised that both the embankment and bottom were covered in concrete, with minimal riparian vegetation. The water had a depth of about 0.1 m as well as inferior to moderate water quality and moderate velocity. Some runoffs and pollutants were observed to be discharged from adjacent developed area and agricultural areas. Vegetation was only observed occasionally along the concrete. No flora species of conservation importance was recorded.

10.6.3.8 WC-S6 was located in the SWW area and to the west of WC-S5 (**Figures 10.3G** and **10.3H** refer). It ran through a mosaic of village/orchard and dry agricultural land. Several patches of marsh / reed were also identified along this watercourse. Akin to WC-S5, both sides of the embankment and bottom were entirely covered in concrete, with muddy sediment. The water had a depth of approximately 0.2 m as well as inferior to moderate water quality and moderate velocity. Vegetation was only infrequently recorded at the crevices of the concrete, such as *Ludwigia perennis* and *Bidens alba*. No flora species of conservation importance was observed.

10.6.3.9 WC-S7 was a concrete-lined drainage channel situated between highly developed residential areas, and flowed towards north to northeast (**Figure 10.3C** refers). The water had a depth of about 0.1 m, with moderate velocity and inferior water quality. As both the banks and channel beds are fully channelised, minimal riparian vegetation was present. Vegetation recorded in this watercourse included Giant Alocasia (*Alocasia macrorrhizos*), Opposite-leaved Fig (*Ficus hispida*) and Umbrella Plant (*Cyperus involucratus*) in low occurrence. No flora species of conservation importance was recorded.

10.6.3.10 WC-S9 was a modified watercourse flowing south to Ngau Tam Mei (**Figure 10.3I** refers). The water depth was about 0.1 m, with moderate water quality. It had concrete banks and bed thus limited riparian vegetation was recorded. No flora species of conservation importance was recorded.

Semi-Natural Watercourse

10.6.3.11 WC-S1 flowed towards the southwest and was downstream to the natural WC-S1a, flowing to converge with the modified WC-S2. WC-S2 flowed from the east towards the northwest, and both WC-S1 and WC-S2 ran through developed areas and brownfields (**Figure 10.3L** refers). Both watercourses converge with WC-S3 (STEMDC) in its downstream stretch. Both watercourses were semi-modified that the bottom was fully covered in concrete, with some section observed to be sandy and lined with boulders. The water had a depth of about 0.1 m, and was observed to be of inferior water quality with heavy pollution, odour, and runoff from adjacent areas, with slow to moderate velocity. Riparian vegetation was dominated by Napier Grass (*Pennisetum purpureum*), Elephant's Ear (*Macaranga tanarius* var. *tomentosa*) and Kudzu (*Pueraria spp.*). No flora species of conservation importance was recorded.

10.6.3.12 WC-S3a and WC-S3b were upstream to WC-S3 (STEMDC) and downstream to the natural section WC-S3c (**Figure 10.3L** refers), flowing towards the north. This watercourse was semi-natural, observed with some modification from adjacent village / orchard habitat, with a muddy bottom. The water depth was about 0.1 – 0.2 m, while water quality was observed to be inferior compared to the natural section (WC-3x) with and slower velocity. Dominant vegetation in this watercourse included Napier Grass (*Pennisetum purpureum*), *Ludwigia perennis* and Water Lettuce (*Pistia stratiotes*). No flora species of conservation importance was recorded.

10.6.3.13 WC-S5a was upstream to WC-S5 (**Figure 10.3H** refers). It ran along the western boundary of San Tin Barracks to WC-S5 and passed through a mosaic of grassland, marsh / reed and developed area. The watercourse was semi-natural, with muddy substratum and some vegetation along the riparian zone, but the riverbank was subject to modification from adjacent developed area. Water quality along the watercourse was sub-optimal, with runoffs and pollutants discharged from adjacent areas, while turbid and odourous water was observed. The water depth was approximately 0.2 m, and velocity was moderate. Riparian vegetation included Umbrella Plant (*Cyperus involucratus*), Ciliate Microstegium (*Microstegium ciliatum*), *Ludwigia perennis* and *Bidens alba*. No flora species of conservation importance was recorded.

10.6.3.14 WC-S6a was the upstream section of WC-S6, running between mosaic of grassland and agricultural land, and developed area (**Figure 10.3H** refers). The water depth was about 0.2 m with moderate water quality and velocity. Garbage was observed along the watercourse. The bottom was sandy with occasionally some boulders. Dominant riparian vegetation included Ciliate Microstegium (*Microstegium ciliatum*), Giant Alocasia (*Alocasia macrorrhizos*) and Oriental Blechnum (*Blechnum orientale*). No flora species of conservation importance was recorded.

10.6.3.15 WC-S7a and WC-S7b ran through the village / orchard area of Ko Hang village, flowed towards the northwest, and converged with the modified drainage channel WC-S7 (**Figure 10.3C** refers). One side of the bank of this watercourse was lined with metal plates. The water had a depth of about 0.15 m, with a muddy bottom, and inferior water quality and slow velocity. Dominant vegetation included Mayflower Glorybower (*Clerodendrum cyrtophyllum*), *Ludwigia perennis* and *Asystasia micrantha*. No flora species of conservation importance was recorded.

10.6.3.16 WC-S8 occurs on the south-eastern boundary of the Assessment Area, passing through village / orchard in Ki Lun Tsuen to the east of Saddle Pass (**Figure 10.3L** refers). This watercourse was east-flowing and converged with other watercourses into Sheung Yue River outside the Assessment Area. The water depth was about 0.1 m and had moderate water quality and moderate velocity. Part of the watercourse was channelised and modified as culverts. Dominant vegetation included Giant Alocasia (*Alocasia macrorrhizo*), *Wedelia trilobata*, Opposite-leaved Fig (*Ficus hispida*) and Mile-a-minute Weed (*Mikania micrantha*). No flora species of conservation importance was recorded.

10.6.3.17 WC-S9a was the upstream section of WC-S9, running between village / orchard area in Ngau Tam Mei (**Figure 10.3I** refers). The water depth was about 0.1 m, with a muddy bottom, and moderate water quality and slow velocity. Dominant vegetation included *Bidens alba* and Taro *(Colocasia esculenta)*. No flora species of conservation importance was recorded.

10.6.3.18 WC-S10 was recorded in Ngau Tam Mei with a narrow upstream, and was observed to widen downstream, flowing towards the southwest (**Figure 10.3I** refers). The water was approximately 0.1 m - 0.3 m in depth, with sandy bottom interspersed by rocks, and with superior water quality and moderate velocity. Riparian vegetation such as Elephant's Ear (*Macaranga tanarius* var*. tomentosa*), Giant Alocasia (*Alocasia macrorrhizos*) and Diffuse Day-flower (*Commelina diffusa*) were frequently recorded along WC-S10. No flora species of conservation importance was recorded.

Seasonally Wet Grassland

10.6.3.19 A small patch of seasonally wet grassland (about 0.1 ha) was recorded within the Project site at Pang Loon Tei (**Figure 10.3L** refers). This habitat was likely derived from abandoned wet agricultural land, which became waterlogged during the wet season. This habitat was surrounded by developed area including brownfields, and received constant human disturbance from adjacent human activities. Dominated vegetation included *Wedelia trilobata*, Diffuse Day-flower, Gairo Morning Glory (*Ipomoea cairica*), Guinea Grass (*Panicum maximum*) and Mile-a-minute Weed (*Mikania micrantha*). No flora species of conservation importance was recorded.

Wet Agricultural Land

10.6.3.20 A few small patches of wet agricultural lands (less than 0.2 ha) were recorded interspersed between the dry agricultural land within the Project site at Shek Wu Wai (**Figure 10.3G** refers). While vegetation was limited at this wet habitat, Indian Lotus (*Nelumbo nucifera*) and Rice (*Oryza sativa*) were the major crop species recorded in these wet agricultural lands. This habitat was subject to regular maintenance and frequent human disturbance. No flora species of conservation importance was recorded in this habitat.

Dry Agricultural Land

10.6.3.21 Patches of dry agricultural land were recorded within the Project site at Shek Wu Wai, clustered in between the watercourses WC-S5 and WC-S6, and was fragmented and interspersed with adjacent habitats (e.g. village / orchard, grassland, and ponds). Some brownfield operation, residential areas, and village development was observed from adjacent areas, with associated disturbance on this habitat (**Figures 10.3G** and **10.3H** refer). Small and isolated patches of this habitat were also observed near Ko Hang Village and Ngau Tam Mei (**Figure 10.3C** and **Figure 10.3I** refers). Crop species recorded in these dry agricultural lands included Lettuce, Flowering Chinese Cabbage (*Brassica rapa* var. *parachinensis*), Water Spinach (*Ipomoea aquatic*), Papaya (*Carica papaya*), Common Banana (*Musa* x *paradisiaca*), etc. Fruit trees, such as Longan (*Dimocarpus longan*), Wampi (*Clausena lansium*) and Jackfruit (Artocarpus heterophyllus), were also commonly planted in this habitat. This habitat was subject to regular maintenance and frequent human disturbance. No flora species of conservation importance was recorded in this habitat.

Woodland

10.6.3.22 A few patches of woodlands were scattered across the southern portion of the Assessment Area. Within the Project site, there was a small patch of lowland woodland located at the west of Shek Wu Wai adjacent to village / orchard areas (**Figure 10.3G** refers). Outside the Project site, there were two patches in the hillside of Hadden Hill, a small patch near the village area of Shek Wu Wai, a large contiguous patch near San Tin Barracks and some scattered woodland on Ngau Tam Shan.

10.6.3.23 These patches of woodland shared similar composition. The canopy was semi-closed and reached a height of approximately 10 – 12 m tall. The canopy was dominated by native tree species, including Chinese Hackberry (*Celtis sinensis*), Ivy Tree (*Schefflera heptaphylla*) and Microcos (*Microcos nervosa*). The understory comprised common native shrub species and treelets of tree species, such as White-back Leaf Mallotus (*Mallotus apelta*), Desmos (*Desmos chinensis*), Wild Coffee (*Psychotria asiatica*), Aporosa (*Aporosa dioica*) and Thin Evodia (*Melicope pteleifolia*). Two flora species of conservation importance, Incense tree (*Aquilaria sinensis*) and Luofushan Joint-fir (*Gnetum luofuense*) were recorded in the woodland south of Pang Loon Tei, Incense Tree was also recorded in woodland north of Ngau Tam Mei during recent ecological surveys, outside the Project boundary (**Figure 10.3H** refers).

Mixed Woodland

10.6.3.24 Within the southern portion of the Project site, a patch of mixed woodland of considerable size was recorded near Shek Wu Wai (**Figure 10.3H** refers), while other patches of mixed woodland were fragmented and scattered throughout the Project site. Outside the Project site within the Assessment Area, there was a contiguous and extensive patch of mixed woodland south of San Tin Barracks and near Ngau Tam Shan as well as patches of fragmented mixed woodland throughout the Assessment Area.

10.6.3.25 Some of these mixed woodlands were developed from plantation through natural succession, while disturbance was also observed at some areas adjacent to developed area and brownfield. The canopy was continuous and reached a height of approximately 5 – 7 m tall. The canopy was dominated by a mix of native and exotic tree species, including Chinese Hackberry (*Celtis sinensis*), Ivy Tree (*Schefflera heptaphylla*) and Lemon-scented Gum (*Corymbia citriodora*). The understory mainly comprised Wild Coffee (*Psychotria asiatica*), Aporosa (*Aporosa dioica*), Microcos (*Microcos nervosa*) and Oriental Blechnum (*Blechnum orientale*). Two flora species of conservation importance were recorded in this habitat, including *Aralia chinensis* near San Tin Barracks (**Figure 10.3G** refers) and Incense tree east of Kam Kwai Leng and west of Tam Mei Hill) (**Figures 10.3C** and **10.3D** refer).

Plantation

10.6.3.26 Plantation had a scattered distribution throughout the southern portion of the Assessment Area, including some roadside plantation (e.g. along Castle Peak Road, Kwu Tung Road), on engineered slopes (e.g. near Tam Mei Hill), and on hillside plantation area (e.g. Kam Kwai Leng, around Shek Wu Wai, along the ridge of Ngau Tam Shan). The canopy of plantations was dominated by exotic tree species, including Ear-leaved Acacia (*Acacia auriculiformis*) and Brisbane Box (*Lophostemon confertus*). Some native species were also recorded, including Aporosa (*Aporosa dioica*) and Elephant's Ear (*Macaranga tanarius* var. *tomentosa*). Three flora species of conservation importance, Cycad-fern (*Brainea insignis*), Incense tree and Luofushan Joint-fir, were recorded in this habitat. Cycad-fern and Luofushan Joint-fir were recorded along the cut-slope on the hillside plantation on Ngau Tam Shan (**Figure 10.3H** refers), whereas Incense Tree was identified on that at Kam Kwai Leng within the Project boundary (**Figure 10.3C** refers).

Shrubland

10.6.3.27 Shrubland, along with grassland, was a dominant habitat type in the southern portion of the Assessment Area. It was mainly recorded on hillslopes, such as those on Ngau Tam Shan, Saddle Pass and Tam Mei Hill. This habitat was often interspersed by contiguous

area of grassland. Common shrub and small tree species, including Rose Myrtle (*Rhodomyrtus tomentosa*), Dwarf Mountain Pine (*Baeckea frutescens*), Narrow-leaved Screwtree (*Helicteres angustifolia*) and Sumac (*Rhus chinensis*), were recorded in this habitat. One flora species of conservation importance, Luofushan Joint-fir, was recorded at Pang Loon Tei outside the Project site (**Figure 10.3L** refers).

Grassland

10.6.3.28 Areas of grassland of various sizes were scattered throughout the southern portion. It was a dominant hillside habitat on Kam Kwai Leng and Ngau Tam Shan within the Project site, as well as on Hadden Hill, Saddle Pass and Tam Mei Hill outside the Project site. Scattered patches of lowland grassland were found in SWW interspersing between dry agricultural land and ponds. A small patch of grassland was also identified in Ngau Tam Mei. Herb species, such as Dwarf Mountain Pine (*Baeckea frutescens*) and Dichotomy Forked Fern (*Dicranopteris pedata*) dominated the habitat. Other commonly recorded herb species included Alsine-like Evolvulus (*Evolvulus alsinoides*), Asiatic Striga (*Striga asiatica*) and Chinese Buttonbush (*Adina pilulifera*). Three flora species of conservation importance, Luofushan Joint-fir, Cycad-fern and Sasanqua Camellia (*Camellia sasanqua*), were recorded in this habitat (refer to **Figure 10.3D**, **10.3H** and **10.3I** respectively).

Village / Orchard

10.6.3.29 Village / orchard in the southern portion included the village areas where human settlement and areas of planted fruit trees as well as other introduced tree and shrub species intermingled. An extensive area of village / orchard was found in Ko Hang and Pang Loon Tei within the Project site, as well as Shek Wu Wai, Saddle Pass and Ngau Tam Mei outside the Project area. Common fruit tree species, including Longan (*Dimocarpus longan*), Jackfruit (*Artocarpus heterophyllus*), Carambola (*Averrhoa carambola*) and Papaya (*Carica papaya*), were frequently recorded. Other common native tree / shrub and small trees included Pop-gun Seed (*Bridelia tomentosa*), Common Red-stem Fig (*Ficus variegata*) and Hairy Fig (*Ficus hirta*) were also recorded at this habitat. No flora species of conservation importance was recorded in this habitat.

Developed Area / Wasteland

10.6.3.30 Developed area / wasteland in the southern portion comprised various residential areas (e.g., Rolling Hills), brownfield operations, open storage, access roads, etc. Common landscaping and plantation species, such as *Bauhinia* spp., Horsetail Tree and Taiwan Acacia were recorded along the roadside. Native tree species, including Big-leaved Fig (*Ficus virens*) and Chinese Banyan, were also commonly recorded. Common shrub and climber species as well as treelets of tree species were also frequently recorded, such as Autumn Maple (*Bischofia javanica*), Dhaincha (*Sesbania cannabina*), Chinese Hackberry (*Celtis sinensis*), Passion Flower (*Passiflora foetida*) and *Ipomoea triloba*. Ruderal species, including White Popinac (*Leucaena leucocephala*) and Mile-a-minute weed (Mikania micrantha), were also recorded in this habitat. One flora species of conservation importance, Luofushan Joint-fir, was recorded in this habitat (**Figure 10.3G** refers).

Fauna

Avifauna

10.6.3.31 A total of 152 avifauna species (with 68 avifauna species of conservation importance) were recorded across the Assessment Area. Among these recorded species, 87 avifauna species were recorded in the southern portion of the Assessment Area (including 19 species recorded in the northern portion only, and 68 species recorded in both northern and southern potions). Of the 87 avifauna species in the southern portion, there were 24 species of conservation importance (including 8 species recorded in the northern portion only, and 16 species recorded in both northern and southern potions) (**Appendix 10.4B** refers). The majority of the recorded avifauna species are common or widespread in Hong Kong, while low abundance of uncommon species (e.g. Chinese Grosbeak) and scarce species (e.g. Eurasian Spoonbill) was also occasionally recorded.

10.6.3.32 Avifauna species of conservation importance recorded in the southern portion of the Assessment Area mainly include raptors (e.g. Common Kestrel, Crested Serpent Eagle), ardeids (e.g. Chinese Pond Heron, Little Egret), waterbirds and waders (e.g. Black-winged Stilt, Eurasian Teal). Most of these species of conservation importance were recorded in low-moderate abundance. Some of the waterbirds and waders were observed to aggregate at a section of STEMDC (WC-S3) near Ki Lun Tsuen and Kwu Tung Road.

10.6.3.33 The recorded species were mostly resident species in Hong Kong, while some of the waterbirds and waders are winter visitor species. As such, a seasonal pattern was observed, with generally low abundance observed during wet season, and moderate abundance in dry season. Nesting behaviour of an avifauna species White-throated Kingfisher (*Halcyon smyrnensis*) was observed, with the sighting of the species burrowing in a nest tunnel on a mud wall, located within plantation habitat on Ngau Tam Shan within Project area (**Figure 10.3H** refers). Nest of White-shouldered Starling was recorded in electric distribution boxes located in village / orchard area in Shek Wu Wai, within Project area. No particular breeding / roosting behaviour of other avifauna species was observed in the southern portion of the Assessment Area, potentially due to the higher level of human disturbances (e.g. at village / orchard and industrial and workshop areas). Location of these species of conservation importance are presented in **Figure 10.3**.

Mammal

10.6.3.34 A total of 16 mammal species was recorded from the southern portion of the Assessment Area, which includes nine bat species (**Appendix 10.4D** refers). Most of the recorded mammal species are nocturnal species, mostly active at night. Among the recorded species, 15 of the species are of conservation importance, included the nine bat species, and six other non-flying mammal species (East Asian Porcupine, Leopard Cat, Masked Palm Civet, Pallas's Squirrel, Red Muntjac, and Small Indian Civet). Most of the non-flying mammal species were recorded along the fringe of woodland and mixed woodland habitats.

10.6.3.35 Among the deployed camera traps, the highest diversity and abundance of mammal species was recorded at the mature woodland at Pang Loon Tei, located to the east of San Tin Barracks. This patch of woodland was recorded to support eight mammal species (three bat species, and five non-flying mammal species including East Asian Porcupine, Leopard Cat, Red Muntjac, Small Indian Civet and Masked Palm Civet), including a pregnant individual of Red Muntjac recorded traversing through the area, suggesting the significance of the woodland habitat as a movement corridor or potentially a breeding ground for the species.

10.6.3.36 Within the Project site, low abundance of mammal individuals was also recorded, including the mixed woodland adjacent to Shek Wu Wai San Tsuen (CT-12, **Figure 10.3G** refers), grassland habitat on a knoll on Kam Kwai Leng (CT-13, **Figure 10.3C** refers) and plantation habitat along ridge of Ngau Tam Shan (CT-15, **Figure 10.3I** refers). These mammals were recorded from camera trap, traversing through the area during night time. Nursery behaviour of East Asian Porcupine was recorded in mixed woodland adjacent to Shek Wu Wai San Tsuen, as observed the presence of juvenile individuals (CT-12, **Figure 10.3G** refers). Sightings of mammals recorded from camera traps are presented in **Appendix 10.4D**, and location of these species of conservation importance are presented in **Figure 10.3**.

Bats and Bat Roosts

10.6.3.37 The majority of bat species were recorded in low-lying habitats such as village / orchard and developed area, near the fringe of wooded habitats, and along major watercourses. Relatively high diversity of bats was recorded in these habitats near Shek Wu Wai San Tsuen, and along the watercourses WC-S5 and WC-S6. Bat species in this area include Short-nosed Fruit Bat (*Cynopterus sphinx*), Pipistrelles (*Pipistrellus* spp.) and Himalayan Leaf-nosed Bats (*Hipposideros armiger*). The bats were recorded circling above the mature vegetation at woodland and village / orchard habitats and above the watercourses, likely using these habitats as foraging and drinking spots. Sparse occurrence of bat

individuals was also recorded in other areas within the southern portion of the Assessment Area, such as village / orchard at Pang Loon Tei and Ngau Tam Mei, also along STEMDC (WC-S3) but in much lower abundance.

10.6.3.38 No bat roosts were identified within the southern portion of the Assessment Area from recent ecological surveys.

Herpetofauna

10.6.3.39 Within the southern portion of the Assessment Area, a total of 11 amphibian species and 13 reptile species were recorded. Generally low abundance of herpetofauna was recorded, which are mostly common species that are widely distributed in Hong Kong. Amphibian species were mostly recorded near village / orchard, and wetland habitats such as watercourses and marsh / reed, with two amphibian species of conservation importance recorded, including Chinese Bullfrog (*Hoplobatrachus rugulosus*) recorded at semi-natural watercourse (WC-S6a) near Shek Wu Wai, village / orchard habitats near Ki Lun Tsuen and pond in Ngau Tam Mei (**Figures 10.3H**, **10.3I** and **10.3L** refer), and an individual of Spotted Narrow-mouthed Frog (*Kalophrynus interlineatus*) at the modified watercourse (WC-S3) near Ki Lun Tsuen (**Figure 10.3G** refers). Reptile species were mostly recorded near shrubland and village / orchard habitats, while three snake species of conservation importance was also identified, including Indo-Chinese Rat Snake (*Ptyas korros*) recorded at mixed woodland near Tam Mei Hill, Many-banded Krait (*Bungarus multicinctus multicinctus*) recorded at modified watercourse (WC-S5) near Shek Wu Wai Village, and Chinese Cobra at developed area / wasteland near Ki Lun Tsuen (refer to **Figures 10.3D, 10.3G**, and **10.3L**).

Butterfly

10.6.3.40 A total of 98 butterfly species was recorded from the southern portion of the Assessment Area, which includes 17 butterfly species of conservation importance, which some of them are rare in Hong Kong such as Broad Spark (*Sinthusa chandrana grotei*), Rounded 6-line Blue (*Nacaduba berenice*) and Dark Brown Ace (*Halpe porus*) (**Appendix 10.4F** refers). Most of the recorded butterfly species, including the species of conservation importance, were recorded near vegetated habitats, such as marsh / reed, dry agricultural land, woodland, shrubland, grassland, or village / orchard habitats. Location of these species of conservation importance are presented in **Figure 10.3**.

Odonate

10.6.3.41 A total of 33 odonate species was recorded from the southern portion of the Assessment Area, including two odonate species of conservation importance Blue-spotted Dusk-hawker (*Gynacantha japonica*) and Scarlet Basker (*Urothemis signata signata*) (**Figure 10.3L**, **10.3I** and **Appendix 10.4H** refers). All of the recorded odonate species, including the species of conservation importance, were abundant or common in Hong Kong. Odonate species were recorded in various habitats within the Assessment Area, mostly along watercourses, and occasionally at other habitats with water sources nearby.

Freshwater Communities

10.6.3.42 A total of 24 freshwater community species were recorded at the southern portion of the Assessment Area, mostly recorded at aquatic habitats such as ponds and watercourses. The freshwater community was largely dominated by the fish species Nile Tilapia (*Oreochromis niloticus*), Apple Snail (*Pomacea canaliculata*), and Ramshorn Snail (Family *Planorbidae*), which are invasive and/or fast-growing species that are also tolerant to different levels of water quality. Apple snail was also recorded in dry agricultural land, along the ditches located between the farmland areas. The presence of these species in high abundance suggests inferior water quality at the habitats. The highest diversity of freshwater community species was recorded at FS8 at a natural watercourse WC-S3c, where the condition and the presence of the relatively sensitive species suggest relatively undisturbed and better water quality at this section of natural

watercourse. No freshwater species of conservation importance was recorded at the southern portion of the Assessment Area.

10.7 EVALUATION OF ECOLOGICAL VALUES

10.7.1 Habitats within the Assessment Area

10.7.1.1 The ecological importance of recorded habitats was evaluated in accordance with the EIAO-TM Annex 8 criteria and presented in **Table 10.5** to **Table 10.21** below. Species of conservation importance identified from literature review and surveys are summarised in **Table 10.22**. Their indicative locations and representative photographs are presented in **Figure 10.3** and **10.4** and **Appendix 10.2**, respectively.

Table 10.5 Ecological Evaluation of Mitigation Wetland within the Assessment Area

Criteria	Mitigation habitats under STEMDC	San Tin Constructed Wetland	LMC EEA	LMC Loop EA
Naturalness	Low	Low	Low	Low
Size	Small to Moderate (6.15 ha)	Small (1.04 ha)	Small to moderate (11.24 ha)	Small (4.34 ha)
Diversity	Low to moderate	Low to moderate	Moderate to High	Low
Rarity	Mitigation wetlands are uncommon in Hong Kong. Current Survey (Mitigation habitats under STEMDC, San Tin Constructed Wetland, LMC EEA) A total of 19 species of conservation importance were recorded, including 12 avifauna species (Black Kite, Black-winged Kite, Black-winged Stilt, Chinese Pond Heron, Great Egret, Greater Coucal, Grey Heron, Intermediate Egret, Little Egret, Little Grebe, Pied Harrier, Wood Sandpiper), 5 mammal species (Japanese Pipistrelle, Lesser Bamboo Bat, Short-nosed Fruit Bat, Small Indian Civet, Unknown Vespertilionidae sp. 1), and 2 butterfly species (Forget-me-not, Lesser Band Dart) Literature Review (Mitigation habitats under STEMDC) A total of 15 avifauna species of conservation importance were recorded, including Black Kite, Chinese Pond Heron, Chinese Hwamei, Cinnamon Bittern, Greater Coucal, Great Egret, Grey Heron, Little Egret, Little Grebe, Marsh Sandpiper, Red-throated Pipit, Red-billed Starling, Yellow Bittern, White-shouldered Starling, White-throated Kingfisher Total number of species of conservation importance recorded: 27			
Re-creatability	High	High	High	High
Fragmentation	High	Low	Low	Low
Ecological linkage	Partially located within CA, WBA and WCA Structurally and functionally connecting upstream and downstream wetland habitats along STEMDC	Located within WBA, adjacent to wetland habitats (watercourses and ponds)	Located within CA, WBA and WCA Located adjacent to wetland habitats (watercourses and ponds)	Located near LMC meander Ecologically connected to LMC meander and ponds south of LMC meander Form part of the avifauna flight corridor
Potential value	Moderate	Low to moderate	Moderate to High	Moderate to High
Nursery / Breeding ground	None recorded from recent ecological surveys			
Age	About 20 years	About 20 years	About 15 years	Young, recently established
Abundance / Richness of Wildlife	Moderate	Low	Moderate to High	Low
Ecological value	**Low to moderate**	**Low to moderate**	**Core: Very High**	**Low to moderate**

Criteria	Mitigation habitats under STEMDC	San Tin Constructed Wetland	LMC EEA	LMC Loop EA
			Clean-up Reedbed: Low to moderate	(existing condition) **Moderate** (upon maturation)

Table 10.6 Ecological Evaluation of Marsh / Reed within the Assessment Area

Criteria	Northern Portion	Southern Portion
Naturalness	Moderate. Succeeded from abandoned farmlands and abandoned fishponds. No active management was observed	Moderate. Succeeded from abandoned man-made habitats, such as ponds and agricultural lands through natural processes; human disturbance such as trimming was sometimes observed
Size	Small to Moderate (10.36 ha)	Small (3.89 ha)
Diversity	Low to moderate flora and fauna diversity	Moderate flora and fauna diversity
Rarity	Uncommon habitat in Hong Kong <u>Current Survey</u> A total of 13 species of conservation importance were recorded, including 7 avifauna species (Black Kite, Chinese Pond Heron, Greater Coucal, Little Egret, Purple Heron, Red-billed Starling, White-shouldered Starling), 2 mammal species (Pallas's Squirrel, Short-nosed Fruit Bat), 3 butterfly species (Metallic Cerulean, Small Cabbage White, Swallowtail), and 1 odonate species (Scarlet Basker) <u>Literature Review</u> A total of 3 species of conservation importance were recorded, including 1 odonate species (Ruby Darter), 1 herpetofauna species (Chinese Bullfrog), and 1 freshwater crab species (*Somanniathelphusa zanklon*) Total number of species of conservation importance recorded: 16	Uncommon habitat in Hong Kong. <u>Current Survey</u> A total of 4 fauna species of conservation importance was recorded, including 2 avifauna species (Greater Coucal, Little Egret), 1 mammal species (Intermediate Horseshoe Bat), and 1 butterfly species (Metallic Cerulean) <u>Literature Review</u> A total of 4 species of conservation importance were recorded, including 3 butterfly species (Danaid Eggfly, Grass Demon, Swallowtail), and 1 herpetofauna species (Chinese Bullfrog) Total number of species of conservation importance recorded: 8
Re-creatability	Low to moderate	Low to moderate
Fragmentation	High. This habitat was scattered throughout the northern portion of the Assessment Area	High. This habitat was fragmented by adjacent habitats in the southern portion of the Assessment Area
Ecological linkage	Some patches of marsh / reed within the northern portion of the Assessment Area are located within CA, WCA, and WBA Majority of this habitat is structurally and functionally connected to the adjacent agricultural lands and fishponds	Structurally and functionally linked to adjacent watercourses, ponds and agricultural lands
Potential value	Moderate. Values could be increased through habitat management	Moderate. Values could be increased through habitat management
Nursery / Breeding ground	Breeding behaviour of White-shouldered Starling is recorded in electric distribution box in this habitat at Lok Ma Chau Tsuen	No notable nursery and breeding behaviour
Age	N/A	N/A
Abundance / Richness of Wildlife	Moderate	Low to moderate
Ecological value	**LMC Tsuen: Moderate** **Others: Low to moderate**	**MA-S1, MA-S2, MA-S3: Moderate** **Others: Low to moderate**

Table 10.7 Ecological Evaluation of Pond within the Assessment Area

Criteria	Northern Portion	Southern Portion
Naturalness	Low. Majority of the pond habitat is for fishery production. Others are for flood retention and landscaping.	Low. A man-made habitat for aquaculture and landscaping.
Size	Large (217.09 ha)	Small (5.74 ha)
Diversity	Moderate flora diversity and high fauna diversity	Low flora and fauna diversity
Rarity	Uncommon, mostly located in north-western New Territories <u>Current Survey</u> A total of 71 species of conservation importance were recorded, including 1 flora species (Incense Tree), 54 avifauna species (Black Kite, Black-crowned Night Heron, Black-faced Spoonbill, Black-headed Gull, Black-winged Stilt, Carrion Crow, Chestnut-eared Bunting, Chinese Pond Heron, Collared Crow, Common Greenshank, Common Kestrel, Common Redshank, Curlew Sandpiper, Eastern Buzzard, Eastern Cattle Egret, Eastern Marsh Harrier, Eurasian Coot, Eurasian Spoonbill, Eurasian Teal, Great Cormorant, Great Egret, Great Knot, Greater Coucal, Greater Sand Plover, Grey Heron, Grey Plover, Grey-headed Lapwing, Intermediate Egret, Kentish Plover, Little Egret, Little Grebe, Little Ringed Plover, Little Stint, Long-toed Stint, Marsh Sandpiper, Northern Lapwing, Northern Pintail, Northern Shoveler, Oriental Pratincole, Pacific Golden Plover, Peregrine Falcon, Pied Avocet, Pied Harrier, Purple Heron, Red-billed Starling, Red-necked Stint, Red-throated Pipit, Sharp-tailed Sandpiper, Temminck's Stint, Tufted Duck, Western Osprey, White-cheeked Starling, White-shouldered Starling, Wood Sandpiper), 9 mammal species (Intermediate Horseshoe Bat, Japanese Pipistrelle, Lesser Bamboo Bat, Short-nosed Fruit Bat, Small Asian Mongoose, Small Indian Civet, Unknown Myotis Species, Unknown Vespertilionidae sp. 1, Unknown Vespertilionidae sp. 2), 3 butterfly species (Danaid Eggfly, Small Cabbage White, Swallowtail), 2 odonate species (Coastal Glider, Scarlet Basker), 1 herpetofauna species (Common Rat Snake), and 1 freshwater fish species (Rose Bitterling) <u>Literature Review</u> A total of 4 species of conservation importance were recorded, including 2 odonate species (Ruby Darter, Scarlet Basker), 1 herpetofauna species (Two-striped Grass Frog), and 1 freshwater fauna species (Rose Bitterling) Pond bund also supported roosting ardeids and Great Cormorant, including: • San Tin Open Storage Area Night Roost • Ha Wan Tsuen Night Roost • Sam Po Shue Night Roost • Lin Barn Tsuen Night Roost • Tam Kon Chau Night Roost • San Tin Open Storage Area Day Roost (abandoned) • Lok Ma Chau Loop Day Roost (abandoned) Total number of species of conservation importance recorded: 73	Uncommon, mostly located in north-western New Territories. <u>Current Survey</u> A total of 4 species of conservation importance were recorded, including 2 avifauna species (Chinese Pond Heron, Greater Coucal), 1 mammal species (Lesser Bamboo Bat), and 1 herpetofauna species (Chinese Bullfrog) <u>Literature Review</u> A total of 2 species of conservation importance were recorded, including 1 odonate species (Ruby Darter), and 1 herpetofauna species (Spotted Narrow-mouthed Frog) Total number of species of conservation importance recorded: 6
Re-creatability	High	High
Fragmentation	Low for ponds San Tin and Sam Po Shue area, and along the Loop	Moderate for ponds in Shek Wu Wai

Criteria	Northern Portion	Southern Portion
	Moderate to high for ponds near Ha Wan Tsuen, Chau Tau, and near urbanised areas along Castle Peak Road	High for other scattered and isolated ponds
Ecological linkage	Large areas of ponds are located within CA, WBA and WCA Ponds are structurally and functionally linked to adjacent wetland (marsh / reed, mitigation wetland, watercourses) Wide extent of contiguous pond habitat formed part of the east-west flight corridor for waterbirds in Deep Bay.	Structurally and functionally linked to adjacent wetland habitats, including marsh / reed and watercourses
Potential value	Moderate to high. Ecologically friendly aquaculture practices (e.g. scheduled drain-down) could enhance its ecological value at active fishponds, whereas inactive and abandoned fishponds could be properly managed to maximise use by wildlife.	
Nursery / Breeding ground	Breeding ground recorded for: • Rose Bitterling (at Lok Ma Chau Tsuen) • Little Ringed Plover (at San Tin) • White-shouldered Starling (at San Tin)	No notable nursery and breeding behaviour
Age	Majority of fishpond areas established since the 1940s	N/A
Abundance / Richness of Wildlife	Lok Ma Chau: Low to moderate San Tin and Sam Po Shue: High	Low
Ecological value	**Lok Ma Chau: Moderate** **San Tin (Zone A): High** **San Tin (Zone B): Moderate to high** **San Tin (Zone C): Moderate** **Sam Po Shue (Zone A): High** **Sam Po Shue (Zone B): Moderate to high** **Sam Po Shue (Zone C): Moderate** **Ha Wan Tsuen Night Roost: Moderate to High** **San Tin Open Storage Area Night Roost: Moderate** **Lin Barn Tsuen Night Roost: Moderate** **Sam Po Shue Night Roost: High** **Tam Kon Chau Night Roost: Moderate to High** **San Tin Open Storage Area Day Roost: Low (*abandoned*)** **Lok Ma Chau Loop Day Roost: Low (*abandoned*)**	**Shek Wu Wai: Low to moderate** **Others: Low**

Note: Sub-zones and associated fauna species of conservation importance was demarcated in **Figure 10.5.**

Table 10.8 Ecological Evaluation of Natural Watercourse within the Assessment Area

Criteria	Northern Portion	Southern Portion
Naturalness	Moderate to high	Moderate to High
Size	Small (5.84 ha)	Very small (0.11 ha)
Diversity	Low flora and fauna diversity	Moderate flora diversity and low fauna diversity
Rarity	Common habitat in Hong Kong Current Survey A total of 4 fauna species of conservation importance were recorded, including 3 avifauna species (Chinese Pond Heron, Greater Coucal, Little Egret), and 1 mammal species (Small Indian Civet) Literature Review No species of conservation importance recorded Total number of species of conservation importance recorded: 4	Common habitat in Hong Kong. Current Survey A total of 2 fauna species of conservation importance were recorded, including 1 mammal species (Japanese Pipistrelle), and 1 butterfly species (Metallic Cerulean) Literature Review No species of conservation importance recorded Total number of species of conservation importance recorded: 2
Re-creatability	Low	Low

Criteria	Northern Portion	Southern Portion
Fragmentation	Low	Low
Ecological linkage	Located within CA, WBA and WCA WC-N2 (LMC Meander) is structurally and functionally linked to Shenzhen River, adjacent ponds and mitigation wetland in the Loop (LMC Loop EA), and form part of the waterbird flight-path	Structurally and functionally linked to adjacent wetland habitats, such as marsh / reed and ponds
Potential value	WC-N2 (LMC Meander): Moderate WC-N2b: Low	Moderate
Nursery / Breeding ground	No notable nursery and breeding behaviour	No notable nursery and breeding behaviour
Age	N/A	N/A
Abundance / Richness of Wildlife	Low	Low
Ecological value	**WC-N2 (LMC Meander): Moderate** **WC-N2b: Low to Moderate**	**WC-S1a: Low** **WC-S3c: Moderate to High**

Table 10.9 Ecological Evaluation of Modified Watercourse within the Assessment Area

Criteria	Northern Portion	Southern Portion
Naturalness	Low	Low
Size	Moderate (21.49 ha)	Small (2.80 ha)
Diversity	Low flora diversity and moderate fauna diversity	Low flora diversity and moderate fauna diversity
Rarity	A common habitat in Hong Kong <u>Current Survey</u> A total of 21 species of conservation importance recorded, including 11 avifauna species (Black-winged Stilt, Chinese Pond Heron, Common Greenshank, Eurasian Teal, Great Cormorant, Great Egret, Greater Coucal, Grey Heron, Little Egret, Northern Shoveler, Wood Sandpiper), 6 mammal species (Chinese Noctule, Japanese Pipistrelle, Lesser Bamboo Bat, Small Indian Civet, Unknown Vespertilionidae sp. 1, Unknown Vespertilionidae sp. 2), 2 odonate species (Blue Chaser, Mangrove Skimmer), 1 herpetofauna species (Chinese Bullfrog), and 1 freshwater crab species (*Somanniathelphusa zanklon*) <u>Literature Review (STEMDC)</u> A total of 23 avifauna species of conservation importance (Black-winged Stilt, Chinese Pond Heron, Cinnamon Bittern, Common Greenshank, Eastern Buzzard, Eurasian Teal, Eurasian Wigeon, Great Egret, Greater Painted-snipe, Grey Heron, Grey-headed Lapwing, Intermediate Egret, Lanceolated Warbler, Little Egret, Long-toed Stint, Marsh Sandpiper, Pied Avocet, Red-throated Pipit, Spotted Redshank, Temminck's Stint, White-shouldered Starling, White-throated Kingfisher, Wood Sandpiper) were recorded	A common habitat in Hong Kong. <u>Current Survey</u> A total of 18 fauna species of conservation importance was recorded, including 7 avifauna species (Black-winged Stilt, Chinese Pond Heron, Collared Crow, Eurasian Teal, Greater Coucal, Little Egret, Wood Sandpiper), 8 mammal species (Chinese Noctule, Japanese Pipistrelle, Least Horseshoe Bat, Lesser Bamboo Bat, Pallas's Squirrel, Short-nosed Fruit Bat, Unknown Vespertilionidae sp. 1, Unknown Vespertilionidae sp. 2), 1 butterfly species (Small Cabbage White), and 2 herpetofauna species (Many-banded Krait and, Spotted Narrow-mouthed Frog) <u>Literature Review</u> A total of 3 fauna species of conservation importance was recorded, including 2 odonate species (Blue Chaser, Ruby Darter), and 1 herpetofauna species (Banded Stream Snake) Total number of species of conservation importance recorded: 21

Criteria	Northern Portion	Southern Portion
	Literature Review (Others) One freshwater fauna species of conservation importance (*Somanniathelphusa zanklon*) was recorded Total number of species of conservation importance recorded: 36	
Re-creatability	High	High
Fragmentation	Low, some fragmentation observed from adjacent developed areas	Fragmentation was observed, with some sections culvertised
Ecological linkage	Both WC-N3 (STEMDC) and WC-N4 are partially located within CA, WBA and WCA WC-N4: structurally and functionally linked to adjacent ponds at Ha Wan Tsuen. Downstream connected to WC-N3 Others: No major ecological linkage	Functionally linked with adjacent wetland habitats, such as ponds and marsh / reed
Potential value	Low to moderate	Low to moderate
Nursery / Breeding ground	No notable nursery and breeding behaviour	No notable nursery and breeding behaviour
Age	N/A	N/A
Abundance / Richness of Wildlife	WC-N3 (STEMDC): Moderate Others: Low	Moderate
Ecological value	**WC-N1 (SZ River): Low** **WC-N3 (STEMDC): Moderate** **WC-N4, Wc-N8a: Low-moderate** **Others: Low**	**WC-S3 (STEMDC): Moderate** **WC-S5, S6: Low-moderate** **Others: Low**

Table 10.10 Ecological Evaluation of Semi-natural Watercourse within the Assessment Area

Criteria	Northern Portion	Southern Portion
Naturalness	Low to moderate	Low to moderate
Size	Small to moderate (9.26 ha)	Small (1.90 ha)
Diversity	Low to moderate flora and fauna diversity	Moderate flora diversity and low fauna diversity
Rarity	A common habitat in Hong Kong Current Survey A total of 18 species of conservation importance recorded, including 9 avifauna species (Chinese Pond Heron, Collared Crow, Great Egret, Greater Coucal, Greater Painted-snipe, Grey Heron, Intermediate Egret, Little Egret, Red-billed Starling), 6 mammal species (Japanese Pipistrelle, Leopard Cat, Lesser Bamboo Bat, Small Asian Mongoose, Small Indian Civet, Unknown Vespertilionidae species 1), 2 butterfly species (Danaid Eggfly, Small Cabbage White), and 1 herpetofauna species (Chinese Bullfrog) Literature Review A freshwater fish species of conservation importance (Rose Bitterling) was recorded Total number of species of conservation importance recorded: 19	A common habitat in Hong Kong. Current Survey A total of 8 fauna species of conservation importance was recorded, including 2 avifauna species (Chinese Pond Heron, Common Emerald Dove), 5 mammal species (Himalayan Leaf-nosed Bat, Japanese Pipistrelle, Lesser Bamboo Bat, Pallas's Squirrel, Unknown Vespertilionidae sp. 1), and 1 herpetofauna species (Chinese Bullfrog) Literature Review A total of 2 species of conservation importance recorded, including 1 odonate species (Emerald Cascader), 1 freshwater fauna (*Cryptopotamon anacoluthon*) Total number of species of conservation importance recorded: 10

Criteria	Northern Portion	Southern Portion
Re-creatability	Moderate to high	Moderate to high
Fragmentation	Low to moderate	Low to moderate
Ecological linkage	Partially located within CA, WCA, and WBA Functionally and structurally linked to adjacent habitats such as ponds, marsh / reed, and dry agricultural land Others: No notable ecological linkage	Functionally and structurally linked with adjacent wetland habitats, such as marsh / reed and ponds
Potential value	Low	Low to moderate
Nursery / Breeding ground	No notable nursery and breeding behaviour	No notable nursery and breeding behaviour
Age	N/A	N/A
Abundance / Richness of Wildlife	Low to moderate	Low to moderate
Ecological value	**WC-N6, WC-N11, WC-N15: Low** **Others: Low to moderate**	**WC-S3a, WC-S10: Low to moderate** **Others: Low**

Table 10.11 Ecological Evaluation of Seasonally Wet Grassland within the Assessment Area

Criteria	Northern Portion	Southern Portion
Naturalness	Low. Succeeded from abandoned waterlogged area	Moderate. Succeeded from abandoned agricultural lands through natural processes.
Size	Very small (0.13 ha)	Very small (0.10 ha)
Diversity	Low flora and fauna diversity	Low flora and fauna diversity
Rarity	An uncommon habitat in Hong Kong. <u>Current Survey</u> 1 avifauna species of conservation importance (Chinese Pond Heron) was recorded <u>Literature Review</u> No species of conservation importance recorded Total number of species of conservation importance recorded: 1	An uncommon habitat in Hong Kong. <u>Current Survey and Literature Review</u> No species of conservation importance recorded in this habitat
Re-creatability	Moderate to high	Moderate
Fragmentation	Low, only a small single area of this habitat was recorded	Low, only a small single area of this habitat was recorded
Ecological linkage	Located within Mai Po Village SSSI, Ramsar Site, Priority Site for Enhanced Conservation and WBA Structurally adjacent to woodland habitat, no other ecological linkage observed	Adjacent to wasteland and brownfield, no apparent ecological linkage observed
Potential value	Low to moderate	Low to moderate
Nursery / Breeding ground	No notable nursery and breeding behaviour	No notable nursery and breeding behaviour
Age	N/A	N/A
Abundance / Richness of Wildlife	Low	Low
Ecological value	**Low**	**Low**

Table 10.12 Ecological Evaluation of Wet Agricultural Land within the Assessment Area

Criteria	Southern Portion
Naturalness	Low. A man-made habitat for crop production
Size	Very small (0.20 ha)
Diversity	Low flora and fauna diversity
Rarity	An uncommon habitat in Hong Kong. Current Survey and Literature Review No species of conservation importance was recorded in this habitat.
Re-creatability	High
Fragmentation	Moderate, only two small, isolated areas of this habitat were recorded
Ecological linkage	Structurally and functionally linked with adjacent dry agricultural land
Potential value	Low to moderate
Nursery / Breeding ground	None observed
Age	N/A
Abundance / Richness of Wildlife	Low
Ecological value	**Low**

Table 10.13 Ecological Evaluation of Dry Agricultural Land within the Assessment Area

Criteria	Northern Portion	Southern Portion
Naturalness	Low. A man-made habitat for crop production	Low. A man-made habitat for crop production
Size	Small (3.00 ha)	Small to moderate (10.69 ha)
Diversity	Low flora diversity and moderate fauna diversity	Low flora diversity and moderate fauna diversity
Rarity	A common habitat in Hong Kong Current Survey A total of 12 species of conservation importance recorded, including 8 avifauna species (Black-winged Stilt, Chinese Pond Heron, Great Egret, Greater Coucal, Little Egret, Red-throated Pipit, White-cheeked Starling, Wood Sandpiper), 2 butterfly species (Danaid Eggfly, Small Cabbage White), 1 odonate species (Blue Chaser), and 1 herpetofauna species (Chinese Bullfrog) Literature Review A herpetofauna species of conservation importance (Chinese Bullfrog) recorded Total number of species of conservation importance recorded: 12	A common habitat in Hong Kong. Current Survey A total of 13 fauna species of conservation importance was recorded, including 7 avifauna species (Chinese Pond Heron, Collared Crow, Common Greenshank, Greater Coucal, Great Egret, Grey Heron, Little Egret), 2 mammal species (Japanese Pipistrelle, Lesser Bamboo Bat), and 4 butterfly species (Danaid Eggfly, Grass Demon, Metallic Cerulean, Small Cabbage White) Literature Review A total of 5 species of conservation importance recorded, including 2 butterfly species (Grass Demon, Small Cabbage White), 1 odonate species (Blue Chaser), and 2 herpetofauna species (Chinese Bullfrog, Spotted Narrow-mouthed Frog) Total number of species of conservation importance recorded: 16
Re-creatability	High	High
Fragmentation	Moderate. Fragmented by roads and village / orchard	Low to moderate for dry agricultural land in Shek Wu Wai Moderate for other patches outside Shek Wu Wai
Ecological linkage	Within WBA, Structurally and functionally linked with adjacent habitats, such as marsh / reed and ponds in Lok Ma Chau Tsuen	Structurally and functionally linked with adjacent habitats, such as marsh / reed, watercourses and ponds in Shek Wu Wai

Criteria	Northern Portion	Southern Portion
	No significant ecological linkage in Chau Tau Tsuen	No significant ecological linkage in other isolated patches
Potential value	Low to moderate	Low to moderate
Nursery / Breeding ground	No notable nursery and breeding behaviour	No notable nursery and breeding behaviour
Age	N/A	N/A
Abundance / Richness of Wildlife	Moderate	Moderate
Ecological value	**Lok Ma Chau: Moderate** **Chau Tau: Low**	**Shek Wu Wai: Low to moderate** **Others: Low**

Table 10.14 Ecological Evaluation of Woodland within the Assessment Area

Criteria	Northern Portion	Southern Portion
Naturalness	Moderate	Moderate
Size	Small to moderate (17.72 ha)	Small to moderate (14.16 ha)
Diversity	Moderate to high flora diversity and low to moderate fauna diversity	Moderate to high flora diversity and moderate fauna diversity
Rarity	A common habitat in Hong Kong Current Survey A total of 11 species of conservation importance recorded, including 1 flora species (Incense Tree), 5 avifauna species (Chinese Pond Heron, Collared Scops Owl, Common Emerald Dove, Greater Coucal, Little Egret), 3 mammal species (Leopard Cat, Pallas's Squirrel, Small Indian Civet), 1 butterfly species (Metallic Cerulean), and 1 herpetofauna species (Indian Forest Skink) Literature Review 1 flora species of conservation importance (Incense Tree) recorded Total number of species of conservation importance recorded: 11	A common habitat in Hong Kong. Current Survey A total of 19 species of conservation importance was recorded, including 2 flora species (Incense Tree, Luofushan Joint-fir), 5avifauna species (Common Emerald Dove, Greater Coucal, Lesser Coucal, Malayan Night Heron, Rufous-capped Babbler), 9 mammal species (East Asian Porcupine, Himalayan Leaf-nosed Bat, Japanese Pipistrelle, Least Horseshoe Bat, Leopard Cat, Masked Palm Civet, Red Muntjac, Short-nosed Fruit Bat, Small Indian Civet), and 3 butterfly species (Common Rose, Small Cabbage White, Tiny Grass Blue), Literature Review 1 flora species of conservation importance (Incense Tree) recorded Total number of species of conservation importance recorded: 19
Re-creatability	Low to moderate. Re-creatable if time is given for natural succession	Low to moderate. Re-creatable if time is given for natural succession
Fragmentation	Moderate, fragmented by roads and developed area	Low to moderate at Pang Loon Tei Moderate at other areas, fragmented by developed area
Ecological linkage	Woodland at Mai Po Village falls within Mai Po Village SSSI, Ramsar Site, and Priority Site for Enhanced Conservation Strip of woodland southeast of Lok Ma Chau Tsuen is ecologically connected to hillside shrubland and grassland	Some woodland fall within “CA” on Hadden Hill and south of Pang Loon Tei
Potential value	Low to moderate	Moderate
Nursery / Breeding ground	No notable nursery and breeding behaviour	No notable nursery and breeding behaviour
Age	N/A	N/A
Abundance /	Moderate	Moderate to high

Criteria	Northern Portion	Southern Portion
Richness of Wildlife		
Ecological value	**Moderate**	**Pang Loon Tei: Moderate to high** **Others: Low to moderate**

Table 10.15 Ecological Evaluation of Mixed Woodland within the Assessment Area

Criteria	Northern Portion	Southern Portion
Naturalness	Low to moderate	Low to moderate
Size	Small to moderate (17.17 ha)	Large (80.26 ha)
Diversity	Moderate flora diversity and low fauna diversity	Moderate to high flora diversity and moderate fauna diversity
Rarity	A common habitat in Hong Kong <u>Current Survey</u> A total of 3 species of conservation importance recorded, including 1 avifauna species (Collared Crow), 1 mammal species (Short-nosed Fruit Bat), and 1 herpetofauna species (Chinese Cobra) <u>Literature Review</u> A flora species of conservation importance (Incense Tree) Total number of species of conservation importance recorded: 4	A common habitat in Hong Kong. <u>Current Survey</u> A total of 15 species of conservation importance was recorded, including 2 flora species (*Aralia chinesis,* Incense Tree), 4 avifauna species (Chinese Francolin, Crested Serpent Eagle, Greater Coucal, Grey Heron), 8 mammal species (East Asian Porcupine, Japanese Pipistrelle, Lesser Bamboo Bat, Leopard Cat, Pallas's Squirrel, Red Muntjac, Unknown Vespertilionidae sp. 1, Unknown Vespertilionidae sp. 2), and 1 herpetofauna species (Indo-Chinese Rat Snake) <u>Literature Review</u> A total of 8 species of conservation importance recorded, including 2 flora species (Incense Tree, Luofushan Joint-fir), 5 butterfly species (Baron, Common Awl, Forget-me-not, Metallic Cerulean, Tiny Grass Blue), and 1 odonate species (Dingy Dusk-hawker) Total number of species of conservation importance recorded: 22
Re-creatability	Moderate	Moderate
Fragmentation	Moderate to High. Small patches of mixed woodland scattered across the northern portion of the Assessment Area	Moderate to High
Ecological linkage	Mixed woodland at Mai Po Village is functionally and structurally linked to adjacent woodland No notable ecological linkage for other mixed woodland	Some mixed woodland falls within “CA” on Hadden Hill Mixed woodland near Shek Wu Wai San Tsuen is functionally and ecological connected to grassland, plantation and shrubland in Kam Kwai Leng
Potential value	Low to moderate	Low to moderate
Nursery / Breeding ground	No notable nursery and breeding behaviour	Nursery behaviour of East Asian Porcupine was recorded near Shek Wu Wai San Tsuen
Age	N/A	N/A
Abundance / Richness of Wildlife	Low to moderate	Moderate
Ecological value	**Low to moderate**	**Pang Loon Tei, Shek Wu Wai and Tam Mei Hill: Low to moderate**

Criteria	Northern Portion	Southern Portion
		Others: Low

Table 10.16 Ecological Evaluation of Plantation within the Assessment Area

Criteria	Northern Portion	Southern Portion
Naturalness	Low	Low
Size	Small to moderate (15.20 ha)	Moderate (49.30 ha)
Diversity	Moderate flora diversity and low fauna diversity	Moderate flora diversity and low to moderate fauna diversity
Rarity	A common habitat in Hong Kong <u>Current Survey</u> A total of 4 species of conservation importance recorded, including 1 avifauna species (Collared Scops Owl), and 3 mammal species (Japanese Pipistrelle, Lesser Bamboo Bat, Pallas's Squirrel) <u>Literature Review</u> 2 butterfly species of conservation importance (Cornelian, Metallic Cerulean) recorded Total number of species of conservation importance recorded: 6	A common habitat in Hong Kong. <u>Current Survey</u> A total of 9 species of conservation importance was recorded, including 3 flora species (Cycad-Fern, Incense Tree, Luofushan Joint-fir), 2 avifauna species (Chinese Grosbeak, White-throated Kingfisher), 1 butterfly species (Metallic Cerulean), and 3 mammal species (Leopard Cat, Masked Palm Civet, Red Muntjac) <u>Literature Review</u> A total of 10 species of conservation importance recorded including 3 flora species (Cycad-fern, Incense Tree, Luofushan Joint-fir), 3 mammal species (Leopard Cat, Pallas's Squirrel, Short-nosed Fruit Bat), and 4 butterfly species (Hainan Palm Dart, Malayan, Peacock Royal, Small Grass Yellow) Total number of species of conservation importance recorded: 15
Re-creatability	High	High
Fragmentation	Moderate	Moderate for patches of plantation in hillside High for roadside plantation
Ecological linkage	No notable ecological linkage observed at plantation on northern portion of Assessment Area	Hillside plantation on Ngau Tam Shan is functionally and structurally linked to adjacent mixed woodland, grassland and shrubland
Potential value	Low	Low
Nursery / Breeding ground	No notable nursery and breeding behaviour	Nesting tunnel of White-throated Kingfisher was recorded on the mud wall on Ngau Tam Shan
Age	N/A	N/A
Abundance / Richness of Wildlife	Low to moderate	Low to moderate
Ecological value	**Low**	**Ngau Tam Shan, Kam Kwai Leng: Low to moderate** **Others: Low**

Table 10.17 Ecological Evaluation of Shrubland within the Assessment Area

Criteria	Northern Portion	Southern Portion
Naturalness	Moderate to high	Moderate to high
Size	Small to moderate (11.93 ha)	Large (97.55 ha)
Diversity	Moderate flora diversity and low fauna	Moderate to high flora diversity and

Criteria	Northern Portion	Southern Portion
	diversity	moderate fauna diversity
Rarity	A common habitat in Hong Kong Current Survey A total of 3 mammal species of conservation importance (Japanese Pipistrelle, Lesser Bamboo Bat, Unknown Vespertilionidae sp. 1) was recorded Literature Review N.A. Total number of species of conservation importance recorded: 3	A common habitat in Hong Kong. Current Survey A total of 19 species of conservation importance was recorded, including 1 flora species (Luofushan Joint-fir), 2 avifauna species (Greater Coucal, Rufous-capped Babbler), 8 mammal species (East Asian Porcupine, Himalayan Leaf-nosed Bat, Japanese Pipistrelle, Leopard Cat, Lesser Bamboo Bat, Pallas's Squirrel, Red Muntjac, Small Indian Civet), 7 butterfly species (Broad Spark, Courtesan, Dark Brown Ace, Malayan, Rounded six-line Blue, Small Cabbage White, Swallowtail), and 1 odonate species (Blue-spotted Dusk-hawker) Literature Review A flora species of conservation importance (Luofushan Joint-fir) recorded Total number of species of conservation importance recorded: 19
Re-creatability	Moderate	Moderate
Fragmentation	High	Moderate to High
Ecological linkage	Shrubland at Lok Ma Chau is within WBA, functionally and structurally linked to adjacent woodland and grassland habitats	Shrubland on Hadden Hill and Ngau Tam Shan partially falls within “CA”. and is linked to adjacent woodland, mixed woodland, and grassland habitats
Potential value	Low to moderate	Low to moderate
Nursery / Breeding ground	No notable nursery and breeding behaviour	No notable nursery and breeding behaviour
Age	Young, occasionally subject to hill fire	Young, occasionally subject to hill fire
Abundance / Richness of Wildlife	Low to moderate	Low to moderate
Ecological value	**Low**	**CA: Low to moderate** **Hillside shrubland south of Pang Loon Tei: Low to moderate** **Others: Low**

Table 10.18 Ecological Evaluation of Grassland within the Assessment Area

Criteria	Northern Portion	Southern Portion
Naturalness	Moderate to high	Moderate to high
Size	Large (64.36 ha)	Large (143.08 ha)
Diversity	Low to moderate flora and fauna diversity	Moderate flora and fauna diversity
Rarity	Common habitat in Hong Kong Current Survey A total of 8 species of conservation importance recorded, including 3 avifauna species (Black Kite, Chinese Hwamei, Collared Scops Owl), and 5 mammal species (Himalayan Leaf-nosed Bat, Japanese Pipistrelle, Short-nosed Fruit Bat, Unknown Vespertilionidae sp. 1, Unknown Vespertilionidae sp. 2)	A common habitat in Hong Kong. Current Survey A total of 12 species of conservation importance was recorded, including 3 flora species (*Camellia sasanqua*, Cycad-fern, Luofushan Joint-fir), 3 avifauna species (Black Kite, Crested Serpent Eagle, Greater Coucal), 5 butterfly species (Danaid Eggfly, Malayan, Peacock Royal, Small Three-ring, Swallowtail), and 1 odonate species (Scarlet Basker)

Criteria	Northern Portion	Southern Portion
	Literature Review A total of 6 species of conservation importance was recorded, including 2 flora species (Cycad-fern, Incense Tree), 3 butterfly species (Danaid Eggfly, Small Three-ring, Swallowtail), and 1 odonate species (Scarlet Basker) Total number of species of conservation importance recorded: 14	Literature Review A total of 12 species of conservation importance was recorded, including 2 flora species (Incense Tree, Luofushan Joint-fir), 1 mammal species (Red Muntjac), 8 butterfly species (Comma, Danaid Eggfly, Forget-me-not, Malayan, Oriental Straight Swift, Small Three-ring, Spotted Angle, Swallowtail), and 1 herpetofauna species (Spotted Narrow-mouthed Frog) Total number of species of conservation importance recorded: 19
Re-creatability	Moderate	Moderate
Fragmentation	Hillside grassland: Low Other lowland grassland: High	Moderate
Ecological linkage	Hillside grassland is functionally and structurally linked to woodland and shrubland Limited ecological linkage for other grassland	Shrubland on Hadden Hill and Ngau Tam Shan partially falls within "CA". and is linked to adjacent woodland, mixed woodland, and shrubland habitats No notable ecological linkage, though some fell within the CA on Hadden Hill and Kai Kung Leng
Potential value	Low to moderate	Low to moderate
Nursery / Breeding ground	No notable nursery and breeding behaviour	No notable nursery and breeding behaviour
Age	Young, occasionally subject to hill fire	Young, occasionally subject to hill fire
Abundance / Richness of Wildlife	Low to moderate	Low to moderate
Ecological value	**Hillside grassland: Low to moderate** **Others: Low**	**Hillside grassland: Low to moderate** **Others: Low**

Table 10.19 Ecological Evaluation of Village / Orchard within the Assessment Area

Criteria	Northern Portion	Southern Portion
Naturalness	Low	Low
Size	Small to Moderate (14.12 ha)	Moderate (64.65 ha)
Diversity	Moderate flora diversity and low to moderate fauna diversity	Moderate to high flora diversity and moderate fauna diversity
Rarity	Very common in Hong Kong Current Survey A total of 11 species of conservation importance recorded, including 4 avifauna species (Asian Barred Owlet, Black Kite, Chinese Pond Heron, Greater Coucal), and 5 mammal species (Himalayan Leaf-nosed Bat, Japanese Pipistrelle, Lesser Bamboo Bat, Unknown Vespertilionidae sp. 1, Unknown Vespertilionidae sp. 2), 1 butterfly species (Small Cabbage White), and 1 herpetofauna species (Four-clawed Gecko) Roost of Himalayan Leaf-nosed Bat observed at Mi Tak Study Hall at Lok Ma Chau Tsuen Literature Review A total of 3 species of conservation importance recorded, including 1 flora	Very common in Hong Kong. Current Survey A total of 20 species of conservation importance was recorded, including 5 avifauna species (Chinese Pond Heron, Greater Coucal, Great Egret, Little Egret, White-shouldered Starling), 7 mammal species (Chinese Noctule, Japanese Pipistrelle, Lesser Bamboo Bat, Pallas's Squirrel, Short-nosed Fruit Bat, Unknown Vespertilionidae sp. 1, Unknown Vespertilionidae sp. 2), 7 butterfly species (Common Birdwing, Common Rose, Courtesan, Forget-me-not, Metallic Cerulean, Small Cabbage White, Swallowtail), and 1 herpetofauna species (Chinese Bullfrog) Literature Review A total of 2 species of conservation importance recorded, including 1 flora

Criteria	Northern Portion	Southern Portion
	species (Incense Tree), 1 butterfly species (Small Cabbage White), and 1 herpetofauna species (Chinese Bullfrog) Total number of species of conservation importance recorded: 13	species (Luofushan Joint-fir), and 1 herpetofauna species (Common Rat Snake) Total number of species of conservation importance recorded: 22
Re-creatability	High	High
Fragmentation	Moderate to high	Moderate to high
Ecological linkage	No notable ecological linkage	No notable ecological linkage
Potential value	Moderate for Bat Roost Low for others	Low
Nursery / Breeding ground	No notable nursery and breeding behaviour	Nest of White-shouldered Starling was recorded in electric distribution box located in Shek Wu Wai
Age	N/A	N/A
Abundance / Richness of Wildlife	Low to moderate	Moderate
Ecological value	**Mi Tak Study Hall Bat roost: Low to moderate** **Others: Low**	**Low to moderate**

Table 10.20 Ecological Evaluation of Developed Area / Wasteland within the Assessment Area

Criteria	Northern Portion	Southern Portion
Naturalness	Low	Low
Size	Large (320.89 ha)	Large (258.67 ha)
Diversity	Moderate to high flora and fauna diversity	Moderate flora and fauna diversity
Rarity	Very common in Hong Kong <u>Current Survey</u> A total of 26 species of conservation importance were recorded, including 1 flora species (Incense Tree), 7 avifauna species (Chinese Pond Heron, Collared Scops Owl, Common Emerald Dove, Great Egret, Greater Coucal, Little Egret, Red-billed Starling), 12 mammal species (Chinese Horseshoe Bat, Chinese Noctule, Himalayan Leaf-nosed Bat, Japanese Pipistrelle, Lesser Bamboo Bat, Pallas's Squirrel, Short-nosed Fruit Bat, Small Asian Mongoose, Small Indian Civet, Unknown Myotis Species, Unknown Vespertilionidae sp. 1, Unknown Vespertilionidae sp. 2), 2 butterfly species (Small Cabbage White, Swallowtail), 1 odonate species (Scarlet Basker), and 3 herpetofauna species (Common Rat Snake, Spotted Narrow-mouthed Frog, Taiwan Kukri Snake) Mai Po Lung Village Egretry at the junction between Castle Peak Road (San Tin section) and Mai Po Lung Road (within the Project site) Mai Po Village Egretry at the junction at Tam Kon Chau Road (outside the Project site) Roost of Japanese Pipistrelle and Chinese Noctule at Koon Ying School near Mai Po Tsuen	Very common in Hong Kong. <u>Current Survey</u> A total of 11 species of conservation importance was recorded, including 1 flora species (Luofushan Joint-fir), 2 avifauna species (Chinese Pond Heron, Common Emerald Dove), 6 mammal species (Chinese Noctule, Japanese Pipistrelle, Lesser Bamboo Bat, Pallas's Squirrel, Unknown Vespertilionidae sp. 1, Unknown Vespertilionidae sp. 2), 1 butterfly species (Metallic Cerulean), and 1 herpetofauna species (Chinese Cobra) <u>Literature Review</u> A flora species of conservation importance (Incense Tree) recorded Total number of species of conservation importance recorded:12

Criteria	Northern Portion	Southern Portion
	Literature Review A total of eight species of conservation importance were recorded, including one flora species (Incense Tree), one butterfly species (Common Rose), six herpetofauna species (Chinese Bullfrog, Chinese Cobra, Common Rat Snake, Copperhead Razer, Indo-Chinese Rat Snake, Taiwan Kukri Snake) Total number of species of conservation importance recorded: 31	
Re-creatability	Low for Egretries and Bat Roost High for others	High
Fragmentation	High	High
Ecological linkage	Supported egretries and form part of the flight-line corridor between egretries and foraging ground Other areas have limited ecological linkage	No notable ecological linkage
Potential value	Moderate for Egretries and Bat Roost Low for others	Low
Nursery / Breeding ground	Mai Po Lung Village Egretry and Mai Po Village Egretry recorded in this habitat	No notable nursery and breeding behaviour
Age	N/A	N/A
Abundance / Richness of Wildlife	Moderate	Moderate
Ecological value	**Egretries: Moderate to high** **Koon Ying School Bat Roost: Low to moderate** **Others: Very Low**	**Very Low**

Table 10.21 Summary of Ecological Values of Habitats within the Assessment Area

Habitat	Assessment Area	
	Northern Portion	Southern Portion
Mitigation Wetland	Mitigation Measures under STEMDC Low to moderate San Tin Constructed Wetland: Low to moderate LMC EEA Core Area: Very High Clean-up Reedbed: Low to moderate LMC Loop EA Existing condition: Low to moderate Upon maturation: Moderate	N/A
Marsh / Reed	LMC Tsuen: Moderate Others: Low to moderate	MA-S1, MA-S2, MA-S3: Moderate Others: Low to moderate

Habitat	Assessment Area	
	Northern Portion	Southern Portion
Pond	Lok Ma Chau: Moderate San Tin (Zone A): High San Tin (Zone B): Moderate to high San Tin (Zone C): Moderate Sam Po Shue (Zone A): High Sam Po Shue (Zone B): Moderate to high Sam Po Shue (Zone C): Moderate Ha Wan Tsuen Night Roost: Moderate to High San Tin Open Storage Area Night Roost: Moderate Lin Barn Tsuen Night Roost: Moderate Sam Po Shue Night Roost: High Tam Kon Chau Night Roost: Moderate to High San Tin Open Storage Area Day Roost: Low (*abandoned*) Lok Ma Chau Loop Day Roost: Low (*abandoned*)	Shek Wu Wai: Low to moderate Others: Low
Natural Watercourse	LMC Meander: Moderate WC-N2b: Low to Moderate	WC-S1a: Low WC-S3c: Moderate to high
Modified Watercourse	WC-N1 (SZ River): Low WC-N3 (STEMDC): Moderate WC-N4 & WC-N8a: Low to moderate Others: Low	WC-S3 (STEMDC): Moderate WC-S5, WC-S6: Low to moderate Others: Low
Semi-natural Watercourse	WC-N6, WC-N11, WC-N15: Low Others: Low to moderate	WC-S3, WC-S10: Low to moderate Others: Low
Seasonally Wet Grassland	Low	Low
Wet Agricultural Land	N/A	Low
Dry Agricultural Land	LMC: Moderate Chau Tau: Low	Shek Wu Wai: Low to moderate Others: Low
Woodland	Moderate	Pang Loon Tei: Moderate to high Others: Low to moderate
Mixed Woodland	Low-moderate	Pang Loon Tei, Shek Wu Wai, Tam Mei Hill: Low to moderate Others: Low
Plantation	Low	Ngau Tam Shan Shan: Low to moderate Others: Low
Shrubland	Low	CA: Low to moderate Hillside shrubland south of Pang Loon Tei: Low to moderate Others: Low
Grassland	Hillside grassland: Low to moderate Others: Low	Hillside grassland: Low to moderate Others: Low
Village / Orchard	Mi Tak Study Hall Bat Roost: Low to moderate Others: Low	Low to moderate
Developed Area / Wasteland	Egretries: Moderate to high Koon Ying School Bat Roost: Low to moderate Others: Very low	Very Low

10.7.2 Species of Conservation Importance

10.7.2.1 A summary of flora and fauna species of conservation importance recorded within the Assessment Area were gathered from previous studies and from recent surveys (conducted under the Assignment between November 2021 to October 2022), and presented in the following **Table 10.22**.

Table 10.22 Species of Conservation Importance Recorded within the Assessment Area from Previous Studies and Recent Survey

Species	Distribution and status in Hong Kong (1)	Protection and Conservation Status	Habitat Recorded (9)		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
Flora					
Incense Tree *Aquilaria sinensis*	Common	Cap. 586[3], Cat 2&3 (NT)[10], VU[9], Cat II[11], NT[13], VU[14]	Developed Area / Wasteland*, Grassland, Mixed Woodland*, Plantation*, Village / Orchard, Woodland* (15,17)	Developed Area / Wasteland*, Pond*, Woodland*	Mixed Woodland*, Plantation*, Woodland
Aralia chinensis	Common	VU[9]	-	-	Mixed Woodland
Cycad-fern *Brainea insignis*	-	Cat 2 (VU)[10], Cat II[11], VU[14]	Grassland, Plantation (15)	-	Plantation*, Grassland
Camellia sasanqua	-	Cap. 96[4]	-	-	Grassland
Luofushan Joint-fir *Gnetum luofuense*	Common	NT[11]	Grassland, Plantation, Mixed Woodland*, Shrubland, Village / Orchard* (15)	-	Developed Area / Wasteland*, Grassland, Plantation, Shrubland*, Woodland
Avifauna					
Asian Barred Owlet *Glaucidium cuculoides*	Uncommon resident	Cap.170[2], Cap.586[3], Class II[6]	Assessment Area (21)	Village / Orchard*	-
Besra *Accipiter virgatus*	Scarce resident	Cap.170[2], Cap.586[3], Class II[6]	Assessment Area (15,19,21)	-	-
Black Kite *Milvus migrans*	Common resident and winter visitor	Cap.170[2], Cap.586[3], RC[5], Class II[6]	Assessment Area, Mitigation Wetland* (15,17,18,19,21)	Grassland, Marsh / Reed, Mitigation Wetland*, Pond*, Village / Orchard, IF	Grassland*, IF
Black-crowned Night Heron *Nycticorax nycticorax*	Common resident and winter visitor	Cap.170[2], (LC)[5]	Assessment Area (15,17,21)	Pond*	-

Species	Distribution and status in Hong Kong [1]	Protection and Conservation Status	Habitat Recorded [9]		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
Black-faced Spoonbill *Platalea minor*	Common winter visitor	Cap.170[2], PGC[5], Class II[6], Endangered[7], Endangered[8], Endangered[9]	Assessment Area [15,18,21]	Pond*, IF	-
Black-headed Gull *Chroicocephalus ridibundus*	Common winter visitor	Cap.170[2], PRC[5],	Assessment Area [15,18]	Pond*, IF	-
Black-winged Kite *Elanus caeruleus*	Occasional visitor	Cap.170[2], Cap.586[3], LC[5], Class II[6], Vulnerable[7], Near Threatened[8]	Assessment Area [15,18]	Mitigation Wetland	-
Black-winged Stilt *Himantopus himantopus*	Common	Cap.170[2], RC[5],	Assessment Area, Modified Watercourse* [15,17,18]	Dry Agricultural Land, Mitigation Wetland*, Modified Watercourse*, Pond*	Modified Watercourse*
Buff-bellied Pipit *Anthus rubescens*	Uncommon passage migrant and winter visitor	Cap.170[2], LC[5]	Assessment Area [21]	-	-
Carrion Crow *Corvus corone*	Rare	Cap.170[2]	-	Pond	-
Chestnut-eared Bunting *Emberiza fucata*	Scarce passage migrant	Cap.170[2], LC[5]	-	Pond	-
Chinese Francolin *Francolinus pintadeanus*	Common resident	Cap.170[2], Near Threatened[8]	Assessment Area [15,19,21]	-	Mixed Woodland
Chinese Grosbeak *Eophona migratoria*	Uncommon winter visitor	Cap.170[2], LC[5]	Assessment Area [15,17,19,21]	-	Plantation
Chinese Hwamei *Garrulax canorus*	Common resident	Cap.170[2], Near Threatened[8]	Assessment Area, Mitigation Wetland* [15,17]	Grassland	-
Chinese Penduline Tit *Remiz consobrinus*	Common autumn migrant and winter visitor	Cap.170[2], RC[5]	Assessment Area [19,21]	-	-
Chinese Pond Heron *Ardeola bacchus*	Common resident	Cap.170[2], PRC (RC)[5]	Assessment Area, Mitigation Wetland*, Modified Watercourse* [15,17,18,19,21]	Developed Area / Wasteland*, Dry Agricultural Land, Marsh / Reed*, Mitigation Wetland*, Modified Watercourse*, Natural Watercourse, Pond*, Seasonally Wet Grassland, Semi-natural Watercourse*, Village / Orchard, Woodland	Developed Area / Wasteland, Dry Agricultural Land*, Semi-natural Watercourse*, Modified Watercourse*, Pond*, Village / Orchard*, IF

Species	Distribution and status in Hong Kong (1)	Protection and Conservation Status	Habitat Recorded (9)		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
Cinnamon Bittern *Ixobrychus cinnamomeus*	Scarce passage migrant	Cap.170[2], LC[5]	Mitigation Wetland*, Modified Watercourse* (17)	-	-
Collared Crow *Corvus torquatus*	Uncommon resident	Cap.170[2], LC[5], Near Threatened[8], Vulnerable[9]	Assessment Area (15,17,18,19,21)	Pond*, Semi-natural Watercourse	Modified Watercourse*, Dry Agricultural Land*
Collared Scops Owl *Otus lettia*	Common resident	Cap.170[2], Cap.586[3], Class II[6]	-	Developed Area / Wasteland*, Grassland, Plantation*, Woodland	-
Common Emerald Dove *Chalcophaps indica*	Scarce but widespread resident	Cap.170[2], Vulnerable[7]	-	Developed Area / Wasteland*, Woodland	Developed Area / Wasteland*, Semi-natural Watercourse*, Woodland
Common Greenshank *Tringa nebularia*	Abundant passage migrant and winter visitor	Cap.170[2], RC[5]	Modified Watercourse* (15,17,18,19,21)	Modified Watercourse*, Pond*	Dry Agricultural Land*
Common Kestrel *Falco tinnunculus*	Common autumn migrant and winter visitor	Cap.170[2], Cap. 586[3], Class II[6]	Assessment Area (15)	Pond	IF
Common Redshank *Tringa totanus*	Common passage migrant	Cap.170[2], RC[5]	Assessment Area (18)	Pond	-
Common Pochard *Aythya ferina*	Scarce winter visitor	Cap.170[2], Vulnerable[9]	Assessment Area (18)	-	-
Crested Goshawk *Accipiter trivirgatus*	Uncommon resident	Cap.170[2], Cap. 586[3], Class II[6], Rare[7], Near Threatened[8]	Assessment Area (15)	-	IF
Crested Serpent Eagle *Spilornis cheela*	Uncommon resident	Cap.170[2], Cap. 586[3], LC[5], Class II[6], Vulnerable[7], Near Threatened[8]	Assessment Area (15,19,21)	-	Plantation, Grassland, IF Mixed Woodland
Curlew Sandpiper *Calidris ferruginea*	Common passage migrant	Cap.170[2], RC[5], Near Threatened[8]	-	Pond	-
Dunlin *Calidris alpina*	Abundant winter visitor, scarce passage migrant	Cap.170[2], RC[5]	Assessment Area (18)	-	-
Eastern Buzzard *Buteo japonicus*	Common winter visitor	Cap.170[2], Cap. 586[3], Class II[6],	Modified Watercourse* (15,17,18,19,21)	Pond, IF	-
Eastern Cattle Egret *Bubulcus coromandus*	Resident and common passage migrant	Cap.170[2], (LC)[5]	Assessment Area, Mitigation Wetland* (15,17,18,19,21)	Pond*	-
Eastern Marsh Harrier *Circus spilonotus*	Common winter visitor and passage migrant	Cap.170[2], Cap. 586[3], LC[5], Class II[6], Near	Assessment Area (18)	Pond, IF	-

Species	Distribution and status in Hong Kong (1)	Protection and Conservation Status	Habitat Recorded (9)		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
		Threatened[8]			
Eurasian Coot *Fulica atra*	Common winter visitor	Cap.170[2], RC[5]	Assessment Area (18)	Pond*	-
Eurasian Eagle-Owl *Bubo bubo*	Scarce resident	Cap.170[2], Cap. 586[3], RC[5], Class II[6], Rare[7], Near Threatened[8]	Assessment Area (15)	-	-
Eurasian Hobby *Falco subbuteo*	Uncommon passage migrant	Cap.170[2], Cap. 586[3], LC[5], Class II[6],	Assessment Area (15)	-	-
Eurasian Spoonbill *Platalea leucorodia*	Scarce	Cap.170[2], Cap. 586[3], LC[5], Class II[6], Vulnerable[7], Near Threatened[8]	Assessment Area (18)	Pond, IF	IF
Eurasian Teal *Anas crecca*	Common winter visitor	Cap.170[2], RC[5]	Modified Watercourse* (17,18,19,21)	Modified Watercourse*, Pond	Modified Watercourse*
Eurasian Wigeon *Mareca penelope*	Common winter visitor	Cap.170[2], RC[5]	Modified Watercourse* (17)	-	-
Falcated Duck *Mareca falcata*	Uncommon winter visitor	Cap.170[2], RC[5], Near Threatened[8], Near Threatened[9]	Assessment Area (18)	-	-
Ferruginous Duck *Aythya nyroca*	Occasional visitor	Cap.170[2], Near Threatened[8], Near Threatened[9]	Assessment Area (18)	-	-
Golden-headed Cisticola *Cisticola exilis*	Scarce winter visitor	Cap.170[2], LC[5]	Assessment Area (15)	-	-
Great Cormorant *Phalacrocorax carbo*	Common winter visitor	Cap.170[2], PRC[5]	Assessment Area (15,17,18,19,21)	Modified Watercourse*, Pond*, IF	-
Great Crested Grebe *Podiceps cristatus*	Common winter visitor	Cap.170[2], RC[5]	Assessment Area (18)	-	-
Great Egret *Ardea alba*	Common resident and winter visitor	Cap.170[2], PRC (RC)[5]	Assessment Area, Mitigation Wetland*, Modified Watercourse* (15,17,18,19,21)	Developed Area / Wasteland, Dry Agricultural Land, Mitigation Wetland*, Modified Watercourse*, Pond*, Semi-natural Watercourse*, IF	Dry Agricultural Land*, Village / Orchard*
Great Knot *Calidris tenuirostris*	Common	Cap.170[2], LC[5], Vulnerable[8],	-	Pond	-

Species	Distribution and status in Hong Kong (1)	Protection and Conservation Status	Habitat Recorded (9)		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
		Endangered[9]			
Greater Coucal *Centropus sinensis*	Common resident	Cap.170[2], Class II[6], Vulnerable[7]	Assessment Area, Mitigation Wetland* (15,17,18,19,21)	Developed Area / Wasteland*, Dry Agricultural Land, Marsh / Reed, Mitigation Wetland*, Modified Watercourse*, Natural Watercourse, Pond*, Semi-natural Watercourse*, Village / Orchard, Woodland	Dry Agricultural Land*, Grassland*, Marsh / Reed*, Mixed Woodland, Pond*, Shrubland*, Village / Orchard*, Woodland
Greater Painted-Snipe *Rostratula benghalensis*	Resident, Passage migrant and winter visitor	Cap.170[2], LC[5]	Modified Watercourse* (15,17,18,19,21)	Semi-natural Watercourse	-
Greater Sand Plover *Charadrius leschenaultii*	Passage migrant	Cap.170[2], RC[5]	-	Pond*	-
Greater Spotted Eagle *Clanga clanga*	Scarce winter visitor	Cap.170[2], Cap. 586[3], GC[5], Class II[6], Rare[7], Endangered[8], Vulnerable[9]	Assessment Area (15,18,21)	-	-
Grey Heron *Ardea cinerea*	Common winter visitor	Cap.170[2], PRC[5]	Assessment Area, Mitigation Wetland*, Modified Watercourse* (15,17,18)	Mitigation Wetland, Modified Watercourse*, Pond*, Semi-natural Watercourse*, IF	Dry Agricultural Land*, Mixed Woodland*
Grey Plover *Pluvialis squatarola*	Abundant winter visitor	Cap.170[2], RC[5]	-	Pond*	-
Grey-chinned Minivet *Pericrocotus solaris*	Common in winter, scarce in summer	Cap.170[2], LC[5]	Assessment Area (18)	-	-
Grey-headed Lapwing *Vanellus cinereus*	Scarce winter visitor	Cap.170[2], LC[5]	Modified Watercourse* (17)	Pond	-
Himalayan Swiftlet *Aerodramus brevirostris*	Scarce passage migrant	Cap.170[2], Near Threatened[8]	Assessment Area (19)	-	-
Intermediate Egret *Egretta intermedia*	Common passage migrant	Cap.170[2], RC[5]	Modified Watercourse* (17,18,19,21)	Mitigation Wetland*, Pond*, Semi-natural Watercourse*	-
Japanese Yellow Bunting *Emberiza sulphurata*	Scarce passage migrant	Cap.170[2], GC[5], Vulnerable[8], Vulnerable[9]	Assessment Area (19,21)	-	-

Species	Distribution and status in Hong Kong (1)	Protection and Conservation Status	Habitat Recorded (9)		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
Kentish Plover *Charadrius alexandrinus*	Abundant winter visitor	Cap.170[2], RC[5]	Assessment Area (18)	Pond*	-
Lanceolated Warbler *Locustella lanceolata*	Scarce passage migrant	Cap.170[2], Near Threatened[8]	Modified Watercourse* (17)	-	-
Lesser Coucal *Centropus bengalensis*	Common resident	Cap.170[2], Class II[6], Vulnerable[7]	Assessment Area (15,19,21)	-	Woodland
Lesser Sand Plover *Charadrius mongolus*	Passage migrant	Cap.170[2], LC[5]	Assessment Area (18)	-	-
Little Egret *Egretta garzetta*	Common resident	Cap.170[2], PRC (RC)[5]	Assessment Area, Mitigation Wetland*, Modified Watercourse* (15,17,18,19,21)	Developed Area / Wasteland*, Dry Agricultural Land, Marsh / Reed, Mitigation Wetland*, Modified Watercourse*, Natural Watercourse, Pond*, Semi-natural Watercourse*, Woodland	Marsh / Reed*, Dry Agricultural Land*, Modified Watercourse*, Village / Orchard*
Little Grebe *Tachybaptus ruficollis*	Common resident	Cap.170[2], LC[5]	Assessment Area, Mitigation Wetland* (15,17,18,19,21)	Mitigation Wetland, Pond*	-
Little Ringed Plover *Charadrius dubius*	Common	Cap.170[2], (LC)[5]	Assessment Area, Modified Watercourse* (15,17,18,19,21)	Pond*	-
Little Stint *Calidris minuta*	Rare passage migrant	Cap.170[2], LC[5]	-	Pond*	-
Long-toed Stint *Calidris subminuta*	Uncommon passage migrant	Cap.170[2], LC[5]	Modified Watercourse* (17)	Pond*	-
Malayan Night Heron *Gorsachius melanolophus*	Vagrant	Cap.170[2], Endangered[7], Near Threatened[8]	-	-	Woodland
Marsh Sandpiper *Tringa stagnatilis*	Common winter visitor and passage migrant	Cap.170[2], RC[5]	Assessment Area, Mitigation Wetland*, Modified Watercourse* (15,17,18)	Pond*	-
Northern Lapwing *Vanellus vanellus*	Scarce winter visitor	Cap.170[2], LC[5]	Assessment Area (18)	Pond	-
Northern Pintail *Anas acuta*	Abundant winter visitor	Cap.170[2], RC[5]	Assessment Area (18)	Pond*	-

Species	Distribution and status in Hong Kong (1)	Protection and Conservation Status	Habitat Recorded (9)		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
Northern Shoveler *Spatula clypeata*	Abundant winter visitor	Cap.170[2], RC[5]	Assessment Area (15)	Modified Watercourse*, Pond*	-
Oriental Pratincole *Glareola maldivarum*	Passage migrant	Cap.170[2], LC[5]	Assessment Area (18)	Pond*	-
Pacific Golden Plover *Pluvialis fulva*	Common winter visitor	Cap.170[2], LC[5]	Assessment Area (18)	Pond*	-
Peregrine Falcon *Falco peregrinus*	Scarce resident and winter visitor	Cap.170[2], Cap. 586[3], (LC)[5], Class II[6], Near Threatened[8]	-	Pond	-
Pheasant-tailed Jacana *Hydrophasianus chirurgus*	Scarce passage migrant	Cap.170[2], LC[5], Near Threatened[8]	Assessment Area (18)	-	-
Pied Avocet *Recurvirostra avosetta*	Abundant winter visitor	Cap.170[2], RC[5]	Modified Watercourse* (17,18)	Pond*	-
Pied Harrier *Circus melanoleucos*	Scarce passage migrant	Cap.170[2], Cap. 586[3], LC[5], Class II[6], Near Threatened[8]	-	Mitigation Wetland, Pond, IF	-
Pied Kingfisher *Ceryle rudis*	Uncommon resident	Cap.170[2], (LC)[5]	Assessment Area (15,18,19,21)	-	-
Purple Heron *Ardea purpurea*	Uncommon passage migrant	Cap.170[2], RC[5]	Assessment Area (18)	Marsh / Reed, Pond*	-
Red-billed Starling *Spodiopsar sericeus*	Common winter visitor	Cap.170[2], GC[5]	Assessment Area, Mitigation Wetland* (15,17,18)	Developed Area / Wasteland, Marsh / Reed, Pond*, Semi-natural Watercourse, IF	-
Red-necked Stint *Calidris ruficollis*	Abundant spring passage migrant	Cap.170[2], LC[5]	Assessment Area (18)	Pond*	-
Red-throated Pipit *Anthus cervinus*	Common passage migrant and winter visitor	Cap.170[2], LC[5]	Assessment Area, Mitigation Wetland*, Modified Watercourse*, (15,17,18,19,21)	Dry Agricultural Land, Pond*	-
Rufous-capped Babbler *Stachyridopsis ruficeps*	Common resident	Cap.170[2], LC[5]	Assessment Area (15)	-	Shrubland, Woodland
Sharp-tailed Sandpiper *Calidris acuminata*	Common passage migrant	Cap.170[2], LC[5]	-	Pond*	-

Species	Distribution and status in Hong Kong (1)	Protection and Conservation Status	Habitat Recorded (9)		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
Speckled Piculet *Picumnus innominatus*	Occasional visitor	Cap.170[2], LC[5]	Assessment Area (15)	-	-
Spotted Redshank *Tringa erythropus*	Abundant in winter and spring	Cap.170[2], RC[5]	Modified Watercourse* (17,18)	-	-
Striated Heron *Butorides striatus*	Uncommon in summer, Scarce in winter	Cap.170[2], LC[5]	Assessment Area (18)	-	-
Swinhoe's Egret *Egretta eulophotes*	Scarce spring migrant	Cap.170[2], GC[5], Class II[6], Endangered[7], Vulnerable[8], Vulnerable[9]	Assessment Area (18)	-	-
Temminck's Stint *Calidris temminckii*	Uncommon winter visitor	Cap.170[2], LC[5]	Modified Watercourse* (17,18)	Pond*	-
Tristram's Bunting *Emberiza tristrami*	Uncommon winter visitor	Cap.170[2], Near Threatened[8]	Assessment Area (15)	-	-
Tufted Duck *Aythya fuligula*	Uncommon winter visitor	Cap.170[2], LC[5]	Assessment Area (15,18)	Pond*	-
Western Osprey *Pandion haliaetus*	Common winter visitor	Cap.170[2], Cap. 586[3], LC[5], Rare[7], Near Threatened[8]	Assessment Area (18)	Pond, IF	-
White-bellied Sea Eagle *Haliaeetus leucogaster*	Uncommon resident	Cap.170[2], Cap. 586[3], RC[5], Class II[6], Indeterminate[7], Vulnerable[8]	Assessment Area (18)	-	-
White-cheeked Starling *Spodiopsar cineraceus*	Common winter visitor	Cap.170[2], PRC[5]	Assessment Area (18,19,21)	Dry Agricultural Land, Pond	-
White-shouldered Starling *Sturnia sinensis*	Common passage migrant	Cap.170[2], (LC)[5]	Assessment Area, Mitigation Wetland*, Modified Watercourse* (15,17,18,19,21)	Marsh / Reed, Pond*	Village / Orchard*
White-throated Kingfisher *Halcyon smyrnensis*	Common resident	Cap.170[2], (LC)[5]	Assessment Area, Mitigation Wetland*, Modified Watercourse* (15,17,18,19,21)	-	Plantation*
Wood Sandpiper *Tringa glareola*	Common passage migrant and winter visitor	Cap.170[2], LC[5]	Assessment Area, Modified Watercourse* (15,17,18,19,21)	Dry Agricultural Land, Mitigation Wetland, Modified Watercourse*,	Modified Watercourse*

Species	Distribution and status in Hong Kong [1]	Protection and Conservation Status	Habitat Recorded [9]		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
				Pond*	
Yellow Bittern *Ixobrychus sinensis*	Uncommon summer visitor and passage migrant	Cap.170[2], LC[5]	Assessment Area, Mitigation Wetland* [15,17,18]	-	-
Yellow-breasted Bunting *Emberiza aureola*	Common passage migrant	Cap.170[2], RC[5], Endangered[8], Critically Endangered[9]	Assessment Area [19,21]	-	-
Zitting Cisticola *Cisticola juncidis*	Common passage migrant and winter visitor	Cap.170[2], LC[5]	Assessment Area [15]	-	-
Mammal (Bats)					
Chinese Horseshoe Bat *Rhinolophus sinicus*	Very Common	Cap.170[2]	-	Developed Area / Wasteland	-
Chinese Noctule *Nyctalus plancyi*	Common	Cap.170[2], PRC (RC)[5]	-	Developed Area / Wasteland*, Modified Watercourse*,	Developed Area / Wasteland*, Modified Watercourse*, Village / Orchard*
Himalayan Leaf-nosed Bat *Hipposideros armiger*	Very Common	Cap.170[2], (LC)[5]	-	Developed Area / Wasteland, Grassland, Village / Orchard	Semi-natural Watercourse*, Shrubland*, Woodland*
Intermediate Horseshoe Bat *Rhinolophus affinis*	Uncommon	Cap.170[2], (LC)[5]	-	Pond*	Marsh / Reed*
Japanese Pipistrelle *Pipistrellus abramus*	Very Common	Cap.170[2]	-	Developed Area / Wasteland*, Grassland, Mitigation Wetland*, Modified Watercourse*, Plantation, Pond*, Semi-natural Watercourse, Shrubland, Village / Orchard*	Developed Area / Wasteland*, Dry Agricultural Land*, Mixed Woodland*, Modified Watercourse*, Natural Watercourse, Semi-natural Watercourse*, Shrubland*, Village / Orchard*, Woodland
Least Horseshoe Bat *Rhinolophus pusillus*	Uncommon	Cap.170[2], PRC (RC)[5]	-	-	Modified Watercourse*, Woodland
Lesser Bamboo Bat *Tylonycteris fulvida*	Very Common	Cap.170[2], (LC)[5], Rare[7]	-	Developed Area / Wasteland*, Mitigation Wetland*, Modified Watercourse*, Plantation, Pond*, Semi-natural Watercourse*, Shrubland, Village / Orchard*	Developed Area / Wasteland*, Dry Agricultural Land*, Mixed Woodland*, Modified Watercourse*, Pond*, Semi-natural Watercourse*, Shrubland*, Village / Orchard*

Species	Distribution and status in Hong Kong (1)	Protection and Conservation Status	Habitat Recorded (9)		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
Short-nosed Fruit Bat *Cynopterus sphinx*	Very Common	Cap.170[2], Indeterminate[7], Near Threatened[8],	Plantation* (15)	Developed Area / Wasteland*, Grassland, Marsh / Reed, Mixed Woodland, Mitigation Wetland*, Pond*	Modified Watercourse*, Village / Orchard*, Woodland
Unknown Myotis Species 1 *Myotis spp.*	-	Cap.170[2]	-	Developed Area / Wasteland*, Pond	-
Unknown Vespertilionidae species 1	-	Cap.170[2]	-	Developed Area / Wasteland*, Grassland, Mitigation Wetland, Modified Watercourse*, Pond*, Semi-natural Watercourse, Shrubland, Village / Orchard	Developed Area / Wasteland*, Mixed Woodland*, Modified Watercourse*, Semi-natural Watercourse*, Village / Orchard*
Unknown Vespertilionidae species 2	-	Cap.170[2]	-	Developed Area / Wasteland*, Grassland, Modified Watercourse*, Pond*, Village / Orchard*	Developed Area / Wasteland*, Mixed Woodland*, Modified Watercourse*, Village / Orchard*
Mammal (Non-flying Mammals)					
East Asian Porcupine *Hystrix brachyura*	Very Common	Cap.170[2], PGC[5]	-	-	Mixed Woodland*, Shrubland*, Woodland
Eurasian Otter *Lutra lutra*	Rare	Cap.170[2], Cap. 586[3], RC[5], Class II[6], Vulnerable[7], Endangered[8], Near Threatened & Largely Depleted[9]	Assessment Area (20)	-	-
Leopard Cat *Prionailurus bengalensis*	Uncommon	Cap.170[2], Cap. 586[3], Vulnerable[7], Vulnerable[8]	Plantation* (15)	Semi-natural Watercourse, Woodland	Mixed Woodland*, Plantation*, Shrubland*, Woodland
Masked Palm Civet *Paguma larvata*	Common	Cap.170[2], PRC[5], Near Threatened[8]	-	-	Plantation, Woodland
Pallas's Squirrel *Callosciurus erythraeus styani*	Common; New Territories population	Cap.170[2]	Plantation* (15)	Developed Area / Wasteland*, Marsh / Reed, Plantation*, Woodland	Developed Area / Wasteland*, Mixed Woodland*, Modified Watercourse*, Semi-natural Watercourse*, Shrubland, Village / Orchard*
Red Muntjac *Muntiacus muntjak*	Very Common	Cap.170[2], PRC[5], Near Threatened[8]	Grassland* (15)	-	Mixed Woodland*, Plantation*, Shrubland*, Woodland

Species	Distribution and status in Hong Kong (1)	Protection and Conservation Status	Habitat Recorded (9)		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
Small Asian Mongoose *Herpestes javanicus*	Uncommon	Cap.170[2], Vulnerable[8]	-	Developed Area / Wasteland*, Pond, Semi-natural Watercourse,	-
Small Indian Civet *Viverricula indica*	Very Common	Cap.170[2], Vulnerable[8], Class II[6]	-	Developed Area / Wasteland*, Mitigation Wetland*, Modified Watercourse*, Natural Watercourse, Pond, Semi-natural Watercourse, Woodland	Shrubland*, Woodland
Butterfly					
Baron *Euthalia aconthea aditha*	Uncommon	LC[5]	Mixed Woodland (15)	-	-
Broad Spark *Sinthusa chandrana grotei*	Rare	-	-	-	Shrubland*
Colon Swift *Caltoris bromus*	Very rare	-	Assessment Area (21)	-	-
Comma *Polygonia c-aureum c-aureum*	Very rare	-	Grassland (15)	-	-
Common Awl *Hasora badra badra*	Very rare	LC[5]	Mixed Woodland (15)	-	-
Common Birdwing *Troides helena spilotia*	Uncommon	Species of conservation concern[1], Cap. 170[2], Cap. 586[3]	-	-	Village / Orchard*
Common Rose *Pachliopta aristolochiae goniopeltis*	Rare	-	Developed Area / Wasteland* (15)	-	Village / Orchard*, Woodland
Cornelian *Deudorix epijarbas menesicles*	Rare	-	Plantation (15)	-	-
Courtesan *Euripus nyctelius*	Very rare	-	-	-	Shrubland, Village / Orchard*
Danaid Eggfly *Hypolimnas misippus*	Uncommon	LC[5]	Assessment Area, Grassland, Marsh / Reed* (15,21)	Dry Agricultural Land*, Pond*, Semi-natural Watercourse	Dry Agricultural Land*, Grassland

Species	Distribution and status in Hong Kong (1)	Protection and Conservation Status	Habitat Recorded (9)		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
Dark Brown Ace *Halpe porus*	Very rare	LC[5]	-	-	Shrubland*
Forget-me-not *Catochrysops strabo strabo*	Very rare	Species of conservation concern[1]	Grassland, Mixed Woodland (15)	Mitigation Wetland*	Village / Orchard*
Grass Demon *Udaspes folus*	Rare	-	Dry Agricultural Land*, Marsh / Reed* (15)	-	Dry Agricultural Land*,
Hainan Palm Dart *Telicota besta besta*	Very rare	LC[5]	Plantation* (15)	-	-
Lesser Band Dart *Potanthus trachala trachala*	Rare	-	-	Mitigation Wetland*	-
Malayan *Megisba malaya sikkima*	Very rare	LC[5]	Grassland, Plantation (15)	-	Grassland, Shrubland*
Metallic Cerulean *Jamides alecto alocina*	Very rare	-	Assessment Area, Mixed Woodland, Plantation (15,21)	Marsh / Reed, Woodland	Developed Area / Wasteland*, Dry Agricultural Land*, Marsh / Reed*, Natural Watercourse, Plantation*, Village / Orchard*
Oriental Straight Swift *Parnara bada bada*	Rare	-	Grassland (15)	-	-
Peacock Royal *Tajuria cippus malcolmi*	Rare	LC[5]	Plantation (15)	-	Grassland
Rounded 6-line Blue *Nacaduba berenice*	Very Rare	-	-	-	Shrubland*
Small Cabbage White *Eurema brigitta rubella*	Rare	-	Assessment Area, Dry Agricultural Land*, Village / Orchard* (15,21)	Developed Area / Wasteland*, Dry Agricultural Land*, Marsh / Reed, Pond*, Semi-natural Watercourse, Village / Orchard*	Dry Agricultural Land*, Modified Watercourse*, Shrubland*, Village / Orchard*, Woodland
Small Grass Yellow *Eurema brigitta rubella*	Rare	LC[5]	Plantation (15)	-	-
Small Three-ring *Ypthima norma norma*	Very rare	Species of conservation concern[1], LC[5]	Grassland (15)	-	Grassland
Spotted Angle *Caprona alida alida*	Very rare	LC[5]	Grassland (15)	-	-

Species	Distribution and status in Hong Kong (1)	Protection and Conservation Status	Habitat Recorded (9)		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
Swallowtail *Papilio xuthus xuthus*	Rare	-	Grassland, Marsh / Reed* (15)	Developed Area / Wasteland*, Marsh / Reed, Pond	Grassland, Shrubland*, Village / Orchard*
Tiny Grass Blue *Zizula hylax*	Very rare	Species of conservation concern[1]	Mixed Woodland (15)	-	Woodland
Odonate					
Blue Chaser *Potamarcha congener*	Common; Scattered	LC[5]	Assessment Area, Dry Agricultural Land*, Modified Watercourse* (15,21)	Dry Agricultural Land, Modified Watercourse	-
Blue-spotted Dusk-hawker *Gynacantha japonica*	Common; Sparse	LC[5]	-	-	Shrubland*
Coastal Glider *Macrodiplax cora*	Common; Sparse	LC[5]	-	Pond	-
Dingy Dusk-hawker *Gynacantha subinterrupta*	Common; Sparse	LC[5]	Mixed Woodland (15)	-	-
Emerald Cascader *Zygonyx iris insignis*	Abundant; Widespread	PGC[5]	Semi-natural Watercourse* (15)	-	-
Mangrove Skimmer *Orthetrum poecilops*	Uncommon; Scattered	GC[5], Vulnerable[9]	-	Modified Watercourse*	-
Ruby Darter *Rhodothemis rufa*	Common; Scattered	LC[5]	Marsh / Reed, Pond*, Modified Watercourse* (15,17)	-	-
Scarlet Basker *Urothemis signata signata*	Common; Scattered	LC[5]	Assessment Area, Grassland*, Pond* (16,17,21)	Developed Area / Wasteland*, Marsh / Reed, Pond*	Grassland
Amphibian					
Chinese Bullfrog *Hoplobatrachus rugulosus*	Widely distributed in Lantau Island and New Territories.	PGC[5], Class II[6], Endangered[7]	Assessment Area, Developed Area / Wasteland, Dry Agricultural Land*, Marsh / Reed*, Village / Orchard (15,16,17,21)	Dry Agricultural Land, Modified Watercourse*, Semi-natural Watercourse	Pond, Semi-natural Watercourse*, Village / Orchard*

Species	Distribution and status in Hong Kong [1]	Protection and Conservation Status	Habitat Recorded [9]		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
Spotted Narrow-mouthed Frog *Kalophrynus interlineatus*	Widely distributed from low to moderate altitudes in northern and central New Territories	Near Threatened[8]	Dry Agricultural Land*, Grassland*, Pond* [15]	Developed Area / Wasteland*	Modified Watercourse
Two-striped Grass Frog *Hylarana taipehensis*	Distributed in Sai Kung, Tai Lam Country Park, Pat Sin Leng Country Park, Tai A Chau	LC[5], Near Threatened[8]	Pond [17]	-	-
Reptiles					
Banded Stream Snake *Opisthotropis balteata*	Rare, Distributed in streams in Lam Tsuen, Pat Sin Leng Country Park, Sai Kung East Country Park, Sai Kung West Country Park	-	Modified Watercourse* [15]	-	-
Chinese Cobra *Naja atra*	Widely distributed	Cap.586[2], PRC[5], Vulnerable[7], Vulnerable[8], Vulnerable[9],	Developed Area / Wasteland [17]	Mixed Woodland	Developed Area / Wasteland*
Common Rat Snake *Ptyas mucosus*	Widely distributed	Cap.586[2], PRC[5], Endangered[7], Endangered[8]	Developed Area / Wasteland*, Village / Orchard* [15,17]	Developed Area / Wasteland*, Pond*	-
Copperhead Racer *Coelognathus radiatus*	Widely distributed	PRC[5], Endangered[7]	Developed Area / Wasteland* [15]	-	-
Four-clawed Gecko *Gehyra mutilata*	Widely but thinly distributed throughout Hong Kong	Endangered[8]	-	Village / Orchard*	-
Indian Forest Skink *Sphenomorphus indicus*	Commonly distributed in woodlands in the eastern and central New Territories	LC[5]	-	Woodland*	-
Indo-Chinese Rat Snake *Ptyas korros*	Widely distributed	PRC[5], Endangered[7], Vulnerable[8]	Developed Area / Wasteland* [15]	-	Mixed Woodland
Many-banded Krait *Bungarus multicinctus multicinctus*	Widely distributed in New Territories, Hong Kong Island and Lantau Island.	PRC[5], Vulnerable[7], Endangered[8]	-	-	Modified Watercourse*

Species	Distribution and status in Hong Kong (1)	Protection and Conservation Status	Habitat Recorded (9)		
			Previous Studies	Recent Survey (North)	Recent Survey (South)
Taiwan Kukri Snake *Oligodon formosanus*	Widely distributed	Near Threatened[8]	Developed Area / Wasteland* (15)	Developed Area / Wasteland*	-
Freshwater Fauna					
Cryptopotamon anacoluthon	Common; Endemic to Hong Kong	PGC[5], Vulnerable[9]	Semi-natural Watercourse* (15)	-	-
Rose Bitterling *Rhodeus ocellatus*	Uncommon; Recorded from a few localities in New Territories and a reservoir in Sha Tin	LC[5]	Pond*, Semi-natural Watercourse* (15,17)	Pond*	-
Somanniathelphusa zanklon	Endemic to Hong Kong	GC[5], Endangered[9]	Marsh / Reed, Modified Watercourse* (15,16,17)	Modified Watercourse*	-

Notes:
1 AFCD (2021a) Hong Kong Biodiversity Database
Distribution of flora and fauna species in Hong Kong follows Wu and Lee (2000), Xing et al. (2000) , AFCD (2022) and Reels (2019)
2 Protected under the Wild Animals Protection Ordinance (Cap. 170)
3 Protected under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586)
4 Protected under the Forests and Countryside Ordinance (Cap. 96)
5 Fellowes et al. (2002): GC = Global Concern; LC = Local Concern; RC = Regional Concern; PRC = Potential Regional Concern; PGC = Potential Global Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in nesting and/or roosting sites rather than in general occurrence.
6 List of Wild Animals Under State Protection (promulgated by State Forestry Administration and Ministry of Agriculture on 14 January 1989).
7 Zheng & Wang (1998) China Red Data Book of Endangered Animals
8 Jiang et al. (2016) Red List of China's Vertebrates
9 The International Union for the Conservation of Nature (IUCN) (2022). The IUCN Red List of Threatened Species (2022.1)
10 Hu et al. (2003): Rare and Precious Plants of Hong Kong. NT= Near Threatened, VU= Vulnerable
11 Listed in the List of Wild Plants under State Protection (promulgated by the Ministry of Forestry in 1999)
12 Fu (1992): China Plant Red Data Book. Vol. 1 - Rare and Endangered Plants. VU= Vulnerable
13 Feng et al. (2002): Study on Rare and Endangered Plants and National Key Protected Plants in Guangdong. NT= Near Threatened
14 Qin et al. (2017): Threatened Species List of China's Higher Plants. VU= Vulnerable
15 CEDD & PlanD (2021a). The exact recorded locations for avifauna were not stated, habitat information available
16 CEDD & PlanD (2013b). The exact recorded locations for avifauna were not stated
17 CEDD & PlanD (2013a). The exact recorded locations for avifauna were not stated
18 Anon (2021). The exact locations and habitats for avifauna recorded were not available from the literature
19 KFBG (2022). The exact recorded locations and habitat were not stated
20 McMillan et al., (2023). The exact recorded locations and habitat were not stated
21 KFBG (2023). The exact recorded locations and habitat were not stated
22 Habitat types: Habitat with * = recorded within current Project site, or recorded within both Project site and Assessment Area

10.8 IDENTIFICATION OF POTENTIAL ENVIRONMENTAL IMPACTS

10.8.1 Construction Phase – Direct Impact

Direct Impact on Recognised Sites of Conservation Importance

10.8.1.1 Within the Project area, five recognised sites of conservation importance were identified, namely Conservation Area ("CA" zone) under OZP No. S/YL-ST/8, Site of Special Scientific Interest ("SSSI" zone) under OZP No. S/YL-MP/6, Wetland Conservation Area (WCA), Wetland Buffer Area (WBA), and Priority Site for Enhanced Conservation (Priority Site). In addition, part of the Project area is recognised as an Important Bird Area (IBA) and regarded as an ecologically sensitive resource under this Project. The potentially affected recognised sites of conservation importance and the IBA were located at the northern portion, designated with the purpose to conserve wetland ecosystem and the associated wildlife (including avifauna and their roosting and foraging habitats), including the following areas:

- *Ha Wan Tsuen and Lok Ma Chau (south of the Loop)*:
  "CA" zone, WCA, WBA, Priority Site, and IBA,
- *San Tin and Sam Po Shue (northwest of San Tin Tsuen Road)*:
  WCA, WBA, Priority Site, and IBA,
- *Mai Po Village:*
  "CA" zone, small corner of "SSSI" zone, WCA, WBA, Priority Site, and IBA (**Figure 10.1** refers),

10.8.1.2 A total of 16 habitats were identified within the Assessment Area, including both wetland and non-wetland habitats, provided in **Section 10.6.1.1**. The Project boundary will encroach onto a range of habitats within these sites of conservation importance, including wetland habitats such as mitigation wetlands, ponds (including fishponds), marsh / reed, watercourses, and other non-wetland habitats. The potentially affected wetland habitats mainly occur in San Tin and Sam Po Shue area, as well as areas near Ha Wan Tsuen and Lok Ma Chau. Other non-wetland habitats within sites of conservation importance comprised of abandoned or degraded areas that were observed to be grassland and developed area / wasteland habitats.

10.8.1.3 In the absence of mitigation measures, the Project would result in the direct and indirect impacts on wetland habitats within the sites of conservation importance, mainly within "CA" zone, WCA, WBA, and Priority Site, as well as the IBA. Considering the extensive area and the importance of wetland habitats, such loss of wetland habitats at these sites would be considered of potentially high ecological impacts. A wetland compensation strategy has been developed to achieve the compensation requirement in accordance with the EIAO-TM. In particular, for the loss of pond habitat within WCA and WBA (wetlands concerned), the Government will enhance the ecological function and capacity of the existing habitats to sufficiently compensate the wetland loss arising from the development of San Tin Technopole and achieve no-net-loss in ecological function and capacity of the wetlands concerned. With the establishment of the proposed SPS WCP with an area of approximately 338 ha, the location of the proposed enhanced wetland will be within the future SPS WCP and is anticipated to improve the connectivity of wetland habitats in the region, while conservation strategies to be implemented within the SPS WCP are anticipated to provide ecological enhancement. The proposed enhanced wetland is further described below in **Section 10.11.2**.

10.8.1.4 In contrast, the small corner of the SSSI zone encroached within the Project boundary only comprises developed area, and no loss of wetland habitat is anticipated from the encroachment. The encroached area is outside the extent of the Mai Po Village Egretry in the past ten years. This area of SSSI zone will be re-zoned prior to commencement of construction activities.

Direct Loss of Habitat and Vegetation

Overview of Habitat Loss

10.8.1.5 Direct loss of habitat and vegetation would arise from the proposed development and associated infrastructure, which include both temporary and permanent impacts. Permanent habitat loss arises from site formation where the habitat would be developed and no longer be available for wildlife use, while temporary habitat loss under the proposed Development mainly arises from habitats that are included in the Project boundary but will be reinstated / revitalised under the Project. Depending on the ecological value of the habitat, the current level of human disturbance and fragmentation, and the proposed land use under the Project, the ecological impact from loss of habitats are presented in the following sections.

10.8.1.6 In general, habitats in the northern portion mainly comprise wetland habitats, forming an integral part of the contiguous wetland ecosystem across Deep Bay area, and serve as important foraging and breeding grounds for avifauna. In contrast, habitats in the southern portion were more fragmented and already exposed to a higher level of human disturbance (e.g. higher level of traffic, and larger proportion of village settlement and residential areas). Some of the habitats have been subject to active management, such as ponds, dry and wet agricultural land.

10.8.1.7 As described in **Table 10.4**, the Project boundary covered a total area of 609.47 ha. Some area within the Project boundary would be excluded from development under the Revised RODP, in the form of a Green Belt where natural habitats would be preserved. Some area would also be subject to temporary loss only, such as wetland habitats that would be reinstated or revitalised under the Project (such as the mitigation wetland STEMDC wetland, pond, modified watercourse and semi-natural watercourse) (**Figure 10.7B** refers). Excluding the Green Belts and the temporary losses, a total area of 563.82 ha within the Project boundary would be subject to permanent loss. The developed area / wasteland was the major habitat accounting for more than 60% of permanent loss. The identified habitat losses are summarised in **Table 10.23**.

10.8.1.8 Consideration has been taken under the current Project to avoid and minimise habitat losses. For example, the boundary of the Project area has been refined to avoid direct impact on a patch of mature woodland and a section of natural watercourse (both of moderate to high ecological values) behind San Tin Barracks at Pang Loon Tei. Other woodland habitats are actively preserved by “Green Belt” land use. Elaboration on these avoidance measures is provided in **Section 10.11.2**. Nonetheless, unavoidable loss of habitats would still arise from the proposed development, including habitats of considerable ecological values. Detailed description on the habitat loss of each of these habitats are provided in the following sections.

Table 10.23 Direct Loss of Terrestrial Habitats within Project Footprint

Habitats	Permanent Loss (ha)	Temporary Loss (ha)	Ecological Value of the Habitat to be Lost
Mitigation Wetland	(North) 0.64 (South) -	(North) 4.29 (South) -	Northern Portion STEMDC wetland: Low to moderate San Tin Constructed Wetland: Low to moderate Southern Portion: N/A
Pond	(North) 89.02 (South) 3.10	(North) 2.86 ha (South) -	Northern Portion Lok Ma Chau: Moderate San Tin (Zone A): High San Tin (Zone B): Moderate to high San Tin (Zone C): Moderate

Habitats	Permanent Loss (ha)	Temporary Loss (ha)	Ecological Value of the Habitat to be Lost
			Sam Po Shue (Zone A): High Sam Po Shue (Zone B): Moderate to high Sam Po Shue (Zone C): Moderate Southern Portion Shek Wu Wai: Low to moderate Others: Low
Marsh / Reed	(North) 4.82 (South) 3.20	-	Northern Portion LMC Tsuen: Moderate Others: Low to moderate Southern Portion MA-S1, MA-S2, MA-S3: Moderate Others: Low to moderate
Natural Watercourse	-	-	*(No loss of habitat)*
Modified Watercourse	(North) 1.96 (South) 1.29	(North) 5.09 ha (South) 1.12 ha	Northern Portion WC-N3 (STEMDC): Moderate WC-N4, Wc-N8a: Low-moderate Others: Low Southern Portion WC-S3 (STEMDC): Moderate WC-S5, S6: Low-moderate Others: Low
Semi-natural Watercourse	(North) 3.60 (South) 1.55	(North) 1.33 ha (South) 0.06 ha	Northern Portion WC-N6, WC-N11: Low Others: Low to moderate Southern Portion WC-S3a: Low to moderate Others: Low
Seasonally Wet Grassland	(North) - (South) 0.10	-	Northern Portion: *(No loss of habitat)* Southern Portion: Low
Wet Agricultural Land	(North) – (South) 0.20	-	Northern Portion: N/A Southern Portion: Low
Dry Agricultural Land	(North) 0.85 (South) 9.51	-	Northern Portion: Low Southern Portion: Shek Wu Wai: Low to moderate Others: Low
Woodland	(North) 1.64 (South) 0.06	-	Northern Portion: Moderate Southern Portion: Low to moderate
Mixed Woodland	(North) 4.27 (South) 13.41	-	Northern Portion: Low to moderate Southern Portion: Shek Wu Wai: Low to moderate Others: Low

Habitats	Permanent Loss (ha)	Temporary Loss (ha)	Ecological Value of the Habitat to be Lost
Plantation	(North) 5.35 (South) 13.37	-	Northern Portion: Low Southern Portion: Ngau Tam Shan, Kam Kwai Leng: Low to moderate Others: Low
Shrubland	(North) - (South) 12.04	-	Northern Portion: *(No loss of habitat)* Southern Portion: Hillside shrubland: Low to moderate Others: Low
Grassland	(North) 5.53 (South) 9.52	-	Northern Portion: Low Southern Portion: Hillside grassland: Low to moderate Others: Low
Village / Orchard	(North) 4.91 (South) 29.52	-	Northern Portion: Low Southern Portion: Low to moderate
Developed Area / Wasteland	(North) 163.43 (South) 180.93	-	Northern Portion: Very low Southern Portion: Very low
Total [(1)]	**(North) 286.02** **(South) 277.80**	**(North) 13.57** **(South) 1.18**	**-**

Note:
Figures are rounded to two decimal places, hence minor discrepancy may occur.

Loss of Mitigation Wetland

10.8.1.9 Mitigation wetland within the Project area (comprising about 4.93 ha in total) includes the STEMDC wetland (3.89 ha) and San Tin Constructed Wetland (1.04 ha), which were both considered of 'low to moderate' ecological values. A total of 26 species of conservation importance were recorded in this habitat, such as avifauna (Black Kite, Chinese Pond Heron, Great Egret) and mammals (Pallas's Squirrel). Under the Project, whereas a small area at STEMDC wetland (0.64 ha) would be permanently lost, the majority (4.29 ha) would only be temporarily impacted during construction phase, and will be reinstated and revitalised after construction (**Figures 10.7A** and **10.7B** refer). Under the proposed construction programme, the STEMDC wetland would be subject to construction activities during Phase 1.3 of the project, lasting between 2026 and 2027, while the San Tin Constructed Wetland would be under Phase 1.2 of the project, lasting between 2025 and 2026 (**Section 2** and **Figure 2.1** refer). Under the proposed development, the STEMDC wetland would be revitalised, while eco-interface was also proposed adjacent to the STEMDC to create buffer between the wetland and the adjacent land uses, to be provided in detailed design stage. Details of this eco-interface are provided in **Section 10.11**. The San Tin Constructed Wetland will be re-provided under the proposed development and reinstated upon the completion of construction. Given that STEMDC wetland and San Tin Constructed Wetland currently only supported low to moderate flora and fauna diversity, revitalisation would strengthen its ecological linkage with adjacent wetland habitats that has the potential to improve its overall ecological value. The direct impact from both permanent and temporary losses of this habitat is therefore considered to be low to moderate.

Loss of Marsh / Reed

10.8.1.10 A total of 8.02 ha of scattered marsh / reed would be permanently lost under the development. Marsh / reed of comparatively more intact and larger size was identified mainly in the northern portion of the Project area, whereas those in the southern portion were relatively smaller and more scattered. The ecological value of particular patches of marsh / reed in northern portion (Lok Ma Chau Tsuen) and in the southern portion (MA-S1, MA-S2 and MA-S3) was moderate, while other marsh / reed in the northern portion and southern portion were low to moderate (**Table 10.6** refers). There were 16 and seven species of conservation importance recorded in this habitat in the northern and southern portion, respectively. Most of the recorded species of conservation importance were common and widespread throughout Hong Kong, none of the species were exclusive to this habitat and no particular breeding and nesting behaviour of avifauna were recorded. Considering the fragmentation and the existing disturbance from adjacent developed area / wasteland, the loss of this habitat is therefore considered to be low to moderate.

Loss of Pond

10.8.1.11 Some pond habitats within the Project site would be subject to permanent loss, except for the pond habitats located at the proposed AFCD Fisheries Research Centre which will be subject to temporary loss only. There are no proposed works at these ponds at the proposed AFCD Fisheries Research Centre, which will be retained for subsequent usage during operation phase (**Table 10.23** and **Figure 10.7B** refers). As such, the direct loss of pond habitats totals to a permanent loss of 92.12 ha (89.02 ha on the northern portion and 3.10 on the southern portion), and temporary loss of 2.86 ha (northern portion).

10.8.1.12 The majority of the ponds were recorded in the northern portion of the Project site, and fell within recognised sites of conservation importance (CA, WCA, WBA, and the Priority Site), forming an ecological linkage with other wetland habitats and ponds. Ponds in the northern portion support high diversity and abundance of waterbirds including avifauna species of conservation importance (**Section 10.5.3.2** and **Figure 10.5** refer). As described in **Section 10.8.1.2**, the direct impact of pond loss in the northern portion will result in loss of wetland habitat and foraging ground at these recognised sites of conservation importance. Considering the extensive area of pond habitat within the Project area, they were under varying level of disturbance, with larger disturbance on pond habitats that are closer to brownfield, traffic roads and residential area. On the other hand, pond towards the northwest of the Project area (e.g. San Tin Zone A and Sam Po Shue Zone A, **Figure 10.5** refers) are subject to less existing disturbance from urbanised area, and supported a higher abundance and diversity of fauna, hence are considered of higher ecological values. Considering the large habitat area, relatively high abundance and diversity of ecological resources, and habitat quality of the ponds subject to direct loss, ecological impact would be considered to be of high in the absence of mitigation measures.

10.8.1.13 Ponds in the southern portion, with an ecological value of low to moderate, were relatively smaller (3.10 ha) and mostly interspersed between urbanised areas such as village / orchard or developed area / wasteland. Diversity and abundance of wildlife at ponds in the southern portion were relatively lower than their counterpart in the northern portion. The impact of pond loss in the southern portion is therefore anticipated to be low.

10.8.1.14 As described in **Section 10.8.1.3**, enhancement of ecological function and capacity of the existing habitats, in accordance with the EIAO-TM, is proposed to be implemented in the future Sam Po Shue Wetland Conservation Park (SPS WCP) to compensate for the loss of wetland habitat arising from the development of San Tin Technopole and achieve no-net-loss in ecological function and capacity of the wetlands concerned. The enhanced fishponds as part of a mosaic of wetland area in the north would allow a higher ecological linkage in San Tin and Sam Po Shue. The overall ecological value of pond in this region would therefore be potentially raised upon the establishment of the SPS WCP.

Loss of Natural Watercourse

10.8.1.15 While a small area of natural watercourse along the LMC meander (WC-N2) was encroached within the Project boundary, no construction activities would be conducted within the natural watercourse. No loss of this habitat is anticipated.

Loss of Semi-Natural Watercourse

10.8.1.16 Approximately 5.15 ha of semi-natural watercourse within the Project site would be permanently lost, while short sections of this habitat (1.39 ha) would be reinstated upon the completion of the Project (**Figure 10.7B** refers). This habitat had an ecological value between 'low' and 'low to moderate'. This habitat supported 19 species of conservation importance in the northern portion and nine in the southern portion, which were mostly common terrestrial species (e.g. avifauna, bats, butterflies), mainly using the riparian vegetation along or adjacent to the watercourses. The water body within the watercourse itself supported limited abundance of pollution-tolerant freshwater species. Some sections of the semi-natural watercourse, especially those adjacent to developed area / wasteland and village / orchard in the southern portion, were inferior in water quality that gave off pungent smells. These watercourses generally supported low to moderate wildlife diversity and abundance. Considering the existing quality and associated common species of this habitat, the impact of direct loss of semi-natural watercourses with low ecological value are therefore low. The impact of direct loss of another semi-natural watercourse (WC-S3a) is considered as low to moderate.

Loss of Modified Watercourse

10.8.1.17 Some major modified watercourses would be diverted or culverted under this Project, subject to detailed design. Approximately 3.25 ha of modified watercourses would be permanently lost. This man-made habitat supported limited vegetation. A total of 36 and 19 species of conservation importance were recorded in this habitat in the northern and southern portion, respectively, including a number of waterbirds and wetland-dependent species, mostly recorded at the modified watercourse sections WC-N3 (STEMDC), WC-N4 (near Lok Ma Chau), WC-N8a, as well as WC-S3 (STEMDC), WC-S5 and WC-S6 (at Shek Wu Wai). Considering the ecological values of these sections ("low to moderate" to "moderate") and the diversity and abundance of associated species, the partial / complete loss and/or modification of these sections may result in low to moderate ecological impact in the absence of mitigation measures. The WC-N8a (at San Tin), WC-N6c (at Chau Tau), and STEMDC would be reinstated and/or revitalised after the construction, with a total area of approximately 6.21 ha. It is recommended that enhancement measures (e.g. landscaping along riparian zone) should also be included during the detailed design stage. The new design would have the potential to result in an overall improvement of its ecological value and strengthen its ecological linkage with adjacent wetland habitats.

10.8.1.18 Other watercourse sections were considered to be of low ecological values, and supported relatively lower diversity and abundance of wildlife, the impact from the potential loss of these modified watercourses sections is therefore considered low.

Loss of Seasonally Wet Grassland

10.8.1.19 A patch of seasonally wet grassland in the southern portion (0.10 ha) would be permanently lost under this Project. The habitat supported low flora and fauna diversity, with an overall low ecological value. In addition, it was surrounded by developed area / wasteland and next to a village road, and therefore, received regular human disturbance. Given its ecological value and small size, the impact on the loss of this habitat is therefore deemed to be low.

Loss of Wet Agricultural Land

10.8.1.20 Approximately 0.20 ha of wet agricultural land in the southern portion would be permanently lost under the development. Most of the recorded flora species within this habitat were common crop species, with no flora species of conservation importance was recorded. Considering the small size of and the low ecological value of the wet agricultural land in Shek Wu Wai, the potential direct loss is anticipated to be of low ecological impact.

Loss of Dry Agricultural Land

10.8.1.21 Dry agricultural land would be subject to direct loss under the proposed development, including 0.85 ha in Chau Tau area in the northern portion ('low' ecological value) and 9.51 ha in the southern portion (ranging from 'low' to 'low to moderate' ecological value). Ecological findings from recent ecological surveys revealed moderate wildlife diversity and abundance at the dry agricultural land within the Project site, which mostly comprise common species (e.g. avifauna and butterfly) that were also recorded in nearby habitats (such as ponds, mitigation wetlands and modified watercourses). The majority of dry agricultural land loss occurs in Shek Wu Wai. As mentioned in **Section 10.6.3.21**, they are under disturbance generated from surrounding brownfield operations, and disconnected from natural habitats southeast of Shek Wu Wai. While dry agricultural land was considered of "low "or "low to moderate" ecological values, the habitat supported some moderate diversity and abundance of wildlife. Considering the size of habitat loss, the loss of dry agricultural land is anticipated to result in low ecological impact on the northern portion, and low to moderate ecological impacts on the southern portion, mainly due to the loss of its functional value in supporting the associated wildlife.

Loss of Woodland

10.8.1.22 Of the 5.24 ha woodland falling within the Project area, three patches of woodland with a total area of 3.54 ha would be zoned as and preserved within "GB" under the Project (refer to **Section 10.8.1.8** and **Figure 10.7B**). The intact woodland patch of moderate to high ecological value at Pang Loon Tei was preserved and avoided from the Project boundary (refer to **Section 10.11.8.1**). The remaining woodland areas of approximately 1.70 ha would be unavoidably lost, including about 1.64 ha on the northern portion (near Mai Po Village, along the margin of the woodland at Lok Ma Chau and Chau Tau) and about 0.06 ha on the southern portion (Shek Wu Wai) (**Figure 10.7A** refers). While the woodland in the northern portion had "moderate" ecological value, that in the southern portion was of "low to moderate" value. The existing disturbance level at these woodland margins was considered high due to edge effect and proximity to roads of heavy traffic. Potential loss of woodland in northern portion may result in low to moderate ecological impact, mainly contributed by the loss of mature woodland near Mai Po Village (moderate ecological value). It is expected some associated flora species of conservation importance (i.e. Incense Tree) within the affected woodlands would potentially be affected. The permanent loss of a strip of woodland edge at Shek Wu Wai in the southern portion would result in low ecological impact.

Loss of Mixed Woodland

10.8.1.23 Akin to woodland, some areas of mixed woodland would be zoned as "GB" where no direct loss would be anticipated (**Figure 10.7B** refers). A total of 17.68 ha of mixed woodland would be permanently lost inevitably under this Project, mainly located in the southern portion of the Project site. Major direct losses of mixed woodland occurred in Shek Wu Wai and near San Tin Barracks (southern portion) and near Chau Tau (northern portion) (**Figure 10.7A** refers). Direct mixed woodland loss was also observed in other isolated small patches scattered throughout the Project area and the fringe of some of the larger mixed woodland. In addition to direct loss of habitat and vegetation, fragmentation was also expected to occur (refer to **Section 10.8.1.33**). Considering the 'low to moderate' ecological value and the existing disturbance in these mixed woodlands, and the size of habitat loss, ecological impact from the loss of mixed woodland is anticipated

to be low in the northern portion, and low to moderate in the southern portion, in the absence of mitigation measures. Several 'Green Belts' have been incorporated under the Project, which encompasses a portion of mixed woodland (**Figure 10.7B** refers). Subject to detailed design, disturbance impact in the wider area is anticipated to reduce from proper planning of land use (including existing brownfield operation). Habitats in Green Belts are anticipated to improve in their habitat quality in the future.

Loss of Plantation

10.8.1.24 Approximately 18.72 ha of plantation would be subject to permanent loss. Under the Project, an extensive patch of plantation at Kam Kwai Leng (near the southwest of the Project area) would be zoned and preserved as Green Belt (GB.5.1, **Figure 10.7B**). Noticeable permanent loss of plantation would occur at other areas of hillside plantation (e.g. north of Kam Kwai Leng, and on Ngau Tam Shan, as well as small areas of loss on smaller knolls and along roadside plantation (**Figure 10.7A** refers). Majority of plantation loss were mostly isolated or narrow strips of roadside plantation that only supported low flora diversity and low to moderate fauna diversity, mainly comprising common vegetation species. Considering the low ecological value, low naturalness of the habitat, and low wildlife diversity and abundance supported, the ecological impact of plantation loss is evaluated to be low.

Loss of Shrubland

10.8.1.25 Approximately 12.04 ha of shrubland would be permanently lost within the Project area, all being situated in the southern portion (**Figure 10.7A** refers). All shrubland habitats within the Project area were considered with 'low' ecological value, while the 'low to moderate' valued shrubland were located outside the Project area and would not be subject to direct impact (including the hillside shrubland at Pang Loon Tei, and shrubland at the CA along Hadden Hill). Within the Project area, most shrubland were relatively fragmented, located adjacent to developed area / wasteland areas, and exhibited limited ecological linkage with adjacent highly valued habitats. The areas of shrubland within the Project site were overall low in ecological value. In this regard, the impact from shrubland loss is considered low.

Loss of Grassland

10.8.1.26 Approximately 15.05 ha of scattered grassland would be permanently lost within the Project area. These are mainly low-lying grassland, except the small area of hillside grassland on Ngau Tam Shan. These areas of grassland in general were fragmented and supported low flora and fauna diversity. Most of the species recorded in this habitat are common in Hong Kong. Considering the relatively low ecological values and the low to moderate wildlife abundance, the ecological impact of grassland loss is considered as low.

Loss of Village / Orchard

10.8.1.27 Approximately 34.43 ha of village / orchard would be subject to permanent loss within the Project area, mostly located in the southern portion. Under the Project, major losses of village / orchard would occur at Ha Wan Tsuen (in the northern portion) and at Pang Loon Tei and Ko Hang village (in the southern portion). Isolated patches of village / orchard would also be lost, mainly throughout the southern portion of the Project area. The overall ecological vale of this habitat was low, and mainly supported common urbanised and disturbance-tolerant wildlife species. Considering the man-made nature of the habitat, the existing disturbance, and the low current wildlife usage, the ecological impact of village / orchard loss is deemed as low.

Loss of Developed Area / Wasteland

10.8.1.28 Approximately 344.36 ha developed area / wasteland within the Project area would be subject to permanent loss. Although this habitat supported a moderate diversity and abundance of flora and fauna, this is predominantly due to the large size of the habitat. The flora species recorded were mainly ornamental species for urban greening and gardening as well as ruderal species, while fauna species recorded were mostly generalist species and disturbance-tolerant. The overall ecological value (except the area where the MPLV Egretry is located) was "very low" to "low". The ecological impact of developed area / wasteland loss is therefore considered low.

10.8.1.29 However, a small area of developed area / wasteland supported the MPLV Egretry. Further discussion on the direct impact concerning the MPLV Egretry is provided in **Section 10.8.1.37**.

Fragmentation of Terrestrial Habitats

10.8.1.30 Fragmentation refers to a discontinuity in habitat, decreasing its carrying capacity, hindering movement, and rendering it less attractive to flora and fauna, or the isolation of some populations of a species resulting in their lower viability. Fragmentation is anticipated to exert direct impact on the wetland habitats in the northern portion as well as some wooded habitats within the Project area.

Fragmentation of Wetland and Associated Fauna

10.8.1.31 Some extent of existing fragmentation was already observed in the northern portion between the wetland habitats on the western side (San Tin and Sam Po Shue area) and the eastern side (Lok Ma Chau area), separated by developed area such as the LMC BCP and San Sham Road. This plot of developed area, being a major control point, was observed with considerable disturbance, including regular human activities and heavy traffic.

10.8.1.32 Under the Project, the LMC BCP would be included in the proposed Development. The existing landscape in LMC BCP and surrounding area were observed as low-rise development, while proposed development (if unmitigated) could arise in high-rise development and could potentially increase fragmentation by obstructing the avifauna flight path. The impact on avifauna flight path would be moderate to high if not mitigated. However, under the Revised RODP a 300 m flight corridor would be retained near Ha Wan Tsuen via the incorporation of a Non-Building Area (NBA) and stringent building height control of ≤15 mPD, which covered most of the west – east flight path revealed in current survey and literature review (**Section 10.11.6** refers). Building structures with stepping heights will also be implemented within the proposed development, where the Revised RODP would include low-rise development near the 300 m flight corridor, and the building height would gradually increase away from the corridor (further described in **Section 10.11.6**). Considering the retained 300 m flight corridor and the implementation of stepping height measures, the ecological impact arise from increase wetland fragmentation in the future would be mitigated.

10.8.1.33 Aside from the flight corridor for avifauna, a small section of existing east-west wildlife corridor was recorded near the LMC BCP, connecting the STEMDC and the pond habitats at Ha Wan Tsuen (**Figure 10.10A** refers). The wildlife corridor (underpass) was constructed as one of the mitigation measures for the Sheung Shui to Lok Ma Chau Spur Line (KCRC, 2001). It consists of a 300 mm wide ledge along the northern embankment of the Ha Wan Nullah (WC-N4) and an underpass beneath the station access road, allowing free movement of mammals. In addition, mammal barrier was also erected along the station access road to protect mammal from the heavy traffic. However, wildlife usage of the underpass is not recorded during survey period (except for records of Domestic Cat). This wildlife underpass would be permanently lost under the proposed development, the impact is considered as low due to the low level of utilization. Nonetheless, re-provision of wildlife corridor and mammal barrier would be included in the

Project to maintain the existing connection between the eastern and western wetland habitats (refer to **Figure 10.10A**).

Fragmentation of Wooded Habitats

10.8.1.34 In addition to the wetland habitats, fragmentation was also expected to affect the wooded habitats (mixed woodland, plantation, shrubland and woodland), mainly in the southern portion. In particular, fragmentation would affect a patch of mixed woodland near Shek Wu Wai Road. This mixed woodland was structurally and functionally connected to nearby woodland, plantation, shrubland and grassland. Under the Project, part of the mixed woodland would be lost under the development, fragmenting the mixed woodland into two unconnected Green Belt zones (refer to **Figures 10.7A** and **10.7B**), while the proposed roads would also further disconnect the wooded habitats towards the west on Kam Kwai Leng. As some mammal species (e.g. Red Muntjac and juvenile East Asian Porcupine) were recorded at the patch of mixed woodland next to Shek Wu Wai, fragmentation of these overall wooded habitats would inevitably cause adverse impacts, isolating these species of conservation importance if no mitigation measures were in place. Considering that this mixed woodland was currently surrounded by developed area / wasteland, and certain level of fragmentation was observed between this mixed woodland and the wooded habitats in Kam Kwai Leng due to fencing, additional fragmentation of this mixed woodland is anticipated to be low to moderate. In order to maintain the connection between the segregated wooded habitats (between the Green Belts, shown in **Figure 10.7B**), wildlife corridors would be included in the Project (refer to **Figure 10.10B**).

10.8.1.35 The proposed development on Ngau Tam Shan (southern end of the Project area) occurs on existing wooded habitats, and may result in potential habitat fragmentation on adjacent grassland, plantation and shrubland habitats and their associated fauna. Leopard Cat and Red Muntjac were recorded in the area, and they are expected to utilise habitats on Ngau Tam Shan as well as the connected wooded habitats further away. The continuity of the vegetated habitats on Ngau Tam Mei could be diminished and potentially hinder animal movement. Nonetheless, wooded habitats are maintained around the proposed development footprint on Ngau Tam Shan. Thus, ecological impact arise from potential habitat fragmentation on Ngau Tam Shan is regarded as low.

10.8.1.36 For other wooded areas zoned as "GB" (**Figure 10.7B** refers), as they have already been isolated and subject to existing fragmentation (e.g. developed area / wasteland or village areas), low impact is anticipated from the additional fragmentation.

Direct Impact on Egretry and Roosting Sites

10.8.1.37 The MPLV Egretry which supported breeding Chinese Pond Heron and Little Egret was situated within Project area (**Figure 10.6A** refers). In the absence of mitigation measures, the loss of this MPLV Egretry could result in high ecological impact such as potential direct injury / mortality of breeding pairs, juveniles and eggs, as well as permanent loss of the ardeid breeding ground. In view of the current extent of the MPLV Egretry, the proposed land use under the Project has been adjusted to minimise direct impact on the breeding ground, while an additional area zoned as "Open Space" is proposed to preserve the MPLV Egretry and the adjoining wooded areas. The current nesting substratum would be largely preserved as far as practicable, except for a narrow strip of Weeping Fig (*Ficus benjamina*) located at the north of Castle Peak Road (San Tin section) and a small patch of vegetation at the east of Shek Wu Wai Road, which would be subjected to direct loss due to a proposed road upgrading works (**Figure 10.6A** refers). Further details of the mitigation measures proposed for the MPLV Egretry are described below in **Section 10.11**. The MPLV Egretry, situated at the busy junction of Castle Peak Road and Shek Wu Wai Road, was subjected to high level of existing disturbance from heavy traffic of container trucks and human disturbance. Considering the majority of the current and historical nesting areas of MPLV Egretry would be retained, the impact from small area of direct loss of the nesting substratum is anticipated to low to moderate. The

measures described below in **Section 10.11** would be implemented to further minimise any potential impacts to the nesting ground.

10.8.1.38 The MPV Egretry adjoins the western end of the Project area boundary. While the previous records of MPV Egretry were recorded within the footprint of Project boundary, no breeding behaviour or nest was recorded within the Project area boundary from current survey (2022) (**Section 10.6.2.51** refers). Hence, direct impact on MPV Egretry is not anticipated.

10.8.1.39 San Tin Open Storage Area Night Roost was identified within the Project boundary in December 2022, located along a pond bund area (**Figure 10.6B** refers). The night roost was situated in the proposed "OU(I&T)" zone in the Project where direct loss of the roosting site is anticipated. The overwintering night roost supported low-moderate abundance of ardeids during dry season. Moderate ecological impact may arise if unmitigated. Mitigation measures such as restriction of construction period, re-provision of roosting substratum at a nearby suitable location, and maintaining avifauna flight corridor will be discussed in **Section 10.11** to minimise and compensate for the potential adverse ecological impacts to the San Tin Open Storage Area Night Roost.

10.8.1.40 The Ha Wan Tsuen Night Roost was located within the Project boundary, between San Sham Road and the Loop (refer to **Figures 10.6C** and **10.6D**). The night roost was situated in the proposed "OU(I&T)" zone in the Project where direct loss of the roosting site is anticipated. The direct impact would be moderate to high if unmitigated. Mitigation measures such as restriction of construction period, re-provision of roosting substratum at a suitable location and maintaining avifauna flight corridor will be discussed in **Section 10.11** to minimise and compensate for the potential adverse ecological impacts to the Ha Wa Tsuen Night Roost.

10.8.1.41 The other night roosts (Lin Barn Tsuen Night Roost, Sam Po Shue Night Roost, and Tam Kon Chau Night Roost) were located outside the Project boundary and are unlikely to be subject to direct impacts arising from the Project.

10.8.1.42 Two relatively small-scaled day roosts, namely San Tin Open Storage Area Day Roost (of Black-crowned Night Herons) and Lok Ma Chau Loop Day Roost (of Great Cormorants) (**Sections 10.6.2.65** and **10.6.2.66** refer) within the Project boundary would be subject to direct loss in construction phase. Low abundance of roosting avifauna was recorded at both day roosts, with irregular and sporadic utilization rate during the survey period. High level of human disturbance was observed at both day roosts. Both day roosts were no longer active since mid-2022. The impact of direct loss on both day roosts would be low.

Direct Impact on Species of Conservation Importance and Associated Habitats

Flora

10.8.1.43 Five flora species of conservation importance, including Incense Tree, *Aralia chinensis,* Cycad-fern, *Camellia sasanqua* and Luofushan Joint-fir, were recorded within the Assessment Area during the current surveys and/or previous studies. While most of them were either situated outside the Project area or retained within the proposed 'Green Belt', some individuals of Cycad-fern, Incense Tree and Luofushan Joint-fir within the Project boundary would be subject to direct loss. Individuals of Cycad-fern were recorded along the slope of hillside plantation on Ngau Tam Shan; Incense Trees were recorded within the Project boundary from recent survey and previous study (CEDD & PlanD, 2021), located at pond bund (LMC area), along roadside of Lok Ma Chau Road, plantation and mixed woodland habitats north of Kam Kwai Leng, developed area south of Shek Wu Wai, and mixed woodland southeast of Chau Tau Tsuen; Luofushan Joint-fir were located in developed area north of San Tin Barrack, shrubland southeast of Pang Loon Tei, and mixed woodland south of Shek Wu Wai. The loss of these flora species of conservation importance is regarded as low to moderate impact if no mitigation is implemented. Appropriate mitigation such as transplantation are further discussed in **Section 10.11**.

Avifauna

10.8.1.44 In the northern portion of the Project area, a relatively high diversity and abundance of avifauna was recorded, including 52 avifauna species of conservation importance. Majority of them were waterbird recorded in ponds, while relatively lower abundance was recorded in other wetland habitats (watercourses, marsh / reed, and mitigation wetland). Considering the high mobility of avifauna species, the construction activities are not anticipated to result in major direct injury / mortality of these species, which are anticipated to be displaced and utilise nearby similar wetland habitats. Nonetheless, the wetland habitats within the Project area were used as foraging ground for various overwintering and resident waterbirds, while breeding activities of Little Ringed Plover (*Charadrius dubius*) and White-shouldered Starling (*Sturnia sinensis*) were also observed in pond area. Majority of the pond and other wetland habitats were already subjected to some disturbance impacts, such as heavy traffic, anthropogenic activities, and construction works (particularly near both sides of LMC BCP), and from adjacent settlement (e.g. San Tin and Mai Po Villages). Some ponds (e.g. San Tin Zone B and Sam Po Shue Zone B with moderate to high ecological values, **Figure 10.5**) experienced less anthropogenic disturbance and form part of the contiguous ponds in San Tin – Sam Po Shue area which supported relatively high diversity and abundance of avifauna species of conservation importance. Considering the avifauna usage and the high ecological linkage to adjacent wetland habitats, the impact from the loss of foraging ground and potential breeding ground to avifauna species is considered of moderate impacts, if unmitigated.

10.8.1.45 Breeding ground for ardeids (egretries) and roosting ground (day roosts and night roosts) were also recorded in the northern portion of the Assessment Area. MPLV Egretry, San Tin Open Storage Area Night Roost, and Ha Wan Tsuen Night Roost are located within the Project boundary and were observed to be active, and would be subjected to direct impact (**Sections 10.8.1.37** and **10.8.1.39** refer). Mitigation measures would be further discussed in **Section 10.11**.

10.8.1.46 In the southern portion of the Assessment Area, 22 avifauna species of conservation importance were recorded within the Project area. Most of them were recorded at the mosaic of agricultural land, watercourse, and village / orchard near Shek Wu Wai and some waterbirds species were observed to aggregate at the middle section of STEMDC (WC-S3) near Kwu Tung Road. Within the Project area, breeding behaviour of White-shouldered Starling (*Sturnia sinensis*) and White-throated Kingfisher (*Halcyon smyrnensis*) were recorded in village / orchard (Shek Wu Wai) and plantation (Ngau Tam Shan) respectively. The mosaic of habitats in Shek Wu Wai would be permanently lost under the Project, while STEMDC would be potentially retained and revitalised, subject to detailed design. Nonetheless, majority of the recorded avifauna species within the southern Project area (including records from current survey, and records in farmlands of Shek Wu Wai by KFBG, 2022) were common and widespread species in Hong Kong. Considering the high mobility of avifauna species, the construction activities are not anticipated to result in major direct injury / mortality of these species, which are anticipated to be displaced and utilise nearby similar habitats. Moreover, habitats in the southern portion of Project area were mostly subject to comparatively higher level of disturbance such as human settlement, agriculture, traffic, open storage and brownfield operation, and existing wildlife in this area are anticipated to be habituated to some level of disturbance. Thus, direct impact on these avifauna species of conservation importance would be low without mitigation measures.

10.8.1.47 Although avifauna are generally highly mobile and capable of moving away from construction works, breeding pairs, chicks and eggs are more vulnerable to construction works and higher risk of direct injury / mortality. As breeding / nesting behaviour of avifauna species of conservation importance including Little Ringed Plover, White-shouldered Starling and White-throated Kingfisher were recorded within Project area, direct impact on these breeding / nesting avifauna species of conservation importance would be low to moderate without mitigation measures. Nonetheless, precautionary measures such as pre-construction survey and nest control (ensuring the absence of

nesting birds) should be implemented to avoid direct injury to breeding pairs, chicks or eggs of avifauna species of conservation importance (**Section 10.11** refers).

Mammal

10.8.1.48 A total of 16 mammal species of conservation importance were recorded within the Project area, majority of them were bat species, mostly recorded flying in village area near Lok Ma Chau Tsuen, Ha Wan Tsuen, Chau Tau Tsuen, Pang Loon Tei and Shek Wu Wai. Bats were recorded to aggregate near wetland habitats such as various watercourses (e.g. WC-N4, WC-S3, WC-S6 and WC-S5) and ponds in San Tin, likely as foraging and drinking spot. No notable roosting site of bat was recorded within the Project area from current survey, while two bat roosts were recorded outside Project area (Mi Tak Study Hall and Koon Ying School, **Section 10.6.2.72** refers), which would not be subject to direct loss. Bat species recorded within the Project area are mostly foraging and/or commuting individuals of common bat species. As the development would be conducted in multiple phases, these foraging and/or commuting individuals bat species present in Project area are able to gradually migrate toward comparable habitats nearby and eventually out of the Project area, thus direct injury or mortality is not anticipated. Considering the high mobility of bat species, and similar habitat types were available near the Project area, while some watercourses are proposed to be retained and revitalised, direct impact to the bat individuals are not anticipated, while the impact from the loss of the associated habitats would be low.

10.8.1.49 Non-flying mammals were also recorded within the Assessment Area, including East Asian Porcupine, Pallas's Squirrel, Leopard Cat, Red Muntjac, Small Asian Mongoose and Small Indian Civet. In northern portion of the Project area, Small Asian Mongoose and Small Indian Civet were recorded in a wasteland adjacent to pond and WC-N4 in Lok Ma Chau. However, construction works (and associated pond filling) along Ha Wan Tsuen East Road were observed during the current survey, imposing existing disturbance on the habitats utilised by the recorded individuals. Similar habitats were available outside Project area in Lok Ma Chau Tsuen. Small Indian Civet was also recorded in mitigation wetland northeast of STEMDC. As the development would be conducted in multiple phases, non-flying mammal species present in the Project area are expected to gradually migrate toward comparable habitats nearby, and eventually out of the Project area. In particular, most of these non-flying mammal species were recorded at locations near the edge of the Project boundary, with similar habitats available in the vicinity (e.g. ponds and marsh/reed at Lok Ma Chau Tsuen, ponds at Sam Po Shue, and the mitigation wetland LMC EEA at LMC Station). In general, considering high mobility of the species and similar habitats available nearby, direct impact (injury / mortality) to the non-flying mammal species would not be anticipated, but the loss of the associated habitats, foraging ground and the potential fragmentation would be low to moderate.

10.8.1.50 In the southern portion of the Project area, non-flying mammals were recorded from several locations including Shek Wu Wai, Pang Loon Tei, and on Ngau Tam Shan. East Asian Porcupine, Red Muntjac and Leopard Cat were recorded in mixed woodland and plantation west of Shek Wu Wai, which were structurally and functionally linked to form a contiguous wooded habitat. Under the Project, some areas at Shek Wu Wai would be zoned "Green Belt", separated by roads and other facilities (**Figure 10.7** refers). The loss of habitats from construction activities and associated habitat fragmentation would result in potentially low to moderate ecological impacts in the absence of mitigation measures. Southeast of Pong Loon Tei, mammal species (incl. East Asian Porcupine, Leopard Cat, Red Muntjac and Small Indian Civet) were recorded in shrubland habitat located at the southern edge of Project area (**Figure 10.3L** refers). The shrubland margin near village area would be permanently lost, however similar natural habitat is available at the adjacent hillside outside Project area. On Ngau Tam Shan, Leopard Cat and Red Muntjac were recorded in the plantation habitat within the Project boundary. Nonetheless, similar hillside plantation habitat is available nearby and the Project area on Ngau Tam Shan are not likely to hinder the movement of mammal species on Ngau Tam Shan (**Section 10.8.1.34** refers). In general, direct impact to non-flying mammal in southern portion of the Project area would be low to moderate if unmitigated. Mitigation measures

such as provision of wildlife corridor connecting the fragmented "GB" in Shek Wu Wai would be discussed in **Section 10.11**.

10.8.1.51 As mentioned in **Section 10.5.2.7**, Eurasian Otter was previously recorded in the Assessment Area and in the vicinity (CEDD & PlanD, 2013a, McMillan et al., 2023). However, no recent sighting of Eurasian Otter was recorded in the Project area during current survey and from literature review (**Section 10.5.2.7** refers), potentially because of the relatively higher level of human activities and disturbance around San Tin and Lok Ma Chau areas compare to wetland habitats near Mai Po. Moreover, Eurasian Otter is highly mobile, and a recent study indicated that individuals could be capable of migrating long distance (> 3 km) (McMillan et al., 2023). As such, some individuals may commute through the area but were not recorded due to its highly elusive nature. Some minor ecological impact may arise from the Project. As such, potential movement of Eurasian Otter is considered in the Project, with the inclusion of a proposed wildlife corridor (**Section 10.11** refers).

Butterfly

10.8.1.52 In the northern portion of the Project area, majority of the recorded butterfly species were common and widespread species in Hong Kong, with four species of conservation importance recorded. Most of them were sparsely recorded in dry agricultural land, ponds, and village / orchard habitats near Lok Ma Chau Tsuen, Chau Tau Tsuen and San Tin, which are subject to permanent loss. No particular breeding ground of these butterfly species was identified. Considering similar habitats were available in the vicinity (e.g. Lok Ma Chau Tsuen outside the Project area) and high mobility of butterfly, direct injury / mortality of butterfly species was not anticipated, while direct impact from the loss of their associated habitats would be low.

10.8.1.53 In the southern portion of the Project area, relatively higher diversity and abundance of butterfly was recorded, with ten butterfly species of conservation importance recorded, while some of them are rare species such as Broad Spark (*Sinthusa chandrana grotei*), Rounded 6-line Blue (*Nacaduba berenice*) and Dark Brown Ace (*Halpe porus*). While these species were not recorded with particular breeding ground, host plants of these three rare species are identified as Rusty-haired Raspberry (*Rubus reflexus*), Lychee (*Litchi chinensis*), and *Bambusa* spp. respectively, which are common flora species recorded within and outside the Project area. Majority of butterfly species of conservation importance were recorded in shrubland and village / orchard habitats, while similar habitats are available southeast of Pang Loon Tei outside Project area. Other butterfly species of conservation importance were scattered in Pang Loon Tei and Shek Wu Wai utilizing dry agricultural land and village / orchard habitats. In general, impact of direct injury / mortality of butterfly species was not anticipated considering their high mobility, while impact from the loss of associated habitats would be low in the southern portion, considering the availability of suitable habitats outside the Project area.

Odonate

10.8.1.54 A total of seven odonate species of conservation importance were recorded in the Project area utilizing wetland habitats such as ponds and watercourses, mainly in Lok Ma Chau Tsuen, San Tin and Shek Wu Wai. Majority of the recorded odonate species, including odonate species of conservation importance, are common and widespread in Hong Kong. Relatively low abundance of odonate species was recorded in the Project area, while no odonate species of conservation importance was recorded utilising habitats within the Project area for breeding or nursery ground (with no nymphs recorded). The Project area is not considered as important habitats for odonate species of conservation importance. Similar habitats in the vicinity are available for species recorded in Lok Ma Chau and San Tin. Considering the high mobility and the low diversity of odonate species recorded, direct impact on these species is anticipated to be low.

Herpetofauna

10.8.1.55 A total of two amphibian species of conservation importance (Chinese Bullfrog and Spotted Narrow-mouthed Frog) were recorded near/in wetland habitats (e.g. watercourses) across Project area which would be subjected to permanent loss. Amphibian species are wetland-dependent with lower mobility, hence they are more sensitive to the direct impact (injury / mortality, and loss of habitats). No breeding ground of these species were observed. Both species were recorded in relatively low abundance, and both species are widely distributed in New Territories. Direct impact (potential injury and loss of habitats) to amphibian species of conservation importance were anticipated to be low to moderate.

10.8.1.56 A total of eight reptile species of conservation importance were recorded in various locations within the Project area. Majority of them were snake species which were highly mobile, with large home range and utilizing different habitats. Most of the reptile species of conservation importance recorded were common and widespread in Hong Kong except a rare species (Banded Stream Snake) recorded in modified watercourse in Shek Wu Wai from the FS Stage of this Project, which was likely washed downhill from more natural habitat south of Shek Wu Wai outside Project area (CEDD & PlanD, 2021a). No particular breeding behaviour and sites of herpetofauna species were recorded in the Project area. Considering high mobility of most reptile species and availability of similar habitats nearby, direct impact to reptile species of conservation importance would be low.

Freshwater Fauna

10.8.1.57 Three freshwater fauna species of conservation importance were recorded in Project area including a freshwater fish (Rose Bitterling) and two freshwater crabs (*Cryptopotamon anacoluthon* and *Somanniathelphusa zanklon*). A population of more than a hundred individuals of Rose Bitterling was recorded in ponds and an adjacent semi-natural watercourse (WC-N5) in Lok Ma Chau during current survey and previous studies (CEDD & PlanD, 2021a; CEDD & PlanD, 2013a) (**Figures 10.3F** and **10.4F** refer). The pond and semi-natural watercourse would be subject to permanent loss under the Project. Rose Bitterling is considered to be of Local Concern (Fellowes et al, 2022) and locally uncommon (AFCD, 2022). The direct impact to Rose Bitterling which has narrow distribution in the Assessment Area would be moderate if unmitigated. Mitigation measures such as translocation would be further discussed in **Section 10.11**. Two freshwater crab species of conservation importance were recorded in low-lying modified watercourse (at Chau Tau) and semi-natural watercourse (south of Pang Loon Tei) within Project area which would be permanently lost. The crab species are likely distributed along those watercourse systems from hillside section (outside Project area) to the low-lying section (within Project area). Low abundance of the two freshwater crab species of conservation importance were recorded. Potential direct impact such as direct injury / mortality and habitat loss for these species is anticipated to be low to moderate if unmitigated. Mitigation measures, such as pre-construction surveys and translocation, are further discussed in **Section 10.11**.

Direct Injury / Mortality on Other Wildlife

10.8.1.58 Construction activities (e.g. site clearance and formation) may result in potential direct injury / mortality of other wildlife species in Project area. Majority of the recorded wildlife species were of higher mobility (e.g. birds, butterflies and mammals), which were already under regular human disturbance. Highly mobile species is anticipated to migrate to similar nearby habitats progressively during construction phase. Other slow-moving or wetland-dependent species recorded at the Project site were mostly common and widespread in Hong Kong. Mitigation measures such as translocation would be implemented for some fauna species of conservation importance, such as amphibian species and freshwater fauna species, further discussed in **Section 10.11**. Direct impact is unlikely to have significant effect on their population, the potential impact is considered as low.

Bird Collision

10.8.1.59 The construction activities in Project area may result in potential injury or mortality due to collision of the commuting birds, in particular, the breeding ardeids at the egretries, and waterbirds that are utilizing the flight corridor near Ha Wan Tsuen (refer to **Figures 10.6A** to **10.6D**), while both San Tin Open Storage Area and Ha Wan Tsuen Night Roosts would be subject to direct loss and subsequent relocation (**Sections 10.8.1.39** and **10.8.1.40** refer) . Construction structures, heavy machineries (e.g. cranes) or building facades with materials that are excessively transparent or reflective (i.e. glass, windows) or difficult to see (e.g. cables, wires) would be of particular concern. Ardeids in MPLV Egretry and MPV Egretry demonstrated certain adaptability and maneuverability, considering the high existing disturbance adjacent to both egretries, such as existing village areas (generally 3-storey village houses), heavy traffic, as well as brownfield operation. The flight height of commuting ardeids from egretries were generally below 20 m, while the construction machineries and the future building height would be much higher than 20 m. Considering the existing disturbance at the egretry and the observed usage, potential ecological impact arising from bird collision would be low to moderate at the egretries, if unmitigated.

10.8.1.60 However, the high abundance of commuting avifauna (mainly waterbirds) utilizing the west – east flight corridor near Ha Wan Tsuen (adjacent to open areas and one-storey village houses) were likely less adapted to urbanized area and high human disturbance. Potential risk of bird collision is anticipated to be higher. Abundance of avifauna is lower in southern portion of Project area and no major flight corridor is observed. However, the construction of high-rise building would still increase risk of bird collision. In the absence of mitigation measures, potential bird collision impact in northern portion of Assessment Area is regarded as moderate, and low to moderate in the southern portion. With the implementation of appropriate mitigation measures (e.g. using non-transparent or non-glaring materials and providing suitable lighting) (**Section 10.11** refers), the ecological impact is anticipated to be mitigated to an acceptable level.

10.8.2 Construction Phase – Indirect Impact

Disturbance Impact to Recognised Sites of Conservation Importance

10.8.2.1 The site formation and construction works would be restricted in Project area. However, temporary construction disturbance including noise, glare, dust, vibration and other human activities could pose indirect impacts on the surrounding areas, especially natural habitats at the recognized sites of conservation importance and ecologically sensitive areas.

10.8.2.2 In the northern portion of Project area, there are a couple of recognised sites of conservation importance outside the Project area in the vicinity, including Ramsar Site, Priority Site, SSSI zone, WCA and “CA” zone, mainly covering the contiguous pond landscape. Low level of human disturbance was present from the current pond culture fisheries operation, while LMC area was subjected to higher existing disturbance from heavier traffic in LMC BCP, construction works related to the Loop and human settlement near Ha Wan Tsuen and Lok Ma Chau Tsuen. If unmitigated, additional disturbance impact on the recognised sites of conservation importance, the associated wetland habitats and wildlife would be moderate to high. In particular, waterbirds and wetland-dependent species and in surrounding area are anticipated to be displaced from the disturbance, resulting in decreased carrying capacity of habitats in the area. Mitigation measures (including enhancement measures , and the establishment of enhanced wetland in the proposed SPS WCP) would be implemented to minimise and compensate for the potential disturbance impact (**Section 10.11** refers), and to ensure the carrying capacity is maintained in the wider area.

10.8.2.3 The WBA within the current Assessment Area covers the landward side of WCA, and mainly comprises developed area / wasteland and small area of wetland habitats (e.g. scattered and isolated ponds and modified watercourses near the village areas), which

are already subject to regular existing disturbance. The increase in disturbance impact on WBA is expected to be low in general.

10.8.2.4 In the southern portion of Project area, "CA" zone is situated just outside the Project area, along the eastern boundary (near Ki Lun Tsuen), and southern boundary (near Pang Loon Tei). The habitats in "CA" zone were subjected to regular human disturbance such as heavy traffic near Ki Lun Tsuen, existing brownfield operations (e.g. workshops and open storage); and the hillside mixed woodland, grassland located within "CA" zone was used as burial ground of locals. In the absence of mitigation measures, the construction activities may result in increased disturbance, compared to existing traffic and brownfield operation. Nonetheless, with the proper implementation of mitigation measures under **Section 10.11**, indirect impact to "CA" zone south of Project area is anticipated to be low.

Disturbance Impact to Ecologically Sensitive Resources

10.8.2.5 The other ecologically sensitive areas in the vicinity of Project area include IBA, LMC Meander, LMC EEA and LMC Loop EA. Increased disturbance during construction phase may potentially induce indirect impact to those ecologically sensitive resources in different extents.

10.8.2.6 The IBA mainly overlapped with other sites of conservation importance such as WCA, "CA" zone, Priority Site, and mostly covered contiguous pond habitats and some developed area. Disturbance impact would be similar to sites of conservation importance discussed in **Section 10.8.2.2**.

10.8.2.7 LMC Meander and LMC Loop EA are adjacent to the Project area. Both areas were subjected to very high level of disturbance because of the existing construction works in the Loop. As such, relatively low abundance of wildlife was recorded in the current survey at the eastern side of LMC Meander. The existing construction disturbance is expected to be completed by the end of the construction phase of the Development of Lok Ma Chau Loop (around 2027). Under the Project, the construction works near LMC meander and LMC Loop EA would commence from 2028 onward. Considering the similar nature of the projects (i.e. site formation works), level of disturbance impact would be similar to the level during construction phase of the Development of Lok Ma Chau Loop (CEDD & PlanD, 2013a). Disturbance impact from the proposed development on the existing LMC meander and LMC Loop EA is considered low to moderate if unmitigated.

10.8.2.8 LMC EEA comprised managed wetland habitats, which supported various avifauna species of conservation importance, adjacent to Project area near northern end of STEMDC. The construction works adjacent to LMC EEA would include potential revitalisation works along STEMDC, where low level of disturbance is anticipated. Site formation works would be further away, on the east of STEMDC and east of San Sham Road. Moreover, LMC EEA is subject to low to moderate disturbance from the operation of LMC station and operation of the viaduct of the LMC Spur Line. Hence, disturbance impact on LMC EEA from the proposed Development is considered low to moderate.

Disturbance Impact to Egretry and Night Roost

10.8.2.9 MPV Egretry was approximately 50 m west from the Project area, while MPLV Egretry will be preserved in the Project area. "Open Space" zoning is proposed to preserve the MPLV Egretry and the adjoining wooded areas. During construction phase, both egretries would be subject to construction disturbance from the vicinity. Breeding ardeids are sensitive to disturbance and human activities. The construction disturbance may affect their breeding and parenting behaviors which may reduce the survival rate of chicks and discourage the ardeid from nesting in the egretries. Ardeids in Hong Kong generally breed between March and August, and no ardeids were recorded roosting in MPV Egretry and MPLV Egretry during non-breeding season. Both egretries were currently situated right next to heavy traffic road and footpath where breeding ardeids have shown adaptability to high level of anthropogenic disturbance. The indirect impact of increased

disturbance on MPV Egretry and MPLV Egretry would be moderate and moderate to high respectively, if unmitigated. With implementation of mitigation measures (such as seasonal and temporal restriction of construction period nearby), the disturbance would be minimised and expected to be low.

10.8.2.10 While San Tin Open Storage Area Night Roost and Ha Wan Tsuen Night Roost were recorded subject to direct loss during construction phase, construction activities in the vicinity of both night roosts prior to their removal and re-provision may also impose disturbance impacts, thus resulting in reduced usage during the overwintering season, which may result in moderate ecological impacts. Other night roosts including Sam Po Shue, Lin Barn Tsuen, and Tam Kon Chau Night Roosts were recorded outside the Project area, while minimum distances between Project area and those night roosts were at least 440 m. The long distance between construction site and night roost suggests no significant ecological impact arising from indirect disturbance is expected.

Disturbance and Obstruction of Flight Path

10.8.2.11 During the construction phase, construction activities and associated tall machineries may pose as potential obstruction of flight paths. Movement of ardeids between their roosting / breeding sites and their foraging grounds would be hindered, resulting in increased energy expenditure and reduced foraging efficiency.

10.8.2.12 The construction site north and northwest of MPLV Egretry would be in conflict with the flight paths of MPLV Egretry, resulting in potential displacement of flight paths. Approximately 99.4% of breeding ardeids in MPLV Egretry flew to the north and northwest for feeding. The construction activities and associated machineries may obstruct the existing flight path as most of the ardeid flight height was below 30 m. The ardeids may adopt a greater flight height near construction works areas or use alternative flight paths (i.e. along Castle Peak Road – San Tin Section) to avoid the construction area and the associated aboveground structures, resulting in potential increase in energy exertion, lowering the chance of breeding success and lower the utilization rate of MPLV Egretry during construction phase. The indirect impact on MPLV Egretry flight path is regarded as moderate to high if unmitigated. In view of the potential adverse impact on the breeding ardeid flight paths, mitigation measures are proposed, including implementation of seasonal control to avoid and minimise construction activities during the ardeid breeding season, and establishing NBA of about 70 m wide to the northwest of the existing MPLV Egretry, connecting to the diverted WC-N8 under the Revised RODP (further discussed in **Section 10.11**). The orientation and location of the proposed NBA coincides with Flight Paths 1 and 2 that were utilised by more than half of the existing breeding ardeids in MPLV Egretry, allowing a movement corridor. As discussed in earlier sections, the existing disturbance level around MPLV Egretry was high, suggesting these ardeids are adapted to high level human disturbance such as heavy traffic and noise. Furthermore, recent study has also suggested that ardeids were observed to fly over obstructing bridge structure when returning to the night roost (Stanton and Klick, 2018), suggesting adaptability in their behaviour, where minor behavioural change might be observed, but their existing usage would be continued. With the mitigation measures proposed, it is anticipated that ardeids are able to continue their movement, and the impact of potential impact on commuting flight paths of breeding ardeids in MPLV Egretry would be mitigated to an acceptable level.

10.8.2.13 The MPV Egretry was situated outside the Project area on the west. Over 70% of the breeding ardeids were recorded flying to the northwest for feeding, away from the Project area. However, some ardeids were observed flying northward (Flight Path 5, 22.4%) and eastward (Flight Path 6, 3.7%) which would overlap with the Project area. The ardeids may potentially adjust their flight paths to avoid disturbance from construction activities. Nonetheless, the majority of the flight paths does not overlap with the Project boundary, and anticipated to be of low ecological impact. Furthermore, mitigation measures are still considered, including the seasonal control of construction activities near the MPV Egretry during breeding season, and incorporating an “eco-interface” as a buffer along the northwestern boundary of the Project area, thus allowing flight paths from the egretry.

10.8.2.14 Both San Tin Open Storage Area Night Roost and Ha Wan Tsuen Night Roost would be subjected to direct loss and roosting substratum would be re-provided, further described in below in **Section 10.11**.

10.8.2.15 Other night roosts (Lin Barn Tsuen Night Roost, Sam Po Shue Night Roost, and Tam Kon Chau Night Roost) were at least 440 m from the Project boundary. Flight paths from these night roosts were mainly recorded flying towards other wetland habitats around the wider San Tin and Sam Po Shue area. The proposed development is not likely to obstruct flight paths from the remaining night roosts.

10.8.2.16 Some major flight paths (a recorded east-west flight corridor) of ardeids, Great Cormorant, and other avifauna were recorded across the existing LMC BCP (**Section 10.6.2.64** refers), which might also be affected by construction works near Ha Wan Tsuen. A large proportion of Great Cormorants and ardeids commuting along this flight corridor were recorded flying at heights of 21 – 30 m or >30 m above ground. In the absence of mitigation measures, this may result in moderate to high ecological impact due to the obstruction of movement between the east and the west.

10.8.2.17 Mitigation measures for this potential impact included the provision of a 300-m wide flight corridor, which comprises a proposed low-rise AFCD Fisheries Research Centre (≤ 15 mPD) and a NBA that no aboveground building structures will be erected (**Figure 10.6C** refers). Height of other structures within the flight corridor would be limited to minimise obstruction to flight usage. Stepping height would also be implemented at the building structures adjacent to this flight corridor. The disturbance impact to the flight corridor would be minimised and considered to be low. Further details of the flight corridor and the NBA are provided at **Section 10.11.6**.

Disturbance Impact to Bat Roost

10.8.2.18 Mi Tak Study Hall Bat Roost and Koon Ying School Bat Roost are approximately 180 m and 150 m away from the Project boundary respectively. Both bat roosts are situated near residential area and under moderate to high level of existing anthropogenic disturbance. The bat species supported are very common and widespread in local rural area. Considering the distance of the bat roosts from Project boundary, the existing level of disturbance, and the existing adaptation and habituation of the bat species, indirect impacts to both bat roosts are expected low.

Disturbance to Habitat and Associated Wildlife

10.8.2.19 During construction phase, disturbances including traffic, noise, glare, dust, vibration and other human activities would be increased and may lead to quality deterioration in nearby habitats and displacement of fauna.

Extent of Disturbance Impact

10.8.2.20 In view of the relatively high abundance and diversity of disturbance sensitive avifauna species at the wetland habitats, the construction disturbance impact is further quantified with the potential extent of impact expected to vary based on construction phase activities. Previous EIA reports adopted similar approaches in assessing disturbance impacts, assuming that for potentially affected species, an Exclusion Zone (EZ) and a Reduced Density Zone (RDZ) will be created around the disturbance source (KCRC, 2002; Mutual Luck Investment Limited, 2008; CEDD & PlanD, 2013a). The maximum extent of disturbance impacts during construction phase of this Project (for large, disturbance-sensitive avifauna) is summarized in **Table 10.24A** and indicated in **Figure 10.8**. Within the EZ, no disturbance sensitive avifauna species would be anticipated during the construction phase, while the RDZ is anticipated to support 50% of the disturbance sensitive avifauna species.

10.8.2.21 Major wetland habitats are located north of Project area, they are mainly contiguous ponds which support high abundance and diversity of avifauna, as well as mitigation wetlands, natural watercourse (LMC Meander), modified watercourses (STEMDC, SZ River) and semi-natural watercourses (WC-N7 to WC-N10, and WC-N12). As described above, these wetland habitats would be subject to disturbance impacts from the proposed development and the associated site formation and construction activities (e.g. noise, traffic and vibration), potentially lowering the number of wildlife using these habitats.

Table 10.24A Assumed Extent of Disturbance Impacts for Large, Disturbance Sensitive Avifauna Species during Construction Phase

Phase / Construction Type	Disturbance Impacted Area (1)	
	EZ (2)	RDZ (3)
Construction Phase		
Low rise buildings / At-grade works	0-100m	100-200m
Mid- to High-rise buildings / Other elevated structures	0-200m	200-400m

(1) The extent of disturbance impacted area (EZ and RDZ) makes reference to approved EIA projects (CEDD & PlanD, 2013a; KCRC, 2002; Mutual Luck Investment Limited, 2008)
(2) Close to source of disturbance, where disturbance levels are high enough to prevent species from using wetland habitats, even with the presence of suitable habitat (0% usage assumed).
(3) Further from source of disturbance where the species would use suitable wetland habitats but likely at a reduced density compared to undisturbed wetland habitat (50% usage assumed).

Disturbance to Pond Habitat

10.8.2.22 Considering the extensive contiguous area of pond habitat, the relatively high diversity and abundance of avifauna species, and the relatively high ecological values of the habitat, the aforementioned disturbance on pond habitats could arise in moderate ecological impact in Lok Ma Chau and moderate to high ecological impact in Mai Po – San Tin – Sam Po Shue area, in the absence of mitigation measures. Ponds in southern portion of Assessment Area outside Project area are relatively small and far away (> 250 m) from the Project area, hence low disturbance impact is anticipated. In view of the construction disturbance impact on the pond habitats and associated wildlife, as well as the decrease of carrying capacity, mitigation measures such as minimisation (e.g. phasing of pond filling, minimisation of disturbance), compensation (wetland compensation), and enhancement measures would be implemented, together with the development of the Project, further detailed in **Section 10.11**.

Disturbance to Mitigation Wetland Habitat

10.8.2.23 Disturbance impacts on mitigation wetlands (LMC Loop EA and LMC EEA) are discussed in **Section 10.8.2.7 – 10.8.2.8**. Other mitigation wetland habitats include the STEMDC wetland (situated next to the LMC BCP and Tun Yu Road), the Flood Storage Pond, and the San Tin Constructed Wetland. All of these habitats are artificial, subject to existing disturbance, and recorded with low to moderate abundance and diversity of wildlife. Increased disturbance from construction works under the proposed Development would result in decrease of carrying capacity at these habitats, resulting in low to moderate ecological impact if unmitigated. The disturbance impacts on these habitats would be mitigated with measures to minimise disturbance, described in **Section 10.11**. As described in **Section 10.8.1.9**, both STEMDC wetland and San Tin Constructed Wetland are located within the Project area, and would be reinstated and re-provided upon the proposed Development, with ecological value expected to increase upon revitalization. For the potential decrease in carrying capacity of the Flood Storage Pond, wetland compensation would be implemented in the form of “enhanced freshwater wetland habitats”, further discussed in **Section 10.11**.

Disturbance to Other Wetland Habitats

10.8.2.24 Disturbance impact from revitalization and/or construction works along major watercourses would also lower the number of foraging birds in watercourses causing potentially low to moderate ecological impact, except SZ River which low ecological impact is anticipated. The remaining watercourses adjacent to Project boundary are relatively small and majority of them were already located at high disturbance area. A relatively less disturbed natural watercourse (WC-S3c) south of Pang Loon Tei is located adjacent to Project boundary. While this section of natural watercourse would be preserved under the Revised RODP, it would be subject to construction disturbance and expected with low to moderate disturbance impact. Nonetheless, WC-S3c is relatively small and short, and was located in an upstream location from the Project area. With implementation of mitigation measures stated in **Section 10.11**, the disturbance impact is regarded as low. Considering the existing disturbance level and scale of other minor watercourses, disturbance impact in construction phase would be low.

10.8.2.25 Patches of marsh / reed in Lok Ma Chau Tsuen and Lin Barn Tsuen, and a small patch of seasonally wet grassland near Mai Po Village would be subject to temporary disturbance from the nearby construction works. However, low abundance of wildlife and species of conservation importance were recorded during current survey. Considering the marsh / reed mentioned is under regular existing disturbance from human settlement, the ecological impact from increased disturbance in construction phase is regarded as low to moderate. Besides, the seasonally wet grassland has low habitat quality and already subject to very high level of disturbance, low disturbance impact is anticipated. Nonetheless, the disturbance impacts on wetland habitats (marsh / reed in Lok Ma Chau Tsuen, modified watercourse WC-S5, S6 and semi-natural watercourses in northern portion) would be mitigated with the implementation of wetland compensation (in the form of “enhanced freshwater wetland habitats”), described in **Section 10.11**.

Disturbance to Other Non-Wetland Habitats

10.8.2.26 Aside from the wetland habitats northwest of the Project area, other habitats recorded in close vicinity of Project boundary are largely vegetated habitats (e.g. woodland, mixed woodland, shrubland, hillside plantation, and hillside grassland). Dust generated during construction phase could degrade the habitats, while deposition of dust and pollutant may affect the growth of vegetation. Relatively high occurrence of avifauna and mammal species of conservation importance were recorded in woodland south of Pang Loon Tei (**Figure 10.3H** refers); while some butterfly species of conservation importance were recorded in hillside grassland on Tam Mei Hill southwest of Project area (**Figure 10.3D** refers); and some mammal species of conservation importance on Ngau Tam Shan (**Figure 10.3I** refers). These habitats and the associated wildlife, including species of conservation importance, were subjected to relatively low existing disturbance, hence they are potentially more sensitive to the disturbance impacts from construction activities. However, construction disturbance is not likely to impact habitats on Tam Mei Hill and it is located uphill from the Project site. Majority of the other vegetated habitats adjacent to Project area (e.g., woodland located at Lok Ma Chau, vegetated habitats near Chau Tau, and grassland to the east of Ki Lun Tsuen) were already under regular disturbance from human activities, and some of them were utilized as burial ground. Considering the existing disturbance at most of these vegetated habitats, disturbance impact is anticipated to be low, except for potential construction disturbance to the woodland in Pang Loon Tei, and plantation, grassland and shrubland on Ngau Tam Shan, which is anticipated to be low to moderate.

10.8.2.27 Disturbance to low-lying urbanized habitats that lies outside the Project boundary such as dry agricultural land, roadside plantation, roadside grassland, developed area / wasteland, and village / orchard in Lok Ma Chau Tsuen, Chau Tau Tsuen and Mai Po Village are anticipated to be low as those habitats were not recorded immediately adjacent to the Project area, and were already under certain levels of existing disturbance.

Night-time Disturbance

10.8.2.28 While there will be no night-time construction activities under the Project, uncontrolled lighting and glare from construction sites at night would affect the roosting waterbirds and nocturnal fauna (night roosts and nocturnal species, e.g., Savanna Nightjar, Black-crowned Night Heron, bats and herpetofauna) in the vicinity. This can affect migration, foraging / predation and breeding success of species. The contiguous ponds landscape was subjected low level of regular disturbance from regular fishery operation and traffic, but unused to intense artificial light / glare. In general, night-time light and glare might induce moderate disturbance to ponds and the associated fauna, if unmitigated. Appropriate mitigation measures for minimizing disturbance are discussed in **Section 10.11**. SZ River was already subjected high level of anthropogenic disturbance and low abundance of fauna was recorded, hence additional disturbance impact would be low.

Water Quality and Hydrological Impacts

10.8.2.29 Site formation and construction works may result in potential water quality impact (e.g. deterioration of water quality, increase in suspended solids and potential contaminants) and potential change in hydrodynamics of watercourses and ponds outside Project area. Potential sources of water impact include site runoff (runoff and erosion of exposed bare soil), construction discharge and accidental spillage of oil, fuel and other harmful chemicals.

10.8.2.30 Site formation and construction works in northern portion would encroach to the existing ponds and watercourses within Project area, where direct loss or diversion is anticipated. However, potential site-runoff, discharge and spillage in Project area would induce water quality impact to the watercourses and Deep Bay north / northwest of Project area as most major watercourses were hydrologically connected, discharging to SZ River and Deep Bay. Sediment particle could cause physical injury to aquatic fauna, and possibly clog the respiratory systems of fish and invertebrates. Potential discharge of pollutants / chemicals may cause bioaccumulation and biomagnification in the Deep Bay ecosystem which would affect the waterbirds and aquatic communities. Aside from the watercourses, ponds adjacent to Project area are also under the risk of site-runoff, discharge and spillage from construction activities, affecting fish stocks and waterbirds. Overall, the water quality impact to the surroundings would be low to moderate if unmitigated. With the adoption of mitigation measures that minimise water quality impact (**Section 10.11** refers), the potential water quality impact is expected to be low.

10.8.2.31 In southern portion, watercourses in Shek Wu Wai would be realigned and the upstream semi-natural watercourse sections of STEMDC (WC-S3a) would be potentially decked over during construction phase, subject to detailed design in the later stage. As the southern portion is at higher altitude and upstream locations compared to the north, potential site runoff, discharge and spillage will flow to the north, while indirect impact on watercourses on the southern portion are likely to be lower impacts. Outside the Project boundary, water quality impact is not anticipated at the natural watercourse (WC-S3c) at Pang Loon Tei, considering that it is located outside the Project site.

10.8.2.32 Within the Project area, the majority of the minor watercourses would be permanently removed / diverted / realigned, except for a few major watercourses such as STEMDC (WC-N3 and WC-S3), WC-N6, and the STWMDC (WC-N8 and WC-N8a) which would be retained for revitalization (**Figure 10.7B** refers). The watercourses that are subject to removal, diversion, and/or realignment are mostly minor watercourses. Hydrological change such as hydraulics of water flow and flow regime on the affected minor watercourses would be localized and low, if unmitigated. On the other hand, the relatively major watercourses would be subject to revitalisation and greening measures, which would be on the bankside above the water level. No hydrodynamic impact to the major watercourse is anticipated from revitalization works.

10.8.2.33 Ponds within Project area would be removed. Ponds adjacent to Project area were mainly hydrologically disconnected to the surrounding watercourse and hydrologically

independent to each pond, their hydrological properties would not be affected by the construction works. Overall, low hydrological impacts are anticipated to the remaining ponds.

10.8.2.34 As stated in Water Quality Impact Section (**Section 5** refers), water quality impacts can be controlled by precaution and mitigation measures. With the implementation of mitigation measures suggested in **Section 5**, ecological impacts due to water quality deterioration and hydrological changes are anticipated to be low.

10.8.3 Operation Phase – Direct Impact

Direct Impact on Recognised Sites of Conservation Importance

10.8.3.1 Five sites of conservation importance ("CA" zone, WCA, WBA, Priority Site, and "SSSI" zone) were situated in the Project site. Based on the proposed land use under the Project, no further direct impact on the sites of conservation importance nor additional habitat loss is anticipated in the operation phase of this Project.

Direct Impact on Terrestrial Habitat

10.8.3.2 Majority of the existing natural or artificial habitats within Project area would be altered to developed area after the construction phase. Some patches of vegetated habitats such as hillside plantation, hillside grassland, mixed woodland, shrubland and woodland would be retained in the "GB" zone under the Project. According to the proposed land use under the Project, no further loss of the vegetated habitats is expected during the operation phase of this Project, no direct impact is anticipated.

Direct Injury / Mortality to Wildlife and Bird Collision

10.8.3.3 Under the Project, an "Open Space" is proposed to preserve the MPLV Egretry and the nearby area on its southwest (**Figures 10.6A** and **10.7** refer). Original nesting substratum would be retained in the "Open Space", while enhancement measures will also be implemented at the area (e.g. planting of mature trees that are currently used as nesting substratum, further described in below section). Any recreation facilities / uses that would attract human activities in proximity of the egretry would be avoided during the detailed design stage of the "Open Space". Hence direct injury to the breeding pairs and chicks in MPLV Egretry is not anticipated in operation phase.

10.8.3.4 Increased risk of bird collision with man-made structures is anticipated during the operation phase. Excessive use of transparent / reflective building façade, presence of cable / wires, use of transparent noise barrier and intense lighting would cause bird collision. Risk of bird collision would be higher in the northern portion of Project area, especially in the vicinity of the commuting flight paths of egretries and night roost, and the west – east flight corridor near the LMC BCP. Considering the generally higher abundance of the avifauna and the presence of their breeding sites, the ecological impact of bird collision is regarded as moderate if unmitigated. Mitigation measures (e.g. providing flight corridor such as a 70 m wide NBA from the MPLV Egretry, and a 300 m flight corridor across LMC BCP) would be proposed, further described in **Section 10.11**. With implementation of other mitigation measures such as using non-transparent or non-glaring materials and providing suitable lighting, ecological impact arising from bird collision is expected to be low.

10.8.3.5 During operation phase, population of common generalist species which are adapted to urbanized area would likely first re-establish in the area, while some wildlife may utilise the preserved "Green Belt" zone. Direct injury / mortality such as bird collision and roadkill would be a challenge to the wildlife in Project area in operation phase. Nonetheless, majority of the wildlife in the vicinity were already subjected to high level of existing disturbance (e.g. operation of brownfield, human settlement and traffic). With proper planning during the detailed design stage, wildlife that are expected to re-establish

in the area during operation phase are not anticipated to be subject to direct impact (e.g. injury / mortality, bird collision) during the operation of land use under the Project.

10.8.4 Operation Phase – Indirect Impact

Disturbance to Recognised Sites of Conservation Importance and Habitats

10.8.4.1 Several recognised sites of conservation importance were identified adjacent to the Project boundary, including two adjoining "CA" zone under the OZP No. S/YL-ST/8 and OZP No. S/YL-MP/6 (across Lok Ma Chau, San Tin and Mai Po) and S/YL-NTM/12 (along Ki Lun Tsuen and Pang Loon Tei), WCA, WBA, Priority Sites for Enhanced Conservation, the Mai Po Inner Deep Bay Ramsar Site, and Mai Po Village SSSI. Mai Po Village Egretry within the Mai Po Village SSSI also has close proximity to the Project boundary (approximately 50 m to the west). These sites of conservation importance with their associated wildlife (mainly avifauna) and habitats (mainly wetland in northern portion) were close to the proposed "Innovation & Technology Park" ("OU(I&T)") zone under the Project.

10.8.4.2 On the northern portion, sites of conservation importance would be subject to an increase in human, noise and visual disturbance generated from nearby facilities and activities at the proposed land uses during the operation phase. In the absence of mitigation measures, potentially moderate ecological impacts may arise on these sites of conservation importance and the associated wetland habitats. Nonetheless, the proposed implementation of the eco-interface along the northwestern boundary of the Project area will create a buffer area between the pond habitat in sites of conservation importance and the Project area. The eco-interface would be established in the form of a landscape buffer via landscape planting, which could screen out and minimise disturbance from the Project area. Moreover, given that the egretries are currently surrounded by open storage area with artificial lighting at night as well as heavy traffic flow and frequent human disturbance, these ecological resources are expected with some extent of tolerance and adaptability to disturbances. Low ecological impacts are anticipated form the operation phase disturbance to the egretries. With the implementation of mitigation measures proposed such as eco-interface (**Section 10.11** refers), the indirect impact on sites of conservation importance is anticipated to be mitigated to a low level.

10.8.4.3 On the southern portion, the two "CA" zones surrounding Pang Loon Tei under the Approved Ngau Tam Mei OZP No. S/YL-NTM/12 will be located adjacent to the proposed "Logistics Storage and Workshop" land use ("OU(LSW)"), "Public Housing" (RSc), "Government" ("G"), "Education ("E") and "OU(I&T)" zones. Compared to the northern portion, these sites and habitats are subject to a higher level of existing disturbance, such as noise and dust emitted from operation of brownfield, and heavy level of human activities and traffic. Upon the proposed Development, potential indirect impacts would arise from the change of land use, but such change is anticipated to be similar to the existing level of disturbances. No significant increase in disturbance magnitude is expected from the operation phase. As such, while the "CA" zones and its associated vegetated habitats would be subject to indirect impact from the operation phase (particularly on the edge of these habitats adjacent to the Project area), these indirect impacts would be similar to existing level of disturbance, and low ecological impact is anticipated in the absence of mitigation measures. With the implementation of mitigation measures to further minimise disturbance impacts (e.g., buffer and landscaping planting along the Project boundary, and establishing of fencing to minimise human activities encroaching into the hillside habitats, Section **10.11** refers), the impact from additional disturbance on sites of conservation importance and the associated vegetation habitats is considered low.

10.8.4.4 Disturbance to other low-lying habitats such as marsh / reed, seasonally wet grassland, dry agricultural land, roadside plantation, roadside grassland, developed area / wasteland, and village / orchard in both northern portion (e.g. Lok Ma Chau Tsuen, Chau Tau Tsuen

and Mai Po Village) and southern portion (e.g. Ngau Taim Mei) is anticipated to be low as those habitats were already under certain levels of existing disturbance.

Impact to Habitats and Associated Species of Conservation Importance

10.8.4.5 Adjacent to the Project area is a contiguous area of pond and other wetland habitats on the northern side. A relatively high diversity and abundance of avifauna (including species of conservation importance) were recorded utilising the pond habitat. During the operation phase, an increase in disturbance is anticipated in the form of increased traffic flow, increased human population and increased artificial lighting. Such disturbance may discourage wildlife from using these adjacent areas. Nonetheless, these habitats and the associate wildlife were already subject to some level of existing disturbance (e.g. traffic of heavy vehicle from adjacent roads, operation of brownfield and aquaculture activities, and human settlement and activities). Considering the nature of the proposed land use under the Project and the incorporation of an "eco-interface" along the STEMDC and the northwestern boundary of the Revised RODP, the disturbance impact from operation phase on nearby wildlife and species of conservation importance is considered to be low to moderate.

Species of Conservation Importance at Wetland Habitats

10.8.4.6 For the avifauna species at the ponds on the north and northwest of the Project boundary, they may also be subject to potential disturbance impacts. Large waterbirds and other disturbance-sensitive avifauna species were anticipated to have reduced usage near Project site. Under the Project, building structures were proposed with stepping heights (height restriction of building structures facing Sam Po Shue will increase from +15 mPD to +35 mPD, stepping up to +75 mPD and > +75 mPD further towards the south) (**Figure 10.8** refers). The presence of such building height may result in varying disturbance impact. With reference to approved EIA studies, it was estimated that an EZ would be expected at 0 – 50 m from the low-rise development (15 – 35 mPD); while a RDZ was expected at 50 – 100 m away from the low-rise development during operation phase (CEDD & PlanD, 2013a; KCRC, 2002; Mutual Luck Investment Limited, 2008) (**Table 10.24B** refers). In the absence of mitigation measures, the exclusion and reduction utilisation of these avifauna species may result in moderate ecological impacts.

Table 10.24B Assumed Extent of Disturbance Impacts for Large, Disturbance Sensitive Avifauna Species during Operation Phase

Phase / Construction Type	Disturbance Impacted Area (1)	
	EZ (2)	RDZ (3)
Operation Phase		
Low rise buildings / At-grade works	0-50m	50-100m
Mid- to High-rise buildings / Other elevated structures	0-100m	100-200m

(1) The extent of disturbance impacted area (EZ and RDZ) makes reference to approved EIA projects (CEDD & PlanD, 2013a; KCRC, 2002; Mutual Luck Investment Limited, 2008)
(2) Close to source of disturbance, where disturbance levels are high enough to prevent species from using wetland habitats, even with the presence of suitable habitat (0% usage assumed).
(3) Further from source of disturbance where the species would use suitable wetland habitats but likely at a reduced density compared to undisturbed wetland habitat (50% usage assumed).

10.8.4.7 While the disturbance from operation phase is considered less significant than the disturbance impact from construction phase, a holistic approach is used under the current wetland compensation strategy, where the disturbance from construction phase would be adopted for calculation of compensation requirement, as indicated in **Figure 10.8**. The proposed compensation would enhance nearby habitats (e.g., wetland habitats at the proposed Sam Po Shue Wetland Conservation Park), in order to compensate for the loss of carrying capacity on wetland-dependent avifauna species during both construction and operation phases, as detailed in **Section 10.11.3**.

Disturbance and Obstruction of Flight Path

10.8.4.8 Similar to the potential obstruction of flight path during the construction phase, obstruction of flight path may also arise during the operation phase due to the establishment of building structures. Both MPLV and MPV Egretries would be preserved under the Project, while flight paths were recorded mostly towards the northern and northwestern direction, as described above. In the absence of mitigation measures, potential obstruction of the flight paths from MPLV Egretry may be subject to potentially moderate to high ecological impacts with the establishment of building structures. Further minimisation measures were proposed (e.g. establishment of flight corridors with NBA, stringent building height control of ≤15 mPD, and planning of the adjacent land uses), further discussed below in **Section 10.11**. With the implementation of the mitigation measures below, the ecological impact arising from the potential obstruction of flight paths from MPLV Egretry would be minimised to an acceptable level.

10.8.4.9 Considering the recorded flight path direction from MPV Egretry (mainly towards the northwest), low ecological impact would be anticipated from the potential obstruction of flight path. Under the Project, a 35m wide NBA in the form of an "eco-interface" has been proposed along the northwest of the project boundary, with landscape buffer between the proposed development and the wetland habitats on the northwest, thus minimising the disturbance to bird flight paths. The building height of the proposed AFCD Wetland Conservation Park Management Office (located near the MPV Egretry) will be restricted to two storeys. Potential obstruction of flight paths from MPV Egretry would be further minimised.

10.8.4.10 As described in **Section 10.8.2.14**, potential obstruction of flight path would arise from the proposed development near the LMC BCP, where an existing east-west flight corridor was observed. In the absence of mitigation measures, this may result in moderate to high ecological impact due to the obstruction of movement between the east and the west. Mitigation measures for this potential impact include a 300 m wide flight corridor constituted by a NBA (**Figure 10.6** refers), and stringent building height control of the proposed fisheries research centre, customs dog base, and sewage pumping station, which would be less than +15 mPD. The proposed building height adjacent to the 300 m flight corridor would be no more than +35 mPD tall, in order to further minimise disturbance on the avifauna usage of this flight corridor. The disturbance impact to the flight corridor would also be minimised to an acceptable level during operation phase.

Water Quality and Hydrological Impact

10.8.4.11 As stated in the Water Quality Impact Assessment (**Section 5** refers), it is anticipated that the water quality impacts associated with the operation phase of the proposed Project would be minimal and acceptable, provided that the recommended measures such as adequate storm drainage system and sewage pumping stations, blue-green infrastructure, and best storm water management practices and storm water pollution control plan are properly implemented. Also, hydrological condition change within the Project area due to operation of the Project is not anticipated. Ecological impacts associated with the change in water quality and hydrology from this Project are considered negligible to low.

10.8.5 Secondary Impact (Wetland Compensation)

10.8.5.1 As described in **Section 10.8.1**, wetland compensation would be required to mitigate for the impact on the wetlands concerned, direct loss of pond habitats within the Project site, and the indirect impact on adjacent wetland habitat and associated fauna. Wetland compensation will be implemented at the proposed SPS WCP, with the introduction of enhanced wetlands (ecologically enhanced fishponds and enhanced freshwater wetland habitats). These habitats are proposed at existing pond habitats, giving rise to secondary impact due to the direct modification of pond habitats. Nonetheless, the establishment of "ecologically enhanced fishponds" and "enhanced freshwater wetland habitat" is anticipated to increase the ecological function and capacity of the existing pond habitat. As such, the ecological enhancement would compensate for the loss of wetland habitat

arising from the development of San Tin Technopole and achieve no-net-loss in ecological function and capacity of the wetlands concerned. No significant secondary impact is anticipated from the implementation of wetland compensation within the SPS WCP.

10.8.5.2 Further details of the development of SPS WCP, including the design details, timeframe and potential phasing of the SPS WCP shall be developed in the detailed design stage of the proposed SPS WCP (further discussed in **Section 10.11.1.5**).

10.9 EVALUATION OF POTENTIAL ENVIRONMENTAL IMPACTS

10.9.1.1 Potential ecological impacts on the identified habitats within the Assessment Area associated with the construction and operation of the Project have been evaluated in accordance with the Annex 8 of the EIAO-TM, as presented in **Table 10.25** – **Table 10.40**.

Table 10.25 Evaluation of Potential Ecological Impacts to Mitigation Wetland

Criteria	Mitigation habitats under STEMDC	San Tin Constructed Wetland	LMC EEA	LMC Loop EA
Habitat Quality	STEMDC wetland: Low to moderate Flood Storage Pond: Low to moderate	Low to moderate	Core: Very High Clean-up Reedbed: Low to moderate	Low to moderate (existing condition) Moderate (upon maturation)
Species / Ecological Resources	Low to moderate diversity, and moderate abundance of flora and fauna	Low to moderate diversity, and low abundance of flora and fauna	Moderate to high diversity and abundance of flora and fauna	Low diversity and abundance of flora and fauna
	<u>Current Survey (Mitigation habitats under STEMDC, San Tin Constructed Wetland, LMC EEA)</u> A total of 19 species of conservation importance were recorded, including 12 avifauna, 5 mammal species, and 2 butterfly species <u>Literature Review (Mitigation habitats under STEMDC)</u> A total of 15 avifauna species of conservation importance were recorded Total number of species of conservation importance recorded: 27			
Size / Abundance	Permanent loss of part of STEMDC wetland (0.64 ha) Temporary loss of both STEMDC wetland and San Tin Constructed Wetland (4.29 ha)		Habitat would not be subject to direct loss	
Duration	Direct impact (small area of STEMDC wetland encroached by NBA under the Revised RODP) would be permanent Direct impact (the remaining STEMDC wetland and San Tin Constructed Wetland to be reinstated and/or revitalised) would be temporary Construction phase disturbance (noise, dust, vibration, and glare) would be temporary Operation phase disturbance (noise, human disturbance, and glare) would be permanent		Construction phase disturbance (noise, dust, vibration, and glare) would be temporary Operation phase disturbance (noise, human disturbance, and glare) would be permanent	
Reversibility	Direct impact (small areas of the STEMDC wetland encroached by NBA under the Revised RODP) would be irreversible Direct impact (the remaining STEMDC		Construction phase disturbance (noise, dust, vibration, and glare) would be reversible Operation phase disturbance (noise, human disturbance, and glare) would	

Criteria	Mitigation habitats under STEMDC	San Tin Constructed Wetland	LMC EEA	LMC Loop EA
	wetland and San Tin Constructed Wetland to be reinstated and/or revitalised) would be reversible Construction phase disturbance (noise, dust, vibration, and glare) would be reversible Operation phase disturbance (noise, human disturbance, and glare) would be reversible		be reversible	
Magnitude	Low to moderate	Low	Low	Low
Overall Impact Significance	Construction phase direct impact: Low to moderate Construction phase indirect impact: Low to moderate Operation phase direct impact: Nil Operation phase indirect impact: Low	Construction phase direct impact: Low to moderate Construction phase indirect impact: Low to moderate Operation phase direct impact: Nil Operation phase indirect impact: Low	Construction phase direct impact: Nil Construction phase indirect impact: Low to moderate Operation phase direct impact: Nil Operation phase indirect impact: Low	Construction phase direct impact: Nil Construction phase indirect impact: Low to moderate Operation phase direct impact: Nil Operation phase indirect impact: Low

Table 10.26 Evaluation of Potential Ecological Impacts to Marsh / Reed

Criteria	Northern Portion	Southern Portion
Habitat Quality	LMC Tsuen: Moderate Others: Low to moderate	MA-S1, MA-S2, MA-S3: Moderate Others: Low to moderate
Species / Ecological Resources	Low to moderate diversity, and moderate abundance of flora and fauna Current Survey A total of 13 species of conservation importance were recorded, including 7 avifauna, 2 mammal, 3 butterfly, and 1 odonate species Literature Review A total of 3 species of conservation importance were recorded, including 1 odonate, 1 herpetofauna, and 1 freshwater crab species Total number of species of conservation importance recorded: 16	Moderate diversity, and low to moderate abundance of flora and fauna Current Survey A total of 4 fauna species of conservation importance was recorded, including 2 avifauna, 1 mammal, and 1 butterfly species Literature Review A total of 4 species of conservation importance were recorded, including 3 butterfly, and 1 herpetofauna species Total number of species of conservation importance recorded: 8
Size / Abundance	4.82 ha would be permanently lost	3.20 ha would be permanently lost
Duration	Direct impact of habitat loss and operation phase disturbance (noise, human disturbance, and glare) to nearby marsh in LMC Tsuen and Lin Barn Tsuen would be permanent Construction disturbance (noise, dust, vibration, and glare) to nearby marsh in LMC Tsuen and Lin Barn Tsuen would be temporary	Direct impact of habitat loss would be permanent No indirect impact anticipated as habitat would be lost
Reversibility	Direct impact (habitat loss) during	Direct impact (habitat loss) during

Criteria	Northern Portion	Southern Portion
	construction phase would be irreversible Indirect impact (disturbance) during both construction and operation phase would reversible	construction would be irreversible No indirect impact anticipated as habitat would be lost
Magnitude	Low to moderate	Low to moderate
Overall Impact Significance	Construction phase direct impact: Low to moderate Construction phase indirect impact: Low to moderate Operation phase direct impact: Nil Operation phase indirect impact: Low	Construction phase direct impact: Low to moderate Construction phase indirect impact: Nil Operation phase direct impact: Nil Operation phase indirect impact: Nil

Table 10.27 Evaluation of Potential Ecological Impacts to Pond

Criteria	Northern Portion	Southern Portion
Habitat Quality	Lok Ma Chau: Moderate San Tin (Zone A): High San Tin (Zone B): Moderate to high San Tin (Zone C): Moderate Sam Po Shue (Zone A): High Sam Po Shue (Zone B): Moderate to high Sam Po Shue (Zone C): Moderate Ha Wan Tsuen Night Roost: Moderate to high San Tin Open Storage Area Night Roost: Moderate Lin Barn Tsuen Night Roost: Moderate Sam Po Shue Night Roost: High Tam Kon Chau Night Roost: Moderate to high San Tin Open Storage Area Day Roost: Low (*abandoned*) Lok Ma Chau Loop Day Roost: Low (*abandoned*)	Shek Wu Wai: Low to moderate Others: Low
Species / Ecological Resources	Moderate flora diversity and high fauna diversity; abundance of wildlife was low to moderate in LMC; high in SPS and ST Current Survey A total of 71 species of conservation importance were recorded, including 1 flora, 54 avifauna, 9 mammal, 3 butterfly, 2 odonate, 1 herpetofauna, and 1 freshwater fish species Literature Review A total of 4 species of conservation importance were recorded, including 2 odonate, 1 herpetofauna, and 1 freshwater fish species Pond bund also supported roosting ardeids and Great Cormorant, including: • San Tin Open Storage Area Night Roost • Ha Wan Tsuen Night Roost • Sam Po Shue Night Roost • Lin Barn Tsuen Night Roost • Tam Kon Chau Night Roost • San Tin Open Storage Area Day Roost (abandoned) • Lok Ma Chau Loop Day Roost (abandoned) Breeding ground recorded for: • Rose Bitterling (at Lok Ma Chau Tsuen) • Little Ringed Plover (at San Tin)	Low diversity and abundance of flora and fauna Current Survey A total of 4 species of conservation importance were recorded, including 2 avifauna, 1 mammal, and 1 herpetofauna species Literature Review A total of 2 species of conservation importance were recorded, including 1 odonate, and 1 herpetofauna species Total number of species of conservation importance recorded: 6

Criteria	Northern Portion	Southern Portion
	• White-shouldered Starling (at San Tin) Total number of species of conservation importance recorded: 73	
Size / Abundance	89.02 ha would be permanently lost and 2.86 ha would be temporarily lost	3.10 ha would be permanently lost
Duration	Habitat loss will be permanent Construction phase disturbance (noise, dust, vibration, and glare) would be temporary Operation phase disturbance (noise, human disturbance, and glare) would be permanent	
Reversibility	Construction phase disturbance (noise, dust, vibration, and glare) would be reversible Operation phase disturbance (noise, human disturbance, and glare) would be irreversible	
Magnitude	Moderate to High	Low to moderate
Overall Impact Significance	Construction phase direct impact: High Construction phase indirect impact: Mai Po – San Tin – Sam Po Shue: Moderate to high Lok Ma Chau: Moderate Operation phase direct impact: Nil Operation phase indirect impact: Low to moderate	Construction phase direct impact: Low Construction phase indirect impact: Low Operation phase direct impact: Nil Operation phase indirect impact: Nil

Table 10.28 Evaluation of Potential Ecological Impacts to Natural Watercourse

Criteria	Northern Portion	Southern Portion
Habitat Quality	LMC Meander: Moderate WC-N2b: Low to Moderate	WC-S1a: Low WC-S3c: Moderate to High
Species / Ecological Resources	Low diversity and abundance of flora and fauna Current Survey A total of 4 fauna species of conservation importance were recorded, including 3 avifauna, and 1 mammal species Literature Review N.A. Total number of species of conservation importance recorded: 4	Moderate flora diversity, and low diversity and abundance of fauna Current Survey A total of 2 fauna species of conservation importance were recorded, including 1 mammal, and 1 butterfly species Literature Review N.A. Total number of species of conservation importance recorded: 2
Size / Abundance	Habitat would not be subject to direct loss	Habitat would not be subject to direct loss
Duration	Indirect impact (noise, dust, vibration) during construction phase would be temporary Indirect impact (human disturbance) during operation phase would be permanent	Indirect impact (noise, dust, vibration) during construction phase would be temporary Indirect impact (human disturbance) during operation phase would be permanent
Reversibility	Indirect impact during construction phase (noise, dust, vibration) and during operation phase (human disturbance) would be reversible	Indirect impact during construction phase (noise, dust, vibration) and during operation phase (human disturbance) would be reversible
Magnitude	Low to moderate	Low to moderate
Overall Impact Significance	Construction phase direct impact: Nil Construction phase indirect impact: LMC Meander: Low to moderate	Construction phase direct impact: Nil Construction phase indirect impact: WC-S1a: Low

Criteria	Northern Portion	Southern Portion
	WC-N2b: Low Operation phase direct impact: Nil Operation phase indirect impact: LMC Meander: Low to moderate WC-N2b: Low	WC-S3c: Low to moderate Operation phase direct impact: Nil Operation phase indirect impact: WC-S1a: Low WC-S3c: Low

Table 10.29 Evaluation of Potential Ecological Impacts to Modified Watercourse

Criteria	Northern Portion	Southern Portion
Habitat Quality	WC-N1 (SZ River): Low WC-N3 (STEMDC): Moderate WC-N4 & WC-N8a: Low-moderate Others: Low	WC-S3 (STEMDC): Moderate WC-S5 & S6: Low-moderate Others: Low
Species / Ecological Resources	Low flora diversity and moderate fauna diversity; moderate abundance of wildlife at WC-N3 and low at others Current Survey A total of 21 species of conservation importance recorded, including 11 avifauna, 6 mammal, 2 odonate, 1 herpetofauna, and 1 freshwater crab species Literature Review (STEMDC) A total of 23 avifauna species of conservation importance were recorded Literature Review (Others) 1 freshwater crab species of conservation importance recorded Total number of species of conservation importance recorded: 36	Low flora diversity and moderate fauna diversity; moderate abundance of wildlife Current Survey A total of 18 fauna species of conservation importance was recorded, including 7 avifauna, 8 mammal, 1 butterfly, and 2 herpetofauna species Literature Review A total of 3 fauna species of conservation importance was recorded, including 2 odonate, and 1 herpetofauna species Total number of species of conservation importance recorded: 21
Size / Abundance	1.96 ha (11.50 km) would be permanently lost 5.09 ha (2.94 km) would be subject to temporary loss	1.29 ha (2.56 km) would be permanently lost 1.12 ha (0.97 km) would be subject to temporary loss
Duration	Direct impact (habitat loss) during construction phase would be permanent Direct impact (temporary revitalize works) during construction phase would be temporary Indirect impact (disturbance and water quality impact) during construction on other modified watercourses would be temporary Indirect impact (disturbance and water quality impact) during operation phase on other modified watercourses would be permanent	Direct impact (habitat loss) during construction phase would be permanent Direct impact (temporary revitalize works) during construction phase would be temporary Indirect impact during construction phase to other modified watercourses would be temporary Indirect impact (disturbance and water quality impact) during operation phase on retained and other modified watercourses would be permanent
Reversibility	Direct impact (habitat loss) during construction phase would be irreversible Indirect impact during construction phase to other modified watercourses would be reversible Indirect impact during operation phase to other modified watercourses	Direct impact (habitat loss) during construction phase would be irreversible Indirect impact during construction phase to retained or revitalised watercourses would be reversible Indirect impact during operation phase to retained or revitalised

Criteria	Northern Portion	Southern Portion
	would be reversible	modified watercourses would be reversible
Magnitude	Low to moderate	Low to moderate
Overall Impact Significance	Construction phase direct impact: WC-N3 (STEMDC), WC-N4, WC-N8a: Low to moderate Others: Low Construction phase indirect impact: WC-N3 (STEMDC), WC-N8a: Low to moderate Others: Low Operation phase direct impact: Nil Operation phase indirect impact: WC-N3: Low to moderate Others: Low	Construction phase direct impact: WC-S3, WC-S5, WC-S6: Low to moderate Others: Low Construction phase indirect impact: WC-S3: Low to moderate Others: Low Operation phase direct impact: Nil Operation phase indirect impact: Low

Table 10.30 Evaluation of Potential Ecological Impacts to Semi-natural Watercourse

Criteria	Northern Portion	Southern Portion
Habitat Quality	WC-N6, WC-N11, WC-N15: Low Others: Low to moderate	WC-S3a, WC-S10: Low to moderate Others: Low
Species / Ecological Resources	Low to moderate diversity and abundance of flora and fauna Current Survey A total of 18 species of conservation importance recorded, including 9 avifauna, 6 mammal, 2 butterfly, and 1 herpetofauna species Literature Review 1 freshwater fish species of conservation importance recorded Total number of species of conservation importance recorded: 19	Moderate flora diversity and low fauna diversity; Low to moderate abundance of wildlife Current Survey A total of 8 fauna species of conservation importance was recorded, including 2 avifauna, 5 mammal, and 1 herpetofauna species Literature Review A total of 2 species of conservation importance recorded, including 1 odonate and 1 freshwater crab species Total number of species of conservation importance recorded: 10
Size / Abundance	3.60 ha (3.91 km) would be permanently lost 1.33 ha (1.14 km) would be subject to temporary loss	1.55 ha (3.78 km) would be permanently lost 0.06 ha (0.16 km) would be subject to temporary loss
Duration	Direct impact (habitat loss) during construction phase would be permanent Direct impact (realignment and revitalisation) during construction phase would be temporary Indirect impact (disturbance) on other semi-natural watercourses during construction phase would be temporary Indirect impact (disturbance) on other semi-natural watercourses during operation phase would be permanent	

Criteria	Northern Portion	Southern Portion
Reversibility	Direct impact (habitat loss) would be irreversible Direct impact (realignment and revitalisation orks) during construction phase would be temporary Indirect impact during construction phase to other semi-natural watercourses would be reversible Indirect impact during operation phase to other semi-natural watercourses would be reversible	
Magnitude	Low	Low
Overall Impact Significance	Construction phase direct impact: WC-N6, WC-N11, WC-N15: Low Others: Low to moderate Construction phase indirect impact: WC-N7, WC-N8, WC-N9, WC-N10, WC-N12: Low to moderate Others: Low Operation phase direct impact: Nil Operation phase indirect impact: Low	Construction phase direct impact: WC-S3a: Low to moderate Others: Low Construction phase indirect impact: WC-S3a: Low to moderate Others: Low Operation phase direct impact: Nil Operation phase indirect impact: Low

Table 10.31 Evaluation of Potential Ecological Impacts to Seasonally Wet Grassland

Criteria	Northern Portion	Southern Portion
Habitat Quality	Low	Low
Species / Ecological Resources	Low diversity and abundance of flora and fauna Current Survey 1 avifauna species of conservation importance was recorded Literature Review No species of conservation importance recorded Total number of species of conservation importance recorded: 1	Low diversity and abundance of flora and fauna Current Survey and Literature Review No species of conservation importance recorded in this habitat
Size / Abundance	Habitat would not be subject to direct loss	0.10 ha would be permanently lost
Duration	Indirect impact (disturbance) during construction phase would be temporary Indirect impact (disturbance) during operation phase would be permanent	Direct impact (habitat loss) would be permanent No indirect impact anticipated as habitat would be lost
Reversibility	Indirect impact (disturbance) during construction phase would be reversible Indirect impact (disturbance) during operation phase would be reversible	Direct impact (habitat loss) would be irreversible No indirect impact anticipated as habitat would be lost
Magnitude	Low	Low
Overall Impact Significance	Construction phase direct impact: Nil Construction phase indirect impact: Low Operation phase direct impact: Nil Operation phase indirect impact: Nil	Construction phase direct impact: Low Construction phase indirect impact: Nil Operation phase direct impact: Nil

Criteria	Northern Portion	Southern Portion
		Operation phase indirect impact: Nil

Table 10.32 Evaluation of Potential Ecological Impacts to Wet Agricultural Land

Criteria	Southern Portion
Habitat Quality	Low
Species / Ecological Resources	Low diversity and abundance of flora and fauna Current Survey and Literature Review No species of conservation importance was recorded in this habitat.
Size / Abundance	0.20 ha would be permanently lost
Duration	Direct impact (habitat loss) would be permanent No indirect impact anticipated as habitat would be lost
Reversibility	Direct impact (habitat loss) would be irreversible No indirect impact anticipated as habitat would be lost
Magnitude	Low
Overall Impact Significance	Construction phase direct impact: Low Construction phase indirect impact: Nil Operation phase direct impact: Nil Operation phase indirect impact: Nil

Table 10.33 Evaluation of Potential Ecological Impacts to Dry Agricultural Land

Criteria	Northern Portion	Southern Portion
Habitat Quality	Lok Ma Chau: Moderate Chau Tau: Low	Shek Wu Wai: Low to moderate Others: Low
Species / Ecological Resources	Low flora diversity and moderate fauna diversity; moderate abundance of wildlife Current Survey A total of 12 species of conservation importance recorded, including 8 avifauna, 2 butterfly, 1 odonate, and 1 herpetofauna species Literature Review 1 herpetofauna species of conservation importance recorded Total number of species of conservation importance recorded: 12	Low flora diversity and moderate fauna diversity; moderate abundance of wildlife Current Survey A total of 13 fauna species of conservation importance was recorded, including 7 avifauna, 2 mammal, and 4 butterfly species Literature Review A total of 5 species of conservation importance recorded, including 2 butterfly, 1 odonate, and 2 herpetofauna species Total number of species of conservation importance recorded: 16
Size / Abundance	0.85 ha would be permanently lost	9.51 ha would be permanently lost
Duration	Direct impact (habitat loss) would be permanent Indirect impact (noise, vibration, dust) during construction phase to nearby / retained dry agricultural land would be temporary Indirect impact (disturbance) during operation phase would be permanent	Direct impact (habitat loss) would be permanently No indirect impact anticipated as habitat would be lost

Criteria	Northern Portion	Southern Portion
Reversibility	Direct impact (habitat loss) would be irreversible Indirect impact during construction phase would be reversible Indirect impact during operation phase would be reversible	Direct impact (habitat loss) would be irreversible No indirect impact anticipated as habitat would be lost
Magnitude	Low	Low to moderate
Overall Impact Significance	Construction phase direct impact: Low Construction phase indirect impact: Low Operation phase direct impact: Nil Operation phase indirect impact: Low	Construction phase direct impact: Low to moderate Construction phase indirect impact: Low Operation phase direct impact: Nil Operation phase indirect impact: Low

Table 10.34 Evaluation of Potential Ecological Impacts to Woodland

Criteria	Northern Portion	Southern Portion
Habitat Quality	Moderate	Pang Loon Tei: Moderate to high Others: Low to moderate
Species / Ecological Resources	Moderate to high flora diversity and low to moderate fauna diversity; moderate abundance of wildlife Current Survey A total of 11 species of conservation importance recorded, including 1 flora, 5 avifauna, 3 mammal, 1 butterfly, and 1 herpetofauna species Literature Review 1 flora species of conservation importance recorded Total number of species of conservation importance recorded: 11	Moderate to high flora diversity and moderate fauna diversity; moderate to high abundance of wildlife Current Survey A total of 19 species of conservation importance was recorded, including 2 flora, 5 avifauna, 9 mammal, and 3 butterfly species Literature Review 1 flora species of conservation importance recorded Total number of species of conservation importance recorded: 19
Size / Abundance	1.64 ha would be permanently lost	0.06 would be permanently lost (none in Pang Loon Tei)
Duration	Direct impact (habitat loss) would be permanent Indirect impact (noise, vibration, dust) during construction phase to nearby / retained woodland would be temporary Indirect impact (disturbance) during operation phase would be permanent	
Reversibility	Direct impact (habitat loss) would be irreversible Indirect impact during construction phase would be reversible Indirect impact during operation phase would be reversible	
Magnitude	Low to moderate	Low
Overall Impact Significance	Construction phase direct impact: Low to moderate Construction phase indirect impact: Low Operation phase direct impact: Nil	Construction phase direct impact: Low Construction phase indirect impact: Pang Loon Tei: Low to moderate Others: Low

Criteria	Northern Portion	Southern Portion
	Operation phase indirect impact: Low	Operation phase direct impact: Nil Operation phase indirect impact: Low

Table 10.35 Evaluation of Potential Ecological Impacts to Mixed Woodland

Criteria	Northern Portion	Southern Portion
Habitat Quality	Low to moderate	Pang Loon Tei, Shek Wu Wai and Tam Mei Hill: Low to moderate Others: Low
Species / Ecological Resources	Moderate flora diversity and low fauna diversity; Low to moderate abundance of wildlife Current Survey A total of 3 species of conservation importance recorded, including 1 avifauna, 1 mammal, and 1 herpetofauna species Literature Review 1 flora species of conservation importance recorded Total number of species of conservation importance recorded: 4	Moderate to high flora diversity and moderate diversity and abundance of fauna Current Survey A total of 15 species of conservation importance was recorded, including 2 flora, 4 avifauna, 8 mammal, and 1 herpetofauna species Juvenile East Asian Porcupine was recorded near Shek Wu Wai San Tsuen within Project area Literature Review A total of 8 species of conservation importance recorded, including 2 flora, 5 butterfly, and 1 odonate species Total number of species of conservation importance recorded: 22
Size / Abundance	4.27 ha would be permanently lost	13.41 ha would be permanently lost
Duration	Direct impact (habitat loss) would be permanent Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be temporary Indirect impact (disturbance) during operation phase would be permanent	Direct impact (habitat loss and fragmentation) during construction phase would be permanent Indirect impact (noise, vibration, dust) during construction phase to nearby / retained mixed woodland would be temporary Indirect impact (disturbance) during operation phase would be permanent
Reversibility	Direct impact (habitat loss) would be irreversible Indirect impact during construction phase would be reversible Indirect impact during operation phase would be reversible	Direct impact (habitat loss and fragmentation) during construction phase would be irreversible Indirect impact (noise, vibration, dust) during construction phase to nearby / retained mixed woodland would be reversible Indirect impact (disturbance) during operation phase would be reversible
Magnitude	Low	Low to moderate
Overall Impact Significance	Construction phase direct impact: Low Construction phase indirect impact: Low	Construction phase direct impact: Low to moderate Construction phase indirect impact: Low

Criteria	Northern Portion	Southern Portion
	Operation phase direct impact: Nil Operation phase indirect impact: Low	Operation phase direct impact: Nil Operation phase indirect impact: Low

Table 10.36 Evaluation of Potential Ecological Impacts to Plantation

Criteria	Northern Portion	Southern Portion
Habitat Quality	Low	Ngau Tam Mei, Kam Kwai Leng: Low to moderate Others: Low
Species / Ecological Resources	Moderate flora diversity and low fauna diversity; Low to moderate abundance of wildlife Current Survey A total of 4 species of conservation importance recorded, including 1 avifauna, and 3 mammal species Literature Review 2 butterfly species of conservation importance recorded Total number of species of conservation importance recorded: 6	Moderate flora diversity and low to moderate diversity and abundance of fauna Current Survey A total of 9 species of conservation importance was recorded, including 3 flora, 2 avifauna, 3 mammal, and 1 butterfly Literature Review A total of 10 species of conservation importance recorded including 3 flora, 3 mammal, and 4 butterfly species Total number of species of conservation importance recorded: 15
Size / Abundance	5.35 ha would be permanently lost	13.37 ha would be permanently lost
Duration	Direct impact (habitat loss) would be permanent Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be temporary Indirect impact (disturbance) during operation phase would be permanent	Direct impact (habitat loss) would be permanent Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be temporary Indirect impact (disturbance) during operation phase would be permanent
Reversibility	Direct impact (habitat loss) would be irreversible Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be reversible Indirect impact (disturbance) during operation phase would be reversible	Direct impact (habitat loss) would be irreversible Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be reversible Indirect impact (disturbance) during operation phase would be reversible
Magnitude	Low	Low to moderate
Overall Impact Significance	Construction phase direct impact: Low Construction phase indirect impact: Low Operation phase direct impact: Nil Operation phase indirect impact: Low	Construction phase direct impact: Low Construction phase indirect impact: Ngau Tam Shan: Low to moderate Others: Low Operation phase direct impact: Nil Operation phase indirect impact: Low

Table 10.37 Evaluation of Potential Ecological Impacts to Shrubland

Criteria	Northern Portion	Southern Portion
Habitat Quality	Low	CA: Low to moderate Hillside shrubland in Pang Loon Tei: Low to moderate Others: Low
Species / Ecological Resources	Moderate flora diversity and low fauna diversity; low to moderate abundance of wildlife Current Survey 3 mammal species of conservation importance recorded Literature Review N.A. Total number of species of conservation importance recorded: 3	Moderate to high flora diversity and moderate fauna diversity; low to moderate abundance of wildlife Current Survey A total of 19 species of conservation importance was recorded, including 1 flora, 2 avifauna, 8 mammal, 7 butterfly, and 1 odonate species Literature Review 1 flora species of conservation importance was recorded Total number of species of conservation importance recorded: 19
Size / Abundance	No habitat would be affected	12.04 ha would be permanently lost
Duration	Direct impact (habitat loss) would be permanent Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be temporary Indirect impact (disturbance) during operation phase would be permanent	Direct impact (habitat loss) would be permanent Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be temporary Indirect impact (disturbance) during operation phase would be permanent
Reversibility	Direct impact (habitat loss) would be irreversible Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be reversible Indirect impact (disturbance) during operation phase would be reversible	Direct impact (habitat loss) would be irreversible Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be reversible Indirect impact (disturbance) during operation phase would be reversible
Magnitude	Low	Low to moderate
Overall Impact Significance	Construction phase direct impact: Nil Construction phase indirect impact: Low Operation phase direct impact: Nil Operation phase indirect impact: Low	Construction phase direct impact: Low Construction phase indirect impact: Ngau Tam Shan: Low to moderate Others: Low Operation phase direct impact: Nil Operation phase indirect impact: Low

Table 10.38 Evaluation of Potential Ecological Impacts to Grassland

Criteria	Northern Portion	Southern Portion
Habitat Quality	Hillside grassland: Low to moderate Others: Low	Hillside grassland: Low to moderate Others: Low
Species / Ecological Resources	Low to moderate diversity and abundance of flora and fauna Current Survey A total of 8 species of conservation importance recorded, including 3 avifauna, and 5 mammal species Literature Review A total of 6 species of conservation importance was recorded, including 2 flora, 3 butterfly, and 1 odonate species Total number of species of conservation importance recorded: 14	Moderate flora and fauna diversity; low to moderate abundance of wildlife Current Survey A total of 12 species of conservation importance was recorded, including 3 flora, 3 avifauna, 5 butterfly, and 1 odonate species Literature Review A total of 12 species of conservation importance was recorded, including 2 flora, 1 mammal, 8 butterfly, and 1 herpetofauna species Total number of species of conservation importance recorded: 19
Size / Abundance	5.53 ha would be permanently lost	9.52 ha would be permanently lost
Duration	Direct impact (habitat loss) would be permanent Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be temporary Indirect impact (disturbance) during operation phase would be permanent	Direct impact (habitat loss) would be permanent Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be temporary Indirect impact (disturbance) during operation phase would be permanent
Reversibility	Direct impact (habitat loss) would be irreversible Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be reversible Indirect impact (disturbance) during operation phase would be reversible	Direct impact (habitat loss) would be irreversible Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be reversible Indirect impact (disturbance) during operation phase would be reversible
Magnitude	Low	Low
Overall Impact Significance	Construction phase direct impact: Low Construction phase indirect impact: Low Operation phase direct impact: Nil Operation phase indirect impact: Low	Construction phase direct impact: Low Construction phase indirect impact: Ngau Tam Shan: Low to moderate Others: Low Operation phase direct impact: Nil Operation phase indirect impact: Low

Table 10.39 Evaluation of Potential Ecological Impacts to Village / Orchard

Criteria	Northern Portion	Southern Portion
Habitat Quality	Mi Tak Study Hall Bat Roost: Low to moderate Others: Low	Low to moderate
Species /	Moderate flora diversity, and low to	Moderate to high flora diversity and

Criteria	Northern Portion	Southern Portion
Ecological Resources	moderate diversity and abundance of fauna Current Survey A total of 11 species of conservation importance recorded, including 4 avifauna, 5 mammal, 1 butterfly, and 1 herpetofauna species Roost of Himalayan Leaf-nosed Bat observed at a study hall in this habitat at Lok Ma Chau Tsuen Literature Review A total of 3 species of conservation importance recorded, including 1 flora, 1 butterfly, and 1 herpetofauna species Total number of species of conservation importance recorded: 13	moderate diversity and abundance of fauna Current Survey A total of 20 species of conservation importance was recorded, including 5 avifauna, 7 mammal, 7 butterfly, and 1 herpetofauna species Literature Review A total of 2 species of conservation importance recorded, including 1 flora, and 1 herpetofauna species Total number of species of conservation importance recorded: 22
Size / Abundance	4.91 ha would be permanently lost	29.52 ha would be permanently lost
Duration	Direct impact (habitat loss) would be permanent Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be temporary Indirect impact (disturbance) during operation phase would be permanent	Direct impact (habitat loss) would be permanent Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be temporary Indirect impact (disturbance) during operation phase would be permanent
Reversibility	Direct impact (habitat loss) would be irreversible Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be reversible Indirect impact (disturbance) during operation phase would be irreversible	Direct impact (habitat loss) would be irreversible Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be reversible Indirect impact (disturbance) during operation phase would be irreversible
Magnitude	Low	Low
Overall Impact Significance	Construction phase direct impact: Low Construction phase indirect impact: Low Operation phase direct impact: Nil Operation phase indirect impact: Low	Construction phase direct impact: Low Construction phase indirect impact: Low Operation phase direct impact: Nil Operation phase indirect impact: Low

Table 10.40 Evaluation of Potential Ecological Impacts to Developed Area / Wasteland

Criteria	Northern Portion	Southern Portion
Habitat Quality	Egretries: Moderate to high Koon Ying School Bat Roost: Low to moderate Others: Very Low	Very Low
Species /	Moderate to high flora and fauna	Moderate diversity and abundance

Criteria	Northern Portion	Southern Portion
Ecological Resources	diversity; moderate abundance of wildlife Current Survey A total of 26 species of conservation importance were recorded, including 1 flora, 7 avifauna, 12 mammal, 2 butterfly, 1 odonate, and 3 herpetofauna species Mai Po Lung Village Egretry was observed at the junction between Castle Peak Road (San Tin section) and Mai Po Lung Road within the Project site Mai Po Village Egretry was observed at the junction at Tam Kon Chau Road within the Assessment Area Literature Review A total of 8 species of conservation importance were recorded, including 1 flora, 1 butterfly, and 6 herpetofauna species Total number of species of conservation importance recorded: 31	of flora and fauna Current Survey A total of 11 species of conservation importance was recorded, including 1 flora, 2 avifauna, 6 mammal, 1 butterfly, and 1 herpetofauna species Literature Review 1 flora species of conservation importance were recorded Total number of species of conservation importance recorded: 12
Size / Abundance	163.43 ha would be permanently lost	180.93 ha would be permanently lost
Duration	Direct impact (habitat loss) would be permanent Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be temporary Indirect impact (disturbance) during operation phase would be permanent	Direct impact (habitat loss) would be permanent Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be temporary Indirect impact (disturbance) during operation phase would be permanent
Reversibility	Direct impact (habitat loss) would be irreversible Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be reversible Indirect impact (disturbance) during operation phase would be reversible	Direct impact (habitat loss) would be irreversible Indirect impact (noise, vibration, dust) during construction phase to nearby mixed woodland would be reversible Indirect impact (disturbance) during operation phase would be reversible
Magnitude	Low to moderate	Low to moderate
Overall Impact Significance	Construction phase direct impact: Low Construction phase indirect impact: Low Operation phase direct impact: Nil Operation phase indirect impact: Low	Construction phase direct impact: Low Construction phase indirect impact: Low Operation phase direct impact: Nil Operation phase indirect impact: Low

Table 10.41 Summary of Potential Ecological Impacts

Impact	Source	Receiver	Nature of Impact	Overall Impact Significance in the absence of Mitigation	Mitigation Required?	Residual Impact
Construction Phase – Direct Impact						
Loss of wetland habitats (northern portion)	Site formation	Sites of conservation importance ("CA" zone, "SSSI zone", WCA, WBA, and Priority Site) and ecologically sensitive resource (IBA)	Permanent loss of habitats within sites of conservation importance and IBA Reduced ecological function / value	"CA" zone. WCA, Priority Site, IBA: High WBA and "SSSI" zone: Low	Yes (Wetland compensation)	Nil
		Wetland habitats (mitigation wetland, ponds, marsh / reed, modified watercourses, semi-natural watercourses)	<u>Permanent loss of wetland habitats</u> Mitigation Wetland: 0.64 ha Pond: 89.02 ha Marsh / reed: 4.82 ha Modified watercourse: 1.96 ha Semi-natural watercourse: 3.60 ha <u>Temporary loss of wetland habitats</u> Mitigation Wetland: 4.29 ha Pond: 2.86 ha Semi-natural watercourse: 1.33 ha Modified watercourse: 5.09 ha	Mitigation habitats under STEMDC and San Tin Constructed Wetland: Low to moderate Pond: High Marsh / reed: Low to moderate Modified watercourse (WC-N3, WC-N4, WC-N8a): Low to moderate Other modified watercourses: Low Semi-natural watercourse (WC-N6, WC-N11, WC-N15): Low Other semi-natural watercourses: Low to moderate	Yes (Wetland compensation, in the form of: "Ecologically enhanced fishponds" for contiguous pond habitats, and "Enhanced freshwater wetland habitats" for other wetland habitat types) (Temporary loss areas will be re-provided and/or revitalised)	Nil
Loss of wetland habitats (southern portion)	Site formation	Wetland habitats (ponds, marsh / reed, modified watercourses, semi-natural watercourses, seasonally wet grassland, wet agricultural land)	<u>Permanent loss of wetland habitats</u> Pond: 3.10 ha Marsh / reed: 3.20 ha Modified watercourse: 1.29 ha Semi-natural watercourse: 1.55 ha Seasonally wet grassland: 0.10 ha Wet agricultural land: 0.20 ha <u>Temporary loss of wetland habitats</u> Semi-natural watercourse: 0.06 ha Modified watercourse: 1.12 ha	Pond: Low Marsh / reed: Low to moderate Modified watercourse (WC-S3, WC-S5, WC-S6): Low to moderate Other modified watercourses: Low Semi-natural watercourse (WC-S3a): Low to moderate Other semi-natural watercourses: Low Seasonally wet grassland:	Yes (Wetland compensation, in the form of: "Enhanced freshwater wetland habitats" for scattered ponds and other wetland habitat types) (Temporary loss areas will be revitalised)	Nil

Impact	Source	Receiver	Nature of Impact	Overall Impact Significance in the absence of Mitigation	Mitigation Required?	Residual Impact
				Low Wet agricultural land: Low		
Loss of other non-wetland habitats (northern portion)	Site formation	Other non-wetland habitats	<u>Permanent loss of other habitats</u> Dry Agricultural Land: 0.85 ha Woodland: 1.64 ha Mixed Woodland: 4.27 ha Plantation: 5.35 ha Grassland: 5.53 ha Village / Orchard: 4.91 ha Developed Area / Wasteland: 163.43 ha	Dry Agricultural Land: Low Woodland: Low to moderate Mixed Woodland: Low Plantation: Low Shrubland: No Grassland: Low Village / Orchard: Low Developed Area / Wasteland: Low	Woodland: Yes (Woodland compensation) Others: No	Nil
Loss of other non-wetland habitats (southern portion)	Site formation	Other non-wetland habitats	<u>Permanent loss of other habitats</u> Dry Agricultural Land: 9.51 ha Woodland: 0.06 ha Mixed Woodland: 13.41 ha Plantation: 13.37 ha Shrubland: 12.04 ha Grassland: 9.52 ha Village / Orchard: 29.52 ha Developed Area / Wasteland: 180.93 ha	Dry Agricultural Land: Low to moderate Woodland: Low Mixed Woodland: Low to moderate Plantation: Low Shrubland: Low Grassland: Low Village / Orchard: Low Developed Area / Wasteland: Low	Woodland: Yes (Woodland compensation) Mixed Woodland: No (with the incorporation of Green Belt under the Revised RODP) Dry Agricultural Land: No; (but enhancement measures proposed to promoting environmental capacity for associated wildlife) Others: No	Nil
Habitat Fragmentation	Site formation	Wetland habitats (northern portion) Wooded habitats (mixed woodland, plantation, grassland, shrubland and woodland) in Shek Wu Wai	<u>Wetland habitats (northern portion)</u> High-rise structures would potentially form a barrier blocking the west – east avifauna flight path Loss of wildlife corridor (underpass) <u>Vegetated habitats (Shek Wu Wai – Kam Kwai Leng area)</u> Fragmentation in mixed woodland Disconnection between mixed woodland, plantation, grassland, shrubland and woodland	Wetland habitats (northern portion): Moderate to high Wildlife corridor (underpass): Low Vegetated habitats (Shek Wu Wai – Kam Kwai Leng area): Low to moderate Vegetated habitats (Ngau Tam Shan and other wooded area): Low	Yes ("Ecologically enhanced fishponds" and "Enhanced freshwater wetland habitats" with improved connectivity, including a wildlife corridor on the northern portion Maintaining flight corridor under the Revised RODP Maintaining "Green Belts" in southern portion with wildlife corridor)	Nil

Impact	Source	Receiver	Nature of Impact	Overall Impact Significance in the absence of Mitigation	Mitigation Required?	Residual Impact
			<u>Vegetated habitats (Ngau Tam Shan)</u> Diminished continuity of vegetated habitats on Ngau Tam Shan		Ngau Tam Shan: No	
Direct impact on Egretry	Site formation	MPLV Egretry	Loss of small area of MPLV Egretry (<0.02 ha, with only one nest observed in 2022) Potential injury / mortality of breeding individuals Disturbance on breeding individuals	High	Yes (Avoidance by preserving the egretry with Open Space land use, minimising construction phase disturbances on egretries by setup buffer area and seasonal control of construction works, enhancement features at the Open Space (O.1.3) at MPLV Egretry) (*Disturbance impact to egretries and associated flight lines provided below*)	Low
Direct impact on San Tin Open Storage Area Night Roost	Site formation	San Tin Open Storage Area Night Roost and roosting ardeids	Permanent loss of San Tin Open Storage Area Night Roost Potential injury / mortality of roosting individuals	Moderate	Yes (Seasonal control of construction activities, re-provision of roosting substratum)	Low
Direct impact on Ha Wan Tsuen Night Roost	Site formation	Ha Wan Tsuen Night Roost and roosting Great Cormorant and ardeids	Permanent loss of Ha Wan Tsuen Night Roost Potential injury / mortality of roosting individuals	Moderate to high	Yes (Seasonal control of construction activities, re-provision of roosting substratum)	Low
Direct impact on Day roost	Site formation	Black-crowned Night Heron in San Tin Open Storage Area Day Roost Great Cormorant in Lok Ma Chau Loop Day Roost	Permanent loss of San Tin Open Storage Area Day Roost and Lok Ma Chau Loop Day Roost	Low (*both day roosts abandoned during the course of ecological surveys*)	No	Nil
Direct impact on flora species of conservation importance	Site formation	Cycad-fern, Incense Tree and Luofushan Joint-fir	Direct loss of Cycad-fern, Incense Tree and Luofushan Joint-fir individuals	Low to moderate	Yes (Transplantation for Cycad-fern, Incense Tree; and seedling planting for Luofushan Joint-fir)	Nil
Direct impact on avifauna species of conservation importance	Site formation	Avifauna species of conservation importance (northern portion) Avifauna species of conservation importance (southern portion)	<u>Northern portion</u> Loss of habitat, foraging ground and breeding ground <u>Southern portion</u> Loss of habitat, foraging ground and	Northern portion: Moderate Southern portion: Low Breeding Little Ringed Plover, White-shouldered Starling and White-throated	Yes (Wetland compensation to enhance carrying capacity) (Nest control for potential breeding grounds of Little Ringed Plover, White-	Nil

Impact	Source	Receiver	Nature of Impact	Overall Impact Significance in the absence of Mitigation	Mitigation Required?	Residual Impact
		Breeding grounds of avifauna species of conservation importance	breeding ground Potential injury / mortality of breeding pairs, chicks and eggs of Little Ringed Plover, White-shouldered Starling and White-throated Kingfisher	Kingfisher: Low to moderate	shouldered Starling and White-throated Kingfisher)	
Direct impact on mammal species of conservation importance	Site formation	Bat species Non-flying mammal species of conservation importance	<u>Bat species</u> Loss of habitat, foraging ground and drinking spot <u>Non-flying mammal species</u> Loss of habitat and foraging ground	Bat species: Low Non-flying mammal species: Low to moderate Otter: Low	Yes (Green Belt with wildlife corridor for non-flying mammal species of conservation importance in Shek Wu Wai, inclusion of wildlife corridors) No (other species)	Nil
Direct impact on butterfly species of conservation importance	Site formation	Butterfly species of conservation importance	Loss of habitat	Low	No	Nil
Direct impact on odonate species of conservation importance	Site formation	Odonate species of conservation importance	Loss of habitat and potential breeding ground	Low	No	Nil
Direct impact on herpetofauna species of conservation importance	Site formation	Amphibian species of conservation importance Reptile species of conservation importance	<u>Amphibian species of conservation importance</u> Loss of habitat Potential direct injury and mortality <u>Reptile species of conservation importance</u> Loss of habitat	Amphibian species: Low to moderate Reptile species: Low	Amphibian species: Yes (Translocation) Reptile species: No	Nil
Direct impact on freshwater fauna spp. of conservation importance	Site formation	Rose Bitterling Freshwater crab species of conservation importance	Loss of habitat and potential direct injury / mortality	Rose Bitterling: Moderate Freshwater crab species: Low to moderate	Yes (Translocation of Rose Bitterling and freshwater crab species)	Nil
Direct injury / mortality to wildlife	Site formation	All wildlife other than species of conservation importance within Project area	Loss of habitat and potential direct injury / mortality	Low	No	Nil
Bird collision	Construction structures, heavy machineries	Egretries Avifauna (northern portion)	Avifauna would potentially collide with the construction structures, heavy machineries (e.g. cranes) or building facades with materials that are	Egretries: Low to moderate Avifauna (northern portion): Moderate	Yes (Setup buffer area and seasonal control of construction activities at	Nil

Impact	Source	Receiver	Nature of Impact	Overall Impact Significance in the absence of Mitigation	Mitigation Required?	Residual Impact
	(e.g. cranes) or building facades	Avifauna (southern portion)	excessively transparent or reflective	Avifauna (southern portion): Low to moderate	egretries and night roosts) (Maintaining flight corridor from egretries and across LMC BCP, minimising bird collision)	
Construction Phase – Indirect Impact						
Construction Disturbance	Construction activities	Sites of conservation importance (CA, WCA, WBA, Priority Site, SSSI zone, Ramsar Site), and ecologically sensitive resources (IBA)	Construction disturbance including noise, glare, dust, vibration and other human activities	CA, WCA, Priority Site, SSSI zone, Ramsar Site, and IBA (northern pond area): Moderate to high WBA: Low CA (southern portion): Low	CA, WCA, WBA, Priority Site, SSSI zone, Ramsar Site, and IBA (northern portion): Yes (Minimising construction disturbance to habitats and wildlife, wetland compensation) CA (southern portion): No	Nil
		Other ecologically sensitive resources (LMC Meander, LMC EEA, LMC Loop EA)	Construction disturbance including noise, glare, dust, vibration and other human activities	LMC Meander, LMC Loop EA: Low to moderate LMC EEA: Low to moderate	Yes (Minimising construction disturbance to habitats and wildlife)	Nil
		MPV Egretry MPLV Egretry	Construction disturbance including noise, glare, dust, vibration and other human activities may affect their breeding and parenting behaviours, which may reduce the survival rate of chicks and discourage the ardeid from nesting	MPV Egretry: Moderate MPLV Egretry: Moderate to high	Yes (Minimising construction phase disturbances on egretries with buffer area and seasonal control of construction works)	Nil
Construction Disturbance	Construction activities	Ha Wan Tsuen Night Roost, and San Tin Open Storage Area Night Roost	Construction disturbance including noise, glare, dust, vibration and other human activities (especially after sunset) may lower the usage by roosting avifauna during overwintering season	Moderate	Yes (Minimising construction phase disturbances on night roosts with buffer area and seasonal control of construction works)	Nil
		Sam Po Shue Night Roost, Lin Barn Tsuen Night Roost, Tam Kon Chau Night Roost	Construction disturbance including noise, glare, dust, vibration and other human activities (especially after sunset) is unlikely due to the large distance	Insignificant	No	Nil
Construction Disturbance	Construction activities	Mi Tak Study Hall Bat Roost, Koon Ying School Bat Roost	Construction disturbance including noise, glare, dust, vibration and other human activities	Low	No	Nil
Disturbance and Obstruction of	Construction activities	Nesting, roosting or commuting ardeids and Great Cormorant in	Construction activities and associated tall machineries may hinder movement of	MPLV Egretry: Moderate to	Yes (Minimising impact on the flight path from	Low

Impact	Source	Receiver	Nature of Impact	Overall Impact Significance in the absence of Mitigation	Mitigation Required?	Residual Impact
Flight Path		MPLV Egretry, MPV Egretry, and avifauna fauna usage of flight corridor across LMC BCP	avifauna between their roosting / breeding sites and their foraging grounds. It may increase energy expenditure and reduced foraging efficiency of nesting, roosting or commuting egret and Great Cormorant	high MPV Egretry: Low Flight corridor across LMC BCP: Moderate to high	egretries, maintaining flight corridor across LMC BCP)	
Construction Disturbance	Construction activities	Wetland habitats including mitigation wetland (LMC EEA, LMC Loop EA, mitigation habitats under STEMDC), marsh / reed, ponds, major watercourses, minor watercourses, seasonally wet grassland, and the associated wildlife at these habitats	Construction disturbance including noise, glare, dust, vibration and other human activities may decrease habitat quality	Mitigation wetland (LMC EEA, LMC Loop EA, Mitigation habitats under STEMDC, San Tin Constructed Wetland): Low to moderate Marsh / reed: Low to moderate Pond (Lok Ma Chau): Moderate Pond (Mai Po – San Tin – Sam Po Shue): Moderate to high Pond (southern portion): Low Major Watercourses (STEMDC, LMC Meander, WC-N7, WC-N8, WC-N8a, WC-N9, WC-N10, WC-N12, WC-S3, WC-S3a): Low to moderate Major Watercourse (SZ River): Low Minor Watercourse (WC-S3c): Low to moderate Other watercourses: Low Seasonally wet grassland: Low	Yes for contiguous ponds and wetland habitats on the northern portion, within the EZ and RDZ: (Wetland compensation with “Ecologically enhanced fishponds” and “Enhanced freshwater wetland habitats” anticipated with improved carrying capacity) (Minimising construction disturbance to habitats and wildlife) Others: No	Nil
Construction Disturbance	Construction activities	Vegetated habitats (woodland, mixed woodland, shrubland, hillside plantation, and hillside grassland), and the associated	Construction disturbance including noise, glare, dust, vibration and other human activities	Woodland in Pang Loon Tei: Low to moderate Plantation, grassland and	Yes: (Minimising construction disturbance to habitats and wildlife)	Nil

Impact	Source	Receiver	Nature of Impact	Overall Impact Significance in the absence of Mitigation	Mitigation Required?	Residual Impact
		wildlife at these habitats		shrubland on Ngau Tam Shan: Low to moderate Others: Low		
Construction Disturbance	Construction activities	Other habitats (dry agricultural land, roadside plantation, roadside grassland, village / orchard, and developed area), and the associated wildlife at these habitats	Construction disturbance including noise, glare, dust, vibration and other human activities	Low	No	Nil
Night-time Disturbance	Lighting and glare	Roosting waterbirds and nocturnal fauna	Uncontrolled lighting and glare from construction sites at night may affect roosting avifauna and other nocturnal fauna	Ponds and associated fauna: Moderate Others: Low	Yes ("Ecologically enhanced fishponds" anticipated with improved carrying capacity and less disturbance, Minimising construction disturbance to habitats and wildlife)	Nil
Water quality deterioration	Site runoff, discharge and accidental spillage	Ponds, watercourses, SZ River and Deep Bay, and their associated wildlife	Potentially deterioration of water quality, increase in suspended solids and potential contaminants	Low to moderate	Yes (Minimise water quality impacts in accordance to Section 5)	Nil
Hydrological impact	Removal, diversion and realignment of watercourses	Ponds, watercourses	Potential change in hydrodynamics of watercourses and ponds	Low	No	Nil
Operation Phase – Direct Impact						
Habitat loss	Operation of Project site	Site of conservation importance (CA, WCA, WBA, Priority Site, and SSSI zone)	No further habitat loss during the operational phase	No	No	Nil
Habitat loss	Operation of Project site	All terrestrial habitats	No further habitat loss during the operational phase	No	No	Nil
Direct injury / mortality to Egretries	Operation of Project site	MPLV Egretry, MPV Egretry	No further loss of nesting substratum	No	No	Nil
Direct injury / mortality to wildlife	Operation of Project site	General wildlife	Bird collision with man-made structures (transparent / reflective building façade, presence of cable / wires, use of transparent noise barrier)	Bird collision: Moderate	Yes (Maintaining flight corridor under Revised RODP) (Minimising bird collision	Nil

Impact	Source	Receiver	Nature of Impact	Overall Impact Significance in the absence of Mitigation	Mitigation Required?	Residual Impact
					via proper planning during detailed design)	
Operation Phase – Indirect Impact						
Operation Disturbance	Operation of Project site	Site of conservation importance (CA, WCA, WBA, Priority Site, SSSI zone, Ramsar Site)	Increase in human, noise, air quality, noise, light pollution, high-rise building, traffic and visual disturbance generated from nearby facilities, increased population and activities at the proposed land uses	Northern Portion: Moderate Southern Portion: Low	Northern Portion Yes (wetland compensation, minimising construction disturbances, and establishing "eco-interface") Southern Portion: No	Nil
Operation Disturbance	Operation of Project site	MPLV Egretry and MPV Egretry	Increase in human, noise, air quality, noise, light pollution, high-rise building, traffic and visual disturbance generated from nearby facilities, increased population and activities at the proposed land uses	Low	No	Nil
Operation Disturbance	Operation of Project site	Wetland habitats including mitigation wetland (LMC EEA, LMC Loop EA, mitigation habitats under STEMDC), marsh / reed, ponds, watercourses, seasonally wet grassland, and the associated wildlife at these habitats	Increase in human, noise, air quality, noise, light pollution, high-rise building, traffic and visual disturbance generated from nearby facilities, increased population and activities at the proposed land uses may decrease habitat quality and reduce wildlife usage	Ponds in northern portion and associated wildlife (including avifauna species of conservation importance): Low to moderate Others: Low	Yes for contiguous ponds and wetland habitats on the north, within the EZ and RDZ: (Wetland compensation" anticipated with improved carrying capacity) (Establishing "eco-interface") Others: No	Nil
Operation Disturbance	Operation of Project site	Vegetated habitats (woodland, mixed woodland, shrubland, hillside plantation, and hillside grassland), and the associated wildlife at these habitats	Increase in human, noise, air quality, noise, light pollution, high-rise building, traffic and visual disturbance generated from nearby facilities, increased population and activities at the proposed land uses	Low	No	Nil
Operation Disturbance	Operation of Project site	Other habitats (dry agricultural land, roadside plantation, roadside grassland, village / orchard, and developed area), and the associated wildlife	Increase in human, noise, air quality, noise, light pollution, high-rise building, traffic and visual disturbance generated from nearby facilities, increased population and activities at the proposed land uses	Low	No	Nil
Disturbance and Obstruction of	Operation of Project site	Nesting, roosting or commuting ardeids and Great Cormorant in	Obstruction of flight path by establishment of high-rise building	MPLV Egretry: Moderate to high	Yes (Minimising impact on the flight path from	Nil

Impact	Source	Receiver	Nature of Impact	Overall Impact Significance in the absence of Mitigation	Mitigation Required?	Residual Impact
Flight Path		MPLV Egretry, MPV Egretry, and avifauna fauna usage of flight corridor across LMC BCP)	structures	MPV Egretry: Low Flight corridor across LMC BCP: Moderate to high	egretries, maintaining flight corridor under the Revised RODP, establishing Eco-interface)	
Water quality deterioration	Operation of Project site	Ponds, watercourses, SZ River and Deep Bay, and their associated wildlife	Potentially deterioration of water quality, increase in suspended solids and potential contaminants	Low	No	Nil
Hydrological impact	Operation of Project site	Ponds, watercourses	Potential change in hydrodynamics of watercourses and ponds	Ponds: Insignificant Watercourses: Low	No	Nil
Secondary Impact (Wetland Compensation)						
Habitat modification in San Tin – Sam Po Shue area	Establishment of enhanced wetland	Ponds in in San Tin – Sam Po Shue area (i.e. areas identified for the proposed SPS WCP)	Modification of the pond habitats	Insignificant (wetland enhancement is anticipated to result in a positive ecological impact)	No	Nil

10.10 CUMULATIVE ECOLOGICAL IMPACTS

10.10.1.1 The construction of the Project is anticipated to commence tentatively in Year 2024 for completion by Year 2039 for full population intake. A full list of concurrent projects is detailed in **Table 2.7**. The current Assessment Area for ecology covers the vicinity of San Tin, Lok Ma Chau, and Shek Wu Wai, overlapping with several major development projects which would be at various stages of construction / operation.

10.10.1.2 Potential cumulative impact may arise from the combined effect of concurrent projects within the Assessment Area with potential ecological impacts, such as:

- Development of Lok Ma Chau Loop (the Loop) – Main Works Package 1;
- Site Formation and Engineering Infrastructure Works at Kwu Tung North and Fanling North New Development Areas;
- The Development of Wetland Conservation Parks System;
- Northern Link (NOL) Main Line;
- Northern Link (NOL) Spur Line;
- Ngau Tam Mei New Development Area;
- Drainage Improvement in Northern New Territories - Drainage Improvement Works in San Tin - Remaining Works.

Cumulative Impact on Wetland Habitats and Sites of Conservation Importance

10.10.1.3 Loss of wetland habitats will arise from the Loop, which includes habitat loss within the Loop, along the proposed “direct link” (from the Loop to the LMC station), along the “western connection road” (along Ha Wan Tsuen Road East), and along the “eastern connection road” (at Ma Tso Lung). The area of wetland loss within the Loop was partially included in the current Assessment Area, while the footprint of the proposed “direct link” and “western connection road” also overlap with the current Project site. However, mitigation measures were proposed under the Development of Lok Ma Chau Loop, such as the compensation of pond, marsh, and reed marsh habitats with the Ecological Area established within the Loop (LMC Loop EA) and off-site compensation. No adverse residual impact on ecological resources were anticipated under the Development of Lok Ma Chau Loop. While the current Project would result in further loss of wetland habitats near San Tin and Lok Ma Chau, cumulative impact on the loss of the wetland habitats is not anticipated to be significant upon the implementation of mitigation measures from the proposed development.

10.10.1.4 The proposed development of Northern Link (NOL) Main Line would overlap with the Project site, including some wetland habitats (e.g. ponds, marsh / reed, watercourses) in Shek Wu Wai area. Nonetheless, the majority of the habitat loss is anticipated to arise from the current Project, while the proposed San Tin station under NOL Main Line would fall within the boundary of the Project. The ecological impacts arising from the Project was assessed under this EIA report with mitigation measures proposed below, while cumulative impact is not anticipated to be significant with the proposed NOL Main Line development.

10.10.1.5 The proposed Development of Wetland Conservation Parks System covers a wide area of wetland habitats over the New Territories area. This also overlaps with the current Assessment Area, particularly at the Sam Po Shue area northwest of the Project site. Under the proposed development of Wetland Conservation Parks System, a wider extent of wetland habitat would be subject to further habitat creation and enhancement, active management, and/or other management regimes, subject to further planning. The establishment of the Wetland Conservation Parks System is anticipated to improve the overall quality of the wetland habitats in the New Territories area, including the wetland habitats at Sam Po Shue.

Cumulative Impact on Woodland and Agricultural Habitats

10.10.1.6 The Project would result in the loss of some woodland habitats, mainly near Mai Po Village and near Lok Ma Chau, and agricultural habitats in Shek Wu Wai. The footprint of the proposed San Tin station under NOL Main Line would be situated in Shek Wu Wai area, likely overlapping with the proposed Project. However, the majority of the habitat loss is anticipated to arise from the current Project, while the proposed San Tin station under NOL Main Line would fall within the boundary of the Project. The ecological impacts arising from the current Project was assessed under this EIA report with mitigation measures proposed below, while cumulative impact is not anticipated to be significant with the proposed NOL Main Line development. The footprints of other proposed development are relatively distant and are not anticipated to result in adverse ecological impact on woodland and agricultural habitats. Cumulative impact on these ecological resources within the Assessment Area are not anticipated.

Cumulative Impact on Egretry and Night Roosts

10.10.1.7 While the MPLV Egretry and the Ha Wan Tsuen Night Roost occurs within the Project boundary, they were both situated relatively distant from concurrent projects, except for the Development of Lok Ma Chau Loop which was located to the east of the Ha Wan Tsuen Night Roost. However, the impact on Ha Wan Tsuen Night Roost would mainly arise from the potential direct impact under the Project (as discussed above in **Section 10.8**), while mitigation measures are proposed below. The combined effect on this night roost is expected to be low from nearby concurrent projects; while combined effect on the MPLV Egretry is not anticipated.

10.10.1.8 Some other night roosts were identified within the current Assessment Area (e.g. Sam Po Shue Night Roost, Lin Barn Tsuen Night Roost, and Tam Kon Chau Night Roost). These night roosts would potentially overlap with the footprint of the proposed development of Wetland Conservation Parks System. Nonetheless, direct impacts on these night roosts are not anticipated from the current Project; while the proposed development of the Wetland Conservation Park is anticipated to result in a long-term benefit to these ecological resources at the wetland habitats in the New Territories area (including Sam Po Shue). No adverse cumulative impacts on these night roosts are anticipated to arise.

Cumulative Impact on Flight Paths

10.10.1.9 The construction and operation of the Project may result in some potential disturbance and obstruction to the flight paths from MPLV and MPV Egretry. Both egretries are located relatively distant from other concurrent projects, while the flight paths from both egretries were mainly recorded flying towards the north and northwest directions. Cumulative impact on the flight paths from the egretries is not anticipated from concurrent projects.

10.10.1.10 An east-west flight corridor across the LMC BCP was also recorded to support major flight paths between the wetland habitats in LMC area (on the east) and the San Tin area (on the west). The construction and operation of the current Project may result in some potential disturbance and obstruction to this flight corridor, while concurrent project in the vicinity includes the Loop which was located to the east of the LMC BCP. Potential cumulative impact may arise as result of the combined disturbance and obstruction of the flight path. However, an Ecological Area (EA) was established under the Loop, which adjoins the LMC meander. No building structures were established along both LMC Loop EA and LMC meander. Further mitigation measures (e.g. incorporation of a flight corridor through NBA and stringent building height control of ≤15 mPD within the flight corridor) are proposed under the Project , further described below in **Section 10.11**. No adverse cumulative impacts are anticipated on the flight corridor.

10.11 MITIGATION OF ADVERSE ENVIRONMENTAL IMPACTS

10.11.1 General Principle on Mitigations Measures

10.11.1.1 According to the *Annex 16* of *EIAO-TM* and *EIAO Guidance Note. 3/2010*, ecological impacts on important habitats and the associated wildlife caused by the proposed Project should be mitigated by, in order of priority, avoidance, minimisation, and compensation approaches to the maximum practical extent.

10.11.1.2 Under the current Project, key ecological impacts include the loss of wetland habitats (pond and other freshwater wetland habitats), potential impacts on Mai Po Lung Village Egretry, Mai Po Village Egretry, and night roosts, potential obstruction of flight paths, loss of woodland habitats, potential impact on flora and fauna species of conservation importance, as discussed in **Section 10.8** and **Table 10.41**. Mitigation measures are proposed for each of these aforementioned ecological resources, as detailed in the following sections.

10.11.1.3 As areas within the Project site will be mostly taken up for development, it would be infeasible to include compensation areas on-site (within Project site) due to the large area requirement for habitat compensation. Compensation areas are recommended as close as possible, at strategic areas to enhance connectivity and environmental carrying capacity of the proposed compensation (e.g. nearby wetland habitats to the northwest in Sam Po Shue, and woodland habitat near existing woodland compensation areas).

10.11.1.4 The Government will develop the Sam Po Shue Wetland Conservation Park (SPS WCP) with a proposed area of approximately 338 ha to create environmental capacity for the development of San Tin Technopole. Among the 338 ha, while 10 ha is reserved for supporting facilities such as visitor center and other basic infrastructure, the Government will enhance the ecological function and capacity of 288 ha of wetlands and fisheries resources of 40 ha of fishponds by establishing the SPS WCP with active conservation management and modernised aquaculture to compensate for the loss in wetland habitats and fisheries resources arising from the development of San Tin Technopole and to achieve no-net-loss in ecological function and capacity of the wetlands concerned. Among the 288 ha, there will be 253 ha [1] of "ecologically enhanced fishponds" compensating for pond habitat loss, and 35 ha[2] of "enhanced freshwater wetland habitat" compensating for other freshwater wetland habitat loss. The Government aims to start the development of SPS WCP in around 2026/2027 for completion by 2039 or earlier to tie in with the full operation of San Tin Technopole. For the site formation works of the first batch of land at San Tin Technopole targeted for commencement in late 2024, no pond filling will be involved. On current planning, pond filling works will not start until 2026/2027, and the pace of pond filling will tie in with the development progress of the SPS WCP. To this end, a working group will be formed between CEDD (as San Tin Technopole's works agent) and AFCD (as SPS WCP's sponsoring department) to coordinate the progress of pond filling and SPS WCP implementation. Enhancement measures in the form of improvement of tidal channel near Mai Po Nature Reserve and removal of exotic mangrove species in the Deep Bay area will also be implemented. Furthermore, interim wetland enhancement works would also be conducted at suitable ponds in the Inner Deep Bay area prior to the commencement of pond filling works.

[1] The 253 ha will compensate for the potential impact on pond habitats in the northern portion of the Project site, including the direct loss of about 89 ha of contiguous pond habitat due to filling of fishponds within the development boundary of San Tin Technopole, and indirect disturbance to adjacent contiguous pond habitat of about 63 ha outside the development boundary of San Tin Technopole.

[2] The 35 ha will compensate for the potential impact on other freshwater wetland habitats, including the direct loss of about 28 ha (at a compensation ratio of 1:1) within the development boundary of San Tin Technopole, and indirect disturbance to about 8 ha outside of development boundary (at a compensation ratio of 1:1 to 1:0.5, depending on the distance of habitat from development boundary).

10.11.1.5 A strategic feasibility study of the entire Wetland Conservation Parks System, which covers the proposed SPS WCP, is currently in progress under AFCD/CON/01/22 (Strategic Feasibility Study on the Development of Wetland Conservation Parks System). Subsequent to the completion of the aforesaid study, the Government will take forward detailed planning and design of the proposed SPS WCP. The proposed SPS WCP will serve dual purposes. First, it allows the Government to enhance the overall ecological value, biodiversity and connectivity in the Deep Bay area through proactive conservation and management. Secondly, it will enhance the ecological function and capacity of 288 ha of wetlands with active conservation management and enhance the fisheries resources of 40 ha of fishponds with modernised aquaculture, to compensate for the loss in wetland habitats and fisheries resources arising from the development of San Tin Technopole and to achieve no-net-loss in ecological function and capacity of the wetlands concerned. For the purposes of this EIA, an initial framework of the compensation measures (including the compensation for wetland loss) will be outlined in the following sections, and will be further refined and updated as necessary under the detailed planning and design of the proposed SPS WCP.

10.11.2 Avoidance Measures under the Proposed Development

Avoidance of Ramsar Site

10.11.2.1 The Project boundary has been revised to avoid direct encroachment into the Mai Po Inner Deep Bay Ramsar Site (**Figure 10.1** refers). Considering the extensive area of wetland habitats within this Ramsar site, its capacity to support a high diversity and abundance of wildlife, and its international ecological importance, the direct encroachment of the Ramsar site have been avoided to preserve the site of conservation importance and the associated ecological resources.

Avoiding Loss of the MPV Egretry and core area of MPLV Egretry

10.11.2.2 In view of the encroachment of Project boundary into the MPLV Egretry, the Project was carefully designed with the aim to preserve the MPLV Egretry, and the vegetation currently used by the breeding ardeids, as best as possible. An “Open Space” is proposed to preserve the core area of the egretry and the vegetation (refer to **Section 10.11.4, Figures 10.6A** and **10.7**). As such, direct loss of the whole egretry due to encroachment of the Project footprint has been actively avoided, while the loss of a very small area of the egretry will be unavoidable, further discussed in **Section 10.11.4**.

10.11.2.3 Furthermore, encroachment into the MPV Egretry was also avoided under the Project. A 35m wide NBA in the form of an “eco-interface” has been proposed along the northwest of the project boundary, with landscape buffer between the proposed development and the wetland habitats on the northwest, thus minimising the disturbance to bird flight paths from MPV Egretry. The building height of the proposed AFCD Wetland Conservation Park Management Office (located near the MPV Egretry) will be restricted to two storeys. Potential obstruction of flight paths from MPV Egretry would be further minimised.

Incorporation of Flight Path and Movement Corridor

10.11.2.4 To avoid loss of connectivity for wildlife due to the proposed development, flights paths and wildlife movement corridors have been incorporated in the Project, while also making use of NBA to avoid flight paths obstruction and fragmentation of wildlife movement corridor. This include the incorporation of a 70 m wide NBA near the MPLV Egretry (**Section 10.11.6.2** refers), a 300 m wide flight corridor near LMC BCP and the Loop (**Section 10.11.6.6** refers), as well as wildlife corridors for mammals, further described in **Section 10.11.11**.

Avoidance of Woodland Habitat in Pang Loon Tei

10.11.2.5 Upon initial findings and early development of the Project, the Project boundary has been refined to avoid and minimise loss of sensitive habitats. The woodland south of Pang Loon Tei and the adjacent natural watercourse were both considered to be of moderate-high ecological value, while various mammal species of conservation importance using the woodland habitat, including East Asian Porcupine, Leopard Cat, Masked Palm Civet, Red Muntjac, and Small Indian Civet (**Figure 10.3H** refers). The Project boundary has avoided encroachment into both woodland and natural watercourse habitats.

10.11.2.6 Aside from the aforementioned avoidance measures, other minimisation and compensation measures are proposed under the Project for the potential ecological impacts identified, further described in the following sections.

10.11.3 Impact on Wetland Habitats (Pond and Other Freshwater Wetland Habitats)

Consideration of Wetland Compensation

10.11.3.1 As discussed in **Section 10.8.1**, the Project would result in unavoidable loss of and disturbance to pond and other wetland habitats in some sites of conservation importance, namely "CA" zone under OZP No. S/YL-ST/8, WCA, WBA, and Priority Site for Enhanced Conservation (Priority Site) on the northern portion the Assessment Area. Further wetland compensation measures would be required at the proposed SPS WCP.

10.11.3.2 As evaluated in **Section 10.8.1**, high ecological impact may arise from the direct permanent loss of pond habitat, while 'moderate' to 'moderate to high' disturbance impacts would arise on the remaining pond habitat and the associated wildlife around Lok Ma Chau, Mai Po, San Tin and Sam Po Shue. Pond habitats within the Project boundary would be considered under the wetland compensation strategy to achieve a holistic approach in the compensation of wetland loss. Other wetland habitats (including relatively scattered ponds on the southern portion, reed / marsh, watercourses, etc.) within the Assessment Area would also be subject to direct loss and indirect disturbance impacts, resulting in 'low' to 'low to moderate' ecological impacts, with associated wetland compensation measures also considered.

Wetland Compensation Strategy (Pond Habitats)

10.11.3.3 Under the current assessment, the largely contiguous area of ponds in the northern portion (about 89.02 ha), which support particularly high density and abundance of avifauna species, would be permanently lost under the development. Outside the Project boundary, a further 32.39 ha and 30.25 ha of pond habitats would be indirectly impacted during the construction phase as they fall within the exclusion zone (EZ) and the reduced density zone (RDZ) respectively (refer to **Section 10.8.2.20** and **Figure 10.8**). While on the southern portion, about 3.10 ha of pond habitat would also be permanently lost. These ponds are comparatively scattered and considered to range from "low" to "low to moderate" ecological values (**Section 10.7** refers). As these ponds exhibit different ecological characteristics as pond habitats on the northern portion, compensation measures for these southern ponds are considered separately, as described in **Section 10.11.3.28**.

10.11.3.4 To compensate for the direct loss of the contiguous pond habitat and indirect disturbance impact to the associated wildlife especially the disturbance sensitive bird species in the northern portion, enhanced wetland in the form of "ecologically enhanced fishponds" shall be established. Enhancing the ecological function and capacity of these ponds would compensate for the loss or reduction of functional value (i.e., the abundance of wildlife species that the ponds are able to support) resulting from the Project. These ecologically enhanced fishponds would comprise existing pond habitats, and ponds that would be converted from existing brownfield or wasteland areas. The ponds shall be enhanced with various features to increase density of wildlife they are able to support, thereby

compensating for the loss of the functional value by accommodating a higher abundance of wildlife. Enhancement measures could include:

- Increase in pond area and enhance connectivity;
- Physical modification of pond habitats to increase environmental carrying capacity;
- Managing and sequencing pond drain down across multiple ponds in the dry season to maximize feeding opportunities for avifauna and other wildlife;
- Providing fencing/controlling access to reduce disturbance from human activities and also prevent disturbance and predation of wildlife by feral dogs;
- Removal of existing bird scaring devices at actively managed ponds, where appropriate;
- Stocking ponds with suitable prey items (i.e., trash-fish) for target wildlife species (may be considered as an enhancement measure to achieve higher enhancement value, described in **Section 10.11.3.26**).

Increase in Pond Area and Enhanced Connectivity

10.11.3.5 To compensate the loss of pond habitats, some areas of existing brownfield areas, inactive and abandoned fishponds could be converted to ecologically enhanced fishpond habitats within the proposed wetland enhancement area. The ecologically enhanced fishponds habitat will connect with existing high value wetland habitats in Mai Po (in the west) and compensatory wetlands for LMC Spur Line and the Loop (in the east), creating a large contiguous patch of high value habitats. Overall ecological connectivity in the wider area could also be enhanced, including the Ecological Area in the Loop and the LMC meander.

Physical Modification of Pond Habitats

10.11.3.6 Across the entire ecologically enhanced fishpond areas, ponds could be physically modified to enhance ecological function and capacity. Typical measures to be implemented could be based on successful examples in Hong Kong such as the LMC EEA (MTRC, 2019), including:

- Consolidating smaller, fragmented ponds into larger waterbodies that support higher densities of avifauna and attract larger, more disturbance sensitive species;
- Reprofiling pond banks to make the edges more gently sloping and shallower, increasing the available foraging area for avifauna;
- Creating habitat islands that provide refuge for avifauna and other wildlife;
- Floating platforms / wetlands will be placed in each pond to provide additional foraging areas for wetland avifauna and potential breeding sites for other species.

Pond Drain-down and Water Management

10.11.3.7 To help enhance the functional value of fishpond habitats, the total number of ponds drained down at any one time can be increased over and above levels currently implemented under the current Management Agreement (MA) practice. The MA involves NGO groups collaborating with fishpond operators to adopt traditional and ecologically sustainable operation regime to manage their fishponds such as regular drain-down of fishponds, maintenance of shallow pond habitats for bird feeding and roosting, clearance of weeds on pond bunds to create more habitats for birds and prohibition of the use of lethal bird deterring device etc. The key conservation objectives are to restore and enhance the conservation value of commercial fishponds in the Deep Bay area and build up a more harmonious relationship between local fishpond farming and bird conservation. Under current MA practice, a relatively small number of ponds across the SPS WCP are drained down at any one time. Furthermore, most ponds participating in the programme are only partially drained for a period of 7 days. Feeding opportunities for avifauna could be enhanced by making the following changes to drain-down practices:

- The total area of fishponds drain-down at any one time could be increased;
- Full drain-down will be implemented rather than partial draining;

- Similar to recommendations in the approved EIA report for Proposed Development at Fung Lok Wai, Yuen Long (Mutual Luck Investment Limited, 2008), drain-down periods will be extended to longer than typical commercial practices or drain-downs under current practices.
- Extending the length of drain down would allow for water levels to be lowered more gradually. Where ponds have been reprofiled to have a shallower gradient, this would result in progressively larger areas of shallow water/mud being exposed. Overall, this would provide a more stable, high-value feeding habitat for avifauna compared to ponds which are drained down more quickly.

10.11.3.8 Fishpond water will primarily be supplied by direct rainfall that will be retained and re-circulated during drain-down periods. As with current practice in the area, supplemental water can be sourced from drainage channels that traverse the site as required.

10.11.3.9 For controlling water levels in the ponds, adjustable sluices or similar water control devices can be provided to connect adjacent ponds, with ponds adjacent to retained drainage channels also having similar devices connecting the ponds to the drainage channels. The water control device levels can be adjusted to allow excess water to flow from pond to pond towards the drainage channels gravity during storm events to prevent overtopping.

Controlled Access and Feral Dog Control

10.11.3.10 Public access to ecologically enhanced fishponds habitat area could be controlled to reduce disturbance from human activities. This could be achieved by potentially gating key access points along the Border Road, Tun Yu Road and San Tin Tsuen Road (where appropriate, subject to detailed design). Smaller gates can be provided to control vehicular access along fishpond bunds. Site access would be maintained and controlled during the construction and operation phases of the SPS WCP.

10.11.3.11 Measures (such as trapping and neutering) would be adopted to minimize disturbance and predation of wildlife by feral dogs.

Removing Bird-scaring Devices

10.11.3.12 The use of wire strung across ponds or other devices to discourage birds predating on fish stocks is still relatively common across the proposed SPS WCP area, particularly in the west close to MPNR. Removing these devices will add value to the ponds for wetland avifauna.

Trash-fish Stocking

10.11.3.13 Stocking shallow ponds with small fish provides a high-quality feeding resource for many species of bird and other fish-eating species and may be considered as an additional measure to achieve higher enhancement value, described in **Section 10.11.3.26**).

Compensation Requirement (Overview)

10.11.3.14 In summary, the loss of pond habitats under the Project will result in the loss of environmental carrying capacity. This includes:

- direct loss of pond habitat within the Project area, where no waterbirds and wetland-dependent species are anticipated upon the commencement of the Project (**Section 10.8.1.12** refers);
- indirect disturbance of pond habitat along the Project boundary, where pond habitat will remain, but would be subject to disturbance impact from construction and operation of the Project. Usage of wildlife (especially disturbance-sensitive waterbird and wetland-dependent species) is expected to decrease within the EZ and RDZ upon commencement of Project (**Section 10.8.2.20** refers).

10.11.3.15 To compensate for such loss of carrying capacity from these impacts, a compensation approach has been proposed to enhance the wetland habitat within the proposed SPS WCP, using the enhancement strategies as provided above (**Sections 10.11.3.3 – 10.11.3.13**) . The enhancement should achieve a level that is adequate to support the existing ecological resources in the enhanced area, and on top of that, additional capacity to accommodate the ecological resources that are affected by the Project. This is illustrated below in **Diagram 1**, with further calculation provided below in **Table 10.43**.

Diagram 1: Illustration of Wetland Compensation Requirement.

Impacted Area under the Project		Wetland Compensation Requirement
• Direct loss of pond habitat within Project area	→	• Wetland compensation via the enhancement of existing pond habitats
• Indirect disturbance of pond habitat and associated wildlife in EZ & RDZ		
Loss of carrying capacity due to decrease in functional value		**Gain in carrying capacity via increase in functional value**

Compensation Requirement (Enhancement of Ponds)

10.11.3.16 The area of ecologically enhanced fishponds required to provide adequate compensation is determined by three factors: 1) the decrease in functional value of impacted ponds resulting from the Project, 2) the existing functional value of ponds to be enhanced for compensation, and 3) the increase in functional value that can be achieved in ponds to be enhanced for compensation. These three elements are outlined in the following sections.

10.11.3.17 To estimate the compensation requirement for pond habitats, four larger wetland avifauna species (Black-faced Spoonbill, Great Cormorant, Great Egret, Grey Heron) have been used as indicators, as they are relatively disturbance sensitive and are considered as key species using the pond habitats (e.g., KCRC, 2002). It is assumed that if mitigation targets can be achieved for these larger and disturbance sensitive species, similar or higher levels of enhancement for other, less sensitive wildlife species can be achieved, reflecting more broadly the overall functional value of the habitat.

10.11.3.18 In order to ensure sufficiency in compensating for wetland loss, the assumed EZ and RDZ from the construction phase (i.e., measured from the boundary of the Project area rather than the edge of new built environment) was adopted (**Section 10.8.2.20** refers). Considering the extent of these EZ and RDZ, the estimated area of ponds directly and indirectly affected by the Project is shown in **Figure 10.8**. This totals to approximately 151.7 ha of pond habitat (including direct loss of about 89.02 ha contiguous pond habitat on the northern portion, and indirect disturbance of about 32.39 ha within the EZ, and about 30.25 ha within the RDZ).

Estimation of Functional Value Decrease (at Impacted Area)

10.11.3.19 Data from the EIA ecological surveys as well as available desktop literature (i.e., 2021-2022 AFCD Monthly Waterbird Survey) were used to estimate the peak dry season densities and abundance of the four indicator species in the directly and indirectly impacted ponds before and after project implementation. These densities were then used to derive the loss of functional value (i.e. overall change in bird abundance) for the four indicator species (**Table 10.42** refers).

Table 10.42 Estimated changes in dry season peak functional value (i.e. abundance) of disturbance sensitive avifauna within the direct and indirectly impacted ponds before and after Project implementation

Species	Estimated functional value before Project implementation*	Estimated functional value after Project implementation**	Estimated change in functional value
Black-faced Spoonbill	17.3	2.8	-14.5
Grey Heron	157.9	12.0	-146.0
Great Egret	48.4	4.4	-44.0
Great Cormorant	208.0	20.2	-187.7

*Estimated based on 2021-22 peak dry-season survey density data.
**Assumes functional value will be zero in directly impacts ponds and ponds within EZ. Functional value in RDZ will decrease to 50% of its original functional value before Project.

Estimation of Functional Value Increase (at Enhancement Area)

10.11.3.20 With reference to available desktop literature (i.e. 2021-2022 AFCD Monthly Waterbird Survey) as well as EIA ecological survey data, baseline densities and abundance for the indicator species were also estimated across areas that could potentially be used for enhancement within the proposed SPS WCP. In terms of ecological function and capacity, existing brownfield and/or wasteland areas supported little to no waterbirds and wetland-dependent species, hence they are considered with insignificant functional value. Other than that, there are three types of existing ponds in the area observed during the survey period, including:

- active/inactive ponds (under active management, or inactive ponds that are not currently farmed, but have the potential to easily revert to active management),
- abandoned ponds (show no signs of active management, and/or overgrown with vegetation or are drying out and converting to terrestrial habitat), and
- wired ponds that have wires or other bird-scaring devices present and were under active production (i.e., were not drained down or being re-profiled).

10.11.3.21 Based on previous approved EIA reports such as the Proposed Development at Fung Lok Wai, Yuen Long (Mutual Luck Investment Limited, 2008), it is assumed the functional value of areas of typical commercially managed ponds (i.e., active/inactive ponds) can be increased by up to 45% upon the implementation of ecological enhancement measures, including the following measures proposed under the EIA:

- The size of the fishponds will be increased by re-profiling unwanted bunds,
- emergent vegetation will be allowed to develop,
- Areas of shallow water and intermittently exposed muddy islands will be created, and
- Modified pond drain-down regime providing enhanced feeding opportunities.

10.11.3.22 Study on drain-down effects of ponds under existing fishpond management agreement has shown that pond drain-down is effective in attracting high abundance and species richness of most waterbird species, with significant increase in abundance of avifauna after pond drain-down (ACE NCSC, 2016) [3].

10.11.3.23 In comparison, the enhancement measures proposed under the current wetland compensation strategy (refer to **Sections 10.11.3.3 – 10.11.3.13**) has included and allowed the ecological functions described under the EIA for Fung Lok Wai, but would adopt an enhanced fishpond drain-down regime in the dry season, with a higher percentage of ponds drained down at any one time than planned for in the EIA for Fung Lok Wai or current management practices. As such, an increase in functional value of 45% could be anticipated under this Project.

[3] Study on pond drain-down effect (ACE NCSC, 2016) showed significant increase in abundance of target waterbird species per fishpond (i.e. Cormorants, Ardeids, and Spoonbills), with at least about two-fold increase or higher.

10.11.3.24 Furthermore, removal of existing bird scaring devices were also proposed under the current wetland compensation strategy. It should be noted that the increase in functional value for abandoned ponds and wired ponds would be even higher, taking into consideration the lower existing functional value of these ponds as compared to typical active/inactive ponds.

10.11.3.25 With the assumed increase in functional value of 45% compared to typical active/inactive fishponds upon the implementation of ecological enhancement measures at the pond areas, the total compensation requirement for pond habitats is estimated to be 253 ha which would also achieve no-net-loss in ecological function and capacity of the wetlands concerned. The estimated compensation requirements are summarised in **Table 10.43** below.

Table 10.43 Estimated Overall Functional Value Change across Impacted Area and Potential Enhancement Area

Species	Impacted Area (151.7 ha)	Enhancement Area (253ha)			Overall change in functional value
	Decrease in functional value (1)	Existing functional value (2)	Post-Project functional value (3)	Increase in functional value	
Black-faced Spoonbill	-14.5	62.9	153.6	+90.7	**+76.2**
Grey Heron	-146.0	114.4	262.5	+148.0	**+2.0**
Great Egret	-44.0	61.2	106.1	+44.9(4)	**+0.9**
Great Cormorant	-187.7	292.8	678.6	+385.8	**+198.1**

Note:
(1) As estimated in **Table 10.42**.
(2) Based on 2021-22 peak dry-season survey data. Sensitivity analysis on usage of abandoned pond by Black-faced Spoonbill is provided in **Appendix 10.6**.
(3) Actual increase in functional value is higher than 45%, as the enhancement area includes pond with existing functional value lower than typical commercial ponds (i.e., abandoned ponds, ponds wired with bird-scaring devices, as well as some areas of brownfield/filled ponds that would be converted back to pond habitat).
(4) Great Egret is the determining factor for enhancement area requirement, as this species would have the smallest proportional increase in overall functional value.

10.11.3.26 Based on these estimated changes in functional values for indicator species, compensation could be provided through the provision of 253 ha of ecologically enhanced fishpond habitat within the proposed SPS WCP (**Figure 10.12A**). Additional enhancement measures, such as trash-fish stocking, will be derived as needed to further enhance the functional value of the ponds.

10.11.3.27 As stated in **Section 10.11.3.17,** the four indicator species used for estimating fishpond compensation requirements are key sensitive receivers that would be most affected by the Project due to their generally high usage of fishpond habitats as well as high disturbance sensitivity. It should also be noted that the ecological enhancement of fishpond habitats would also increase the ecological function and capacity of the enhancement area for other wildlife species of conservation importance recorded from fishpond habitats in the Project area (**Appendix 10.7** refers), as summarized below:

- ***Ducks and Grebes:*** The functional value of enhanced fishponds for duck species (e.g., Tufted Duck, Northern Pintail and Northern Shoveler) as well as Little Grebe would increase due to larger pond sizes, shallower pond margins and more emergent/riparian vegetation, and generally lower levels of disturbance. These species would also be expected to make use of the 35 ha of enhanced freshwater wetland habitats to be established in the proposed SPS WCP (as described in the following section).
- ***Shorebirds:*** The functional value of enhanced fishponds for shorebirds (e.g., Pacific Golden Plover, Kentish Plover, Little Ringed Plover, Little Stint, Long-toed Stint, Greater Sand Plover, Grey Plover, Eurasian Coot, Common Greenshank, Red-necked Stint, Sharp-tailed Sandpiper, Temminck's Stint, and Pied Avocet) would increase due to larger pond sizes, shallower pond margins, extended pond drain-downs and greater area of ponds drain-down at any one time, and generally lower levels of disturbance.

- ***Freshwater Wetland Avifauna:*** The functional value of enhanced fishponds for avifaunal species commonly associated with freshwater wetlands (e.g., Black-winged Stilt, Marsh Sandpiper, Red-throated Pipit and Wood Sandpiper) would increase due to larger pond sizes, shallower pond margins and more emergent/riparian vegetation, and generally lower levels of disturbance. These species would also be expected to make use of the 35ha of freshwater wetland habitats to be established in the proposed SPS WCP(as described in the following section).
- ***Other Wetland-associated Avifauna Species:*** The functional value of enhanced fishponds for other wetland-associated avifauna species (e.g., Collared Crow, Oriental Pratincole, Red-billed Starling and White-shouldered Starling) would increase due to larger pond sizes, shallower pond margins and more emergent/riparian vegetation, extended pond drain-downs and greater area of ponds drawn-down at any one time, removal of bird-scaring devices, and generally lower levels of disturbance. These species would also be expected to make use of the 35 ha of enhanced freshwater wetland habitats to be established in the proposed SPS WCP (as described in the following section). Specific enhancement measures for white-shouldered starling (e.g., provision nest boxes) can also be considered as part of the detailed planning of the proposed SPS WCP.
- ***Eurasian Otters:*** Although no Eurasian Otters were recorded from the Assessment Ares during ecological surveys conducted for this Project, a recent publication (Mcmillan et al., 2023) recorded spraints (otter scats) within the Assessment Area in 2018 and 2019, suggesting that the wetland habitats support a small population of Eurasian Otters. The functional value of enhanced fishponds would increase for otters due to shallower pond margins, extended pond drain-downs and greater area of ponds drawn-down at any one time, and generally lower levels of disturbance. Otters would also utilise freshwater wetland habitats (as described in the following section). Otters would also benefit from the better control of feral dogs in the enhancement area, with such dogs known to cause mortality of otters in the Deep Bay area (e.g., KFBG, 2018). Specific enhancement measures for otters (e.g., provision of artificial holts and floating platforms) can also be considered as part of the detailed planning of the proposed SPS WCP.
- ***Other Non-Avifaunal Species of Conservation Interest:*** Bats would benefit from lower levels of disturbance and increased potential roosting sites in the enhanced fishpond area through provision of natural (e.g., appropriate vegetation) and artificial (e.g., bat boxes) roosts. Similar to Eurasian Otter, other terrestrial mammals would benefit from lower levels of disturbance and reduced predation risk from feral dogs. Dragonflies (e.g., Scarlet Basker), amphibians (e.g., Spotted Narrow-mouthed Frog) and other aquatic organisms (e.g. Rose Bitterling) would benefit from improved water quality (resulting from better water quality monitoring and feeding regime that could minimise biodegradation of excess feed in enhanced fishponds), shallower margins and increased riparian / emergent vegetation. These species would also be expected to make use of freshwater habitats (as described in the following sections).

Wetland Compensation Strategy (Compensate loss of other Freshwater Wetland Habitats)

10.11.3.28 Aside from the contiguous pond habitat as described in **Section 10.11.3.3**, other wetland habitats (including scattered ponds on the southern portion, mitigation wetland, marsh / reed, watercourse, seasonally wet grassland, and wet agricultural land) were recorded within the Project site that would be subject to direct loss (including permanent loss upon site formation, and temporary loss that would be reinstated / revitalised, refer to **Table 10.23**). Some of these wetland habitats were also recorded along the EZ and RDZ under the Project (refer to **Figure 10.8**), which would be subject to disturbance impact from the Project. Ecological values of these wetland habitats ranges from “low” to “moderate”.

10.11.3.29 The significance of impacts to these habitats varies, ranging from ‘low’ to ‘low to moderate’ only due to the relatively lower ecological values and different ecological characteristics (e.g., lower densities of disturbance sensitive avifauna) of the other freshwater wetland habitats compared to pond habitats. As such, an area-based approach was adopted to estimate compensation requirements. The potential ecological impacts on these habitats are provided in **Section 10.9**. As a conservative approach,

compensation of wetland habitats will be considered for wetland loss with "low to moderate" or above ecological impacts. The areas of wetland habitats with such criteria are summarised below in **Table 10.44**.

10.11.3.30 Due to the relatively lower ecological value and different ecological characteristics (i.e., lower densities of disturbance sensitive avifauna) of the other freshwater wetland habitats compared to pond habitats, an area-based approach was adopted to estimate compensation requirements. Wetland habitats within the Project site would be subject to direct impact, hence would be compensated for on a 1:1 compensation. Habitats within both EZ and RDZ are anticipated to support lower density of wildlife due to disturbance, where disturbance sensitive avifauna species is estimated at 0% and 50% at EZ and RDZ respectively (refer to **Section 10.8.2.20**). As such, compensation ratios of 1:1 and 1:0.5 are proposed for wetland habitats within the EZ and RDZ respectively. Under the current wetland compensation strategy, about 35 ha of "enhanced freshwater wetland habitats" would be required within the proposed SPS WCP (refer to **Table 10.44**).

Table 10.44 Estimation of Compensation Requirement (Other Freshwater Wetland)

Habitat	Direct Impact	Indirect Impact	
	Project site (ha)	EZ (ha)	RDZ (ha)
Pond (1)	2.53	0.08	0
Mitigation Wetland	4.93	2.26	0
Marsh / Reed	8.02	1.63	1.54
Semi-natural Watercourse	4.93	1.14	1.24
Modified Watercourse	7.39	0.13	0
Sub-Total	**27.79**	**5.24**	**2.78**
Compensation Ratio	1:1	1:1	1:0.5
Compensation Requirement	**27.79**	**5.24**	**1.39**
Total	**34.42**		

Note: (1) Excludes the contiguous pond habitat which will be compensated under a separate Wetland Compensation Strategy for Pond Habitats as described above in Section 10.11.3.3.

10.11.3.31 The "enhanced freshwater wetland habitats" would be designed to compensate for impacts on a like-for-like basis as far as practicable, and could include various habitat types that would support communities currently utilising impacted freshwater habitats:

- ***Ducks and Grebes****: Areas of open water with shallow margins and deeper central areas (up to 1.5m) could be maintained in part of the "enhanced freshwater wetland habitats" area, providing suitable foraging habitat for wading birds, as well as attract ducks, grebes and other open water species;*
- ***Freshwater Wetland Avifauna****: Shallow (100-300mm deep), permanently inundated areas could compensate for impacts to marsh/reed habitats. They would provide habitat for rails, bitterns and wetland associated passerines, such as Black-winged Stilt, Marsh Sandpiper, Red-throated Pipit and Wood Sandpiper)*
- ***Other Wetland-associated Avifauna Species****: Other wetland-associated avifauna species (e.g., Collared Crow, Oriental Pratincole, Red-billed Starling and White-shouldered Starling) would also be expected to make use of the 35 ha of enhanced freshwater wetland habitats. These would include seasonal wetlands that become drier, open vegetated habitats in the dry season. Specific enhancement measures for white-shouldered starling (e.g., provision nest boxes) can also be considered as part of the detailed planning of the proposed SPS WCP.*
- ***Eurasian Otters****: Aside from fishponds, otters would potentially utilise various freshwater wetland habitats created within the SPS WCP including open waters, permanent and temporary wetlands and drainage channels. In particular patches of dense emergent vegetation and well vegetated channels would provide potential refuge areas for these species. Specific enhancement measures for otters (e.g., provision of artificial holts and floating platforms) can also be considered as part of the detailed planning of the proposed SPS WCP.*

- ***Other Non-Avifaunal Species of Conservation Interest****: Bats would benefit from lower levels of disturbance and increased potential roosting sites in the other freshwater wetland habitats through provision of natural (e.g., appropriate vegetation) and artificial (e.g., bat boxes) roosts. Similar to Eurasian Otter, other terrestrial mammals (e.g, Small Indian Civet) would benefit from lower levels of disturbance and reduced predation risk from feral dogs. Dragonflies (e.g., Scarlet Basker), amphibians (e.g., Spotted Narrow-mouthed Frog) and other aquatic organisms (e.g. Rose Bitterling) would benefit from good water quality (resulting from better water quality management in created freshwater wetland habitats as compared to existing marsh/reeds and water courses), shallower waters and increased riparian / emergent vegetation in the other freshwater wetland habitats. Dragonflies and some amphibian species would also benefit from the availability of seasonal wetlands due to reduced predation by fish.*

10.11.3.32 Native wetland plants species could be used in vegetated areas of the enhanced freshwater wetland habitats, including the following species:

Table 10.45 Species to be Considered for Enhanced Freshwater Wetland Habitat

Open Water	
Nymphaea spp.	*Nelumbo nucifera*
Permanent Wetland	
Vallisneria natans	*Cyperus malaccensis*
Ottelia alismoides	*Sagittaria trifolia*
Hydrilla verticillata	*Ludwigia ascendens*
Eleocharis dulcis	
Reed bed	
Phragmites australis	
Seasonal Wetland	
Bacopa monnieri	*Sagittaria guyanensis*
Sagittaria trifolia	*Saururus chinensis*
Polygonum barbatum	*Eleocharis tetraquetra*
Eleocharis equisetina	*Polygonum hydropiper*
Polygonum glabrum	*Polygonum juncundum*
Schoenoplectus mucronatus	

10.11.3.33 The disturbance impact from the Project is anticipated to result in EZ and RDZ along the Project boundary, which is expected to support lower densities of disturbance sensitive of wildlife, in particular avifauna species. As the species recorded in marsh / reed habitats tend to be less disturbance-sensitive than species utilizing more open wetland habitats, the proposed "enhanced freshwater wetland habitats" could be considered along these EZ and RDZ, where the remaining areas of the proposed SPS WCP (outside the EZ and RDZ) can be maximised for ecologically enhanced fishponds.

10.11.3.34 Upon the establishment of the proposed SPS WCP, it could be able to accommodate the aforementioned enhanced wetland of about 288 ha (253 ha of "ecologically enhanced fishponds" and 35 ha of "enhanced freshwater wetland habitats"). The Government will enhance the ecological function and capacity of 288 ha of wetlands in the proposed SPS WCP with active conservation management to compensate for the loss in wetland habitats arising from the development of San Tin Technopole, which would create sufficient environmental capacity to support the compensation requirement of the Project.

Habitat Creation and Management Plan (HCMP)

10.11.3.35 A draft HCMP is set out in **Appendix 10.8**. The implementation details of the enhanced wetland, the associated management and monitoring requirements (e.g. monitoring location, frequency and parameters) will be provided in the subsequent HCMP. The HCMP should be submitted for approval from relevant Government departments (including AFCD and EPD), at least three months before the commencement of pond filling works.

Minimising Construction Phase Indirect Impacts on Sites of Conservation Importance and Associated Habitats

10.11.3.36 To further minimise potential adverse impacts to the wetland habitats in sites of conservation importance due to extensive construction activities, especially at pond habitat, phasing of pond filling works in San Tin – Sam Po Shue area should be adopted. The pond filling works will be phased to tie in with the phased development of the SPS WCP, with a working group formed to coordinate the progress of pond filling and SPS WCP implementation (**Section 10.11.1.4** refers). The pond filling works should also be started from urbanised area towards the wider wetland area (i.e. from the southeast near STEMDC or San Tin Highway towards the northwest) and construction activities should be minimised at any one time, so as to allow gradual migration of wildlife to the wetland habitats northwest to the Project area. Pond filling works should also be conducted in wet season as far as possible when there is a lower abundance of avifauna. In order to reduce the scale of disturbance and the total area of pond filling at the same time, filling of ponds in San Tin / Sam Po Shue should be conducted in multiple wet seasons (at least 2 years or more).

10.11.3.37 With particular focus to minimize construction disturbance to the wetlands and waterbirds with high bird usage, site hoarding of about 3 m high should be erected along the works site and works area before commencement of construction activities. The hoarding would shield the avifauna in the nearby wetlands from the disturbance of human activities during construction phase. Such hoarding would be non-transparent and superimposing dark patterns or stripes to avoid the risk of potential bird collision. Further minimisation measures for construction activities are described below at **Section 10.11.12**.

10.11.3.38 Under the Revised RODP (**Figure 10.7** refers), an "eco-interface" area with width of about 35 m was proposed along the northwest of the Project boundary, between the proposed Project area in San Tin and the wider pond habitats in San Tin and Sam Po Shue; while another "eco-interface" area with width of about 20 m was also proposed along the east of STEMDC, creating a buffer between the "OU(I&T)" land use and the watercourse STEMDC. The "eco-interface" would be established in the form of a landscape buffer via landscape planting, comprising native tree species, shrub mix and riparian vegetation, and incorporating a gentle slope interface, with an aim to minimise disturbance from Project area by providing a buffer between the development and the adjacent wetland habitats and associated fauna. Further description of this "eco-interface" (as a landscape buffer) is also provided at **Section 14** (Landscape and Visual Impact).

Wetland Enhancement Measures

10.11.3.39 Together with the development of the Project, enhancement measures would also be implemented to enhance the ecological value of wetland habitats in the Deep Bay area.

10.11.3.40 Two management issues at Mai Po Inner Deep Bay Ramsar Site could be addressed to enhance environmental capacity across the broader NWNT wetland system:

- Firstly, tidal channels that link *gei wai* in the Mai Po Nature Reserve to the Inner Deep Bay have become silted up over time, limiting tidal exchange and degrading the function of habitats within the *gei wai*. Improvement of these channels via de-silting can promote tidal exchange and enhance habitat condition within the *gei wai* (**Figure 10.12B** refers);
- Secondly, the invasive exotic mangrove *Sonneratia* sp. has spread rapidly across mudflat habitats and drainage channels across the NWNT. Selective clearance of larger *Sonneratia* stands can help restore wetland habitats in affected areas.

10.11.3.41 Realising the beneficial effects brought by the enhancement measures, they are targeted to be commenced as early as possible. Both enhancement measures shall be undertaken in the wet season (April – September) to minimise disturbance impacts to overwintering avifauna and hence they are proposed to be commenced earliest at the start of the 2025 wet season. Details of the enhancement measures (e.g. details,

timeframe and requirement/frequency of repetition for the enhancement works) shall be provided in a separate work plan prepared by the project proponent, and submitted to AFCD for agreement at least three months prior to the commencement of these works.

Improvement of Tidal Channel

10.11.3.42 *Gei wai* located within the Mai Po Nature Reserve are managed for conservation, especially as feeding and roosting grounds for over-wintering birds (WWF, 2018). By draining these *gei wai*, waterbirds can utilize the shallow water inside as a feeding ground. *Gei wai* in Deep Bay, together with mudflat and fishponds, provide feeding ground for over 40,000 wintering birds (HKBWS, 2022).

10.11.3.43 The *gei wai* at Mai Po are now only linked to the Deep Bay waters through a number of water channels several hundred metres in length (**Figure 10.12B**). Tidal exchange is further limited by direct sediment deposition within the channels. Limited tidal exchange would result in inferior water quality due to lack of exchange, diminishing food source for avifauna (diminished resupply of fish and shrimp for the exchange), as well as lack of water level control within the *gei wai* that may affect wetland vegetation growth.

10.11.3.44 Under the current Project, selected tidal channels (**Figure 10.12B** refers) would be de-silted. These channels connect to the sluice-gates of several existing *gei wai*, where proposed de-silting works could potentially enhance the functioning of 10 *gei wai*. The total length of proposed channel de-silting is approximately 5.1 km. Similar works proposed under the Shenzhen Western Corridor EIA (HyD, 2002) estimated the de-silting in each channel would be approximately 4m in width, with the elevation of water channel bottoms reduced by approximately 1m. Assuming a similar scale of de-silting is required for the current works, the total volume of material removed would be approximately 20,400 m^3. Improvement de-silting works would be undertaken in the wet season (April – September) by phases to minimise disturbance impacts to overwintering avifauna.

Sonneratia Clearance

10.11.3.45 The exotic mangrove genus *Sonneratia* was first recorded in the Deep Bay area in the early 2000's and has spread rapidly across NWNT and some other parts of Hong Kong. The *Sonneratia* that occur in Hong Kong are invasive alien species that can cause two main issues to existing intertidal communities:

- *Sonneratia* are fast-growing species that have the potential to out-compete native mangrove species;
- *Sonneratia* grow on the seaward side of the mangrove, and can extend out onto and impact mudflat habitats that are important feeding grounds for avifauna.

10.11.3.46 Under the current project, additional enhancement of the Deep Bay area will be provided by the removal of exotic mangrove species on mudflat (*Sonneratia* spp.). The removal of exotic mangrove species would be undertaken in the wet season (April – September) selectively to minimise disturbance impacts to overwintering avifauna.

Interim Wetland Enhancement

10.11.3.47 Interim wetland enhancement measures prior to the commencement of pond filling works would also be implemented. Suitable ponds in the Inner Deep Bay area will be identified for implementing interim enhancement works, which may comprise restoration of abandoned ponds and arrangement of active management including fish stocking for suitable ponds. Details of the suitable ponds and interim enhancement works shall be provided in a separate Interim Wetland Enhancement Plan and submitted for approval from relevant Government departments (including AFCD and EPD) at least three months before the commencement of these interim enhancement works.

10.11.4 Impact on Egretries

Mai Po Lung Village (MPLV) Egretry

Preservation of Egretry and Roosting Substratum

10.11.4.1 As discussed in **Section 10.11.2.2**, the Project boundary has been carefully designed with the aim to preserve the MPLV Egretry, and the vegetation currently used by the breeding ardeids, as best as possible. The core area of the MPLV Egretry (which supports the majority of the breeding ardeids and their nests) is located near the junction between Shek Wu Wai Road and Castle Peak Road (San Tin section), mainly along roadside vegetation. An "Open Space" is currently proposed to preserve the core area of the egretry and the vegetation (refer to **Figures 10.6A** and **10.7**). As such, direct loss of the whole egretry due to encroachment of the Project footprint has been actively avoided, while the loss of a very small area of the egretry will be unavoidable, as discussed below.

10.11.4.2 A small area on the north of the MPLV Egretry would be encroached by the proposed Castle Peak Road (San Tin section) and Road L11, which runs along the northern boundary of the "Open Space"; while a small area of the east of the MPLV Egretry would be encroached by the proposed road junction at Road D3 and Road L11 (refer to **Figure 10.6A**). These small areas would be subject to potential removal of the tree individuals currently used as the substratum of the egretry. This small area of the egretry (less than 0.02 ha) comprises a narrow strip of vegetation located in between and adjacent to open storage area, supporting only one nest in 2022. Due to its location, heavy traffic and human activities were also observed directly adjacent to the egretry. While loss of this small portion of egretry is inevitable, other enhancement / compensation measures shall be proposed to revitalise other areas of the egretry and promote ardeid use.

10.11.4.3 The current land use at the southwest of the MPLV Egretry comprise mainly open storage areas and low-rise village areas. Under the Revised RODP layout, an "Open Space" is proposed to preserve the MPLV Egretry and the nearby area on its southwest (refer to **Figure 10.7**). Detailed design of this "Open Space" shall incorporate enhancement features, which may include:

- Preservation of trees currently within the core area of the MPLV Egretry;
- Incorporation of water features within the "Open Space" area, adjacent to the existing of MPLV Egretry;
- Planting of mature trees adjacent to the water features, with native species that are currently used as egretry substratum;
- Maintaining a buffer area between the water features and the established mature trees from the adjacent proposed land-uses (e.g. logistics storage and workshop, district cooling system, and traffic roads).

10.11.4.4 The purpose of these enhancement measures will aim to supplement potentially suitable substratum for the breeding ardeids, in addition to the avoidance measure (preservation of trees) proposed above. The enhancement measures would be established before the construction phase. Any construction activities within the 100 m distance of the egretry should be subject to seasonal control, further described in **Section 10.11.4.11**. Furthermore, the proposed "Open Space" area were also recorded to support some breeding ardeids and their nests in the past 10 years (2012 – 2021), which are no longer observed in recent ecological survey (2022) (refer to **Figure 10.6A**). These measures could serve to revitalise the previous extent of the egretry, and potentially reactivate / encourage breeding ardeids usage in the proposed "Open Space". Buffer planting along the Open Space could also minimise potential indirect disturbance impacts on the egretry from adjacent proposed land-use and traffic network during operation phase. An Egretry Habitat Enhancement and Management Plan including the details of design plan, site preparation works, works schedule and management plan should be prepared for approval from relevant Government departments (including EPD and AFCD) before the commencement of construction works. In addition, pre-construction surveys are necessary to confirm the latest boundary, condition, flight paths of both MPLV Egretry

and MPV Egretry and the associated mitigation measures before commencement of the construction works.

10.11.4.5 Under the proposed "Open Space", only low intensity activities would be allowed (e.g. plant nursery), while other recreational activities (e.g. sports and recreation) would not be included in the "Open Space" in order to minimise the disturbance to the MPLV Egretry.

10.11.4.6 Two other existing egretries occur within man-made urban parks in Hong Kong, including the North District Park and Penfold Park, suggesting the adaptabilities of breeding ardeids to man-made features. The design of water features and vegetation structure shall make reference to these two egretries to promote the potential usage by future breeding ardeids, while the tree species to be planted at the "Open Space" shall also make reference to the tree species used as substratum at the MPLV Egretry, as well as tree species commonly used by the target species at MPLV Egretry (i.e. Little Egret and Chinese Pond Heron).

10.11.4.7 Mitigation measures for flight paths from the egretry are further described in **Section 10.11.6**.

Mai Po Village (MPV) Egretry

10.11.4.8 During the current ecological survey (2022), the footprint of MPV Egretry was recorded outside the Project boundary to the west, where no direct impact would be anticipated. Nonetheless, a historical record of the MPV Egretry footprint within the past 10 years (2012 – 2021) revealed the presence of some breeding ardeids at a small area on the western tip of the Project boundary (refer to **Figures 10.6A** and **10.7**). These historical areas of the MPV Egretry within the Project site was recorded to support breeding ardeids in 2018 and 2019 (AFCD, pers. Comm., unpublished data). Nonetheless, breeding ardeids were no longer recorded within this area of MPV Egretry within the Project boundary from recent surveys, potentially due to unsuitable tree species for substratum. Under the Revised RODP, the currently active extent of the MPV Egretry will be avoided. A buffer area of 100 m will be further established from the MPV Egretry to minimise potential disturbance impacts, further described in **Section 10.11.4.11**.

10.11.4.9 Mitigation measures for flight paths from the egretry are further described in **Section 10.11.6**.

Minimising Construction Phase Impacts on Egretries

10.11.4.10 Considering the close proximity between the proposed development and both MPLV Egretry and MPV Egretry, encroachment into the trees at both egretries shall be strictly avoided during construction phase (except for the minor encroachment of the MPLV egretry as discussed in **Section 10.11.4.2**). The latest boundary, condition, flight paths of both MPLV Egretry and MPV Egretry and the associated mitigation measures should be confirmed by pre-construction surveys before commencement of the construction works.

10.11.4.11 Potential disturbance impact on the breeding ardeids shall be further minimised by establishing a buffer area of 100 m from the footprint of both egretries (**Figure 10.11** refers). In addition, the boundary of the 100 m buffer area should be updated subject to findings of pre-construction survey. Stringent seasonal control would be implemented within the buffer area, where construction activities shall be avoided during the ardeid breeding period (i.e. from March to early September). Construction activities shall be conducted from late-September to February in the following year, unless AFCD's prior approval on construction method has been obtained and appropriate mitigation measures have been proposed and adopted. Tree crown pruning works at the egretries shall be avoided as best as possible, and where necessary, shall also be conducted and completed outside the ardeid breeding season to minimise disturbance to any breeding ardeids that may be present. Method Statement on construction activities near the egretries and necessary tree crown pruning works shall be submitted to AFCD in advance of the works.

10.11.4.12 Other stringent control measures shall also be implemented (e.g. establishment of hoarding and regular auditing). Aside from the construction activities, any associated temporary works areas (e.g. site office, stockpiling / material storage area, etc.) shall be strictly restricted outside the egretries as well. Potential pruning works shall only be conducted where necessary, limited at overgrown tree branches that may affect construction activities.

10.11.5 Impact on Night Roosts

Minimising Construction Phase Direct / Indirect Impacts on Night Roost

10.11.5.1 The Ha Wan Tsuen Night Roost and San Tin Open Storage Area Night Roost would be subjected to the unavoidable direct loss during construction phase. In order to minimise the potential direct injury / mortality to the roosting ardeids and Great Cormorants, the construction activities and tree felling in Ha Wan Tsuen Night Roost and San Tin Open Storage Area Night Roost should be allowed only in wet season (April – September) which no roosting individual was recorded in current survey. As the condition, location and extent of the night roosts may fluctuate naturally, pre-construction surveys are necessary to confirm the latest boundary and condition of the night roosts before commencement of the construction works.

Compensating for the Direct Loss of Night Roost by Re-providing Roosting Substratum

10.11.5.2 According to previous EIA studies, night-roosting ardeids changed their night roosting sites in the same region when subjected to a loss of a night roosting site (Ocean Park, 2014; MTRC, 2010). The studies indicated the adaptive nature of night-roosting ardeids and suggested that the loss of the roosting site would temporarily alter ardeid behaviour but not decrease their survival rate. Nonetheless, roosting substratum would be re-provided in the vicinity, thus providing opportunities for ardeids and Great Cormorants to occupy new roosting sites on their own. Re-provision planting of the roosting substratum both night roosts should also be commenced as early as possible before the commencement of construction activities that may result in the loss of both night roosts.

Re-provision of Roosting Substratum for Ha Wan Tsuen Night Roost

10.11.5.3 Ha Wan Tsuen Night Roost was located near the northern boundary of the Project footprint (**Figure 10.6C** refers). Great Cormorants and some ardeids were recorded at this night roost, roosting on mature trees along a pond bund. These roosting avifauna were only recorded during dry season, using this area as an overwintering night roost. Potential direct impact on this night roost may be anticipated.

10.11.5.4 Under the Revised RODP, encroachment into the footprint of the Ha Wan Tsuen Night Roost is unavoidable. An OU(I&T) "Other Specified Use (Innovation and Technology)" land use is proposed at the area. Located at the strategic cross-boundary intersection point overlooking the SZ I&T park and adjoining to the Loop and LMC MTR station, the site presents a valuable opportunity to create a landmark development as a gateway anchor of the San Tin I&T park. It also serves as a converging point between the proposed science park developments to the south and the Loop to the east, where development at this site would capitalize the strategic location of the site.

10.11.5.5 To minimise and compensate for the potential impact from the inevitable loss of the night roost, a re-provision of roosting area which comprises water features and riparian vegetation shall be provided before the removal of Ha Wa Tsuen Night Roost, adjacent to the proposed fisheries research centre under the Revised RODP. This re-provided roosting area would be approximately 230 m southeast of the existing Ha Wan Tsuen Night Roost and the exact extent would be subject to detail design in the future (**Figures 10.6C** and **10.6D** refer). The re-provided roosting area would comprise mature individuals of native tree species that are currently used as a roosting substratum (**Table 10.46** refers). The incorporation of these features (water features and associated roosting trees) shall be completed before dry season (October to March), prior to the

arrival of the overwintering birds, in order to provide suitable roosting opportunities. This site would be located along a proposed flight corridor, and would be adjacent to existing water bodies (LMC meander and ponds), potentially providing enhanced connectivity with wetland habitats. Prior to the tree removal at the existing Ha Wan Tsuen Night Roost, noisy construction activities within 100 m of the existing Ha Wan Tsuen Night Roost would be subject to timing control during dry season (October to March) to minimise indirect disturbance impacts; while upon the tree removal at Ha Wan Tsuen Night Roost (and the re-provision of roosting substratum at the Fisheries Research Centre), the same timing control would be implemented within 100 m of the re-provided night roost. During dry season (October to March), noisy construction activities (with the use of PME) within the 100 m Buffer Area should cease at least an hour before sunset, and shall commence at least an hour after sunrise on the following day, making reference to the time of sunrise and sunset from the Hong Kong Observatory.

Re-provision of Roosting Substratum for San Tin Open Storage Area Night Roost

10.11.5.6 Ardeids were recorded roosting on a mature India-rubber Tree (*Ficus elastica*) along pond bund in San Tan (**Figure 10.6B** refers). This night roost was active only in dry season. As the roosting site is encroached by the OU(I&T) under the Project, the roosting tree would be subject to direct loss. To compensate for the unavoidable loss of the night roost, roosting opportunity shall be provided at the "Open Space" along the bank of the diverted and revitalised WC-N8 (STWMDC), approximately 110 m east of the original night roost (exact extent would be subject to detailed design in the future). While India-rubber Tree was currently used as the roosting substratum, this species is not feasible for re-planting due to its growth form. The re-provided roosting area should instead include mature native tree species recorded in other night roost, including but not limited to mature *Ficus* spp. (**Table 10.46** refers).

10.11.5.7 Similar to Ha Wan Tsuen Night Roost, the re-provision of roosting area should be provided before removal of night roost and completed before dry season (October to March), prior to the arrival of the overwintering birds, in order to provide suitable roosting opportunities; while timing control shall be imposed for noisy construction activities within 100 m of the night roosts. Prior to the tree removal at the existing roosting site, noisy construction activities within 100 m of the existing San Tin Open Storage Area Night Roost would be subject to timing control during dry season (October to March) to minimise indirect disturbance impacts; while upon the tree removal (and the re-provision of roosting substratum along the revitalised STWMDC), the same timing control would be implemented within 100 m of the re-provided night roost. During dry season (October to March), Noisy construction activities (with the use of PME) within the 100 m Buffer Area should cease at least an hour before sunset, and shall commence at least an hour after sunrise on the following day, making reference to the time of sunrise and sunset from the Hong Kong Observatory.

Table 10.46 Tree Species to be Considered for Re-provision of Roosting Substratum

Tree Species	Common Name	Native / Exotic	Recommended for Night Roost Planting
Celtis sinensis	Chinese Hackberry	Native	Yes (2)
Ficus microcarpa	Chinese Banyan	Native	Yes (1)
Ficus virens	Big-leaved Fig	Native	Yes (2)
Macaranga tanarius var. *tomentosa*	Elephant's Ear	Native	Yes (1)

Notes:
(1) Tree species recorded as roosting substratum in night roosts under this Project.
(2) Tree species recorded as roosting substratum in egretries under this Project.

10.11.5.8 With the implementation of aforementioned measures and seasonal control, construction activities are not anticipated to impose significant indirect disturbance on the egretry during breeding season or direct injury / mortality on Ha Wan Tsuen Night Roost and San Tin Open Storage Area Night Roost. As discussed above, in the case where construction

activities or temporary works near the re-provided night roosts cannot be avoided during the overwintering season (October to March), noisy construction works within 100 m of both re-provided night roosts (exact area would be subject to the pre-construction survey finding and detailed design in the future) should cease before the peak returning time (an hour before sunset) of the ardeids and Great Cormorants, and shall commence at least an hour after sunrise on the following day, making reference to the time of sunrise and sunset from the Hong Kong Observatory.

10.11.6 Impact on Flight Paths

Mai Po Lung Village Egretry

10.11.6.1 Under the current ecological surveys, a large proportion (>65%) of the ardeids in MPLV Egretry flew towards the northwest (Flight Paths 1, 2, and 5); more than 25% of the ardeids flew towards the north (Flight Paths 3 and 4); while small proportion of ardeids were recorded flying westward along Castle Peak Road (San Tin section) and towards southwest (Flight Paths 6 and 7, totalling to less than 5%) (**Figure 10.6A** refers). In addition, pre-construction surveys are necessary to confirm the latest boundary, condition, flight paths of both MPLV Egretry and MPV Egretry and the associated mitigation measures before commencement of the construction works.

10.11.6.2 A NBA of about 70 m wide is proposed to the northwest from the existing MPLV Egretry, which connects to the diverted WC-N8, a proposed "Open Space" and "eco-interface" areas along the north of the Project boundary. The orientation and location of this proposed NBA largely coincides with Flight Paths 1 and 2, hence allowing a movement corridor for about 60% of the ardeids from the Egretry. Building structures would be avoided in this NBA, while green space would also be incorporated, subject to further design. This NBA aims to provide a relatively open corridor with minimal aboveground structure, and incorporation of natural elements to provide a flight corridor connecting the MPLV Egretry towards the wetland habitats in the "Open Space", "eco-interface" area, and eventually to the wider pond areas in San Tin and Sam Po Shue, thus minimising flight path obstruction during the operation phase of the proposed development. Under the Project, obstruction of flight paths will also be further minimised by maintaining flight corridors along the proposed Road D3, allowing connection of flights between the MPLV and the diverted WC-N8 located towards the northeast, and along the proposed Road L11 towards the west. No tall structures are anticipated above the proposed Road D3 and Road L11, thus expected to allow flight to and from the MPLV Egretry, partially coinciding with the Flight Paths 4 and 6. These measures (NBA, proposed Road D3 and Road L11) will provide movement corridors for the existing Flight Paths 1, 2, 4, and 6 (>75% of ardeids). Heights of associated structures on these corridors shall be limited in order to allow flight movement.

10.11.6.3 The breeding ardeids are currently observed to fly in close proximity or directly adjacent to human activities and disturbances (e.g. existing heavy traffic and structures along Castle Peak Road), suggesting these ardeids are adapted to an existing high level of human activities. In order to minimize the disturbance on the flight path along the NBA during breeding period of the egretry (i.e. from March to early September) and encourage ardeid usage, the noisy construction works (with the use of PME) within the 70 m wide NBA should cease at least an hour before sunset, and shall commence at least two hours after sunrise on the following day, making reference to the time of sunrise and sunset from the Hong Kong Observatory), to avoid the period of highest utilisation of flight path. Further disturbances shall also be minimised along the proposed NBA, by incorporation of greening features of suitable heights, where appropriate, to minimise visual disturbance on the ardeids from human activities and further encourage flight usage. In addition, ardeids were recorded flying along a corridor from a local study (Stanton and Klick, 2018). The study investigated the flight corridor of roosting ardeids along a modified watercourse (Staunton Creek Nullah), bounded by tall buildings and a wooded hillside, of approximately 40 m in width. The study also indicated that ardeids showed behavioural adaptability to traffic and the surrounding urban environment by changing their flight behaviour (e.g. altered flight pattern and height), and was observed to continue

movement along the original direction. Considering the adaptability of egrets, the egrets from MPLV Egretry would be anticipated to adopt and utilise the proposed 70 m wide NBA. While some behavioural change and increase in energy expenditure might be anticipated, the long term effect on the MPLV Egretry and the associated ardeids are not anticipated.

Mai Po Village Egretry

10.11.6.4 As shown in **Figure 10.6A**, Flight Path 5 from the MPV Egretry is subject to potential obstruction from the Project development. As this occurs on the edge of the Project boundary, the potential obstruction is not anticipated to be of major magnitude. The current flight pattern of ardeids were also observed with some fluctuation, hence the ardeids are expected to adjust and adapt to minor obstruction with their manoeuvrability. Nonetheless, some ecological impacts might arise without any mitigation measures in place.

10.11.6.5 The Flight Path 5 was observed to overlap with the proposed "eco-interface" along the boundary of the proposed development, which eventually connects to the wider pond areas and wetland habitats in San Tin and Sam Po Shue. Within this "eco-interface", provision of buffer area with greening and wetland habitats are being considered, thus promoting the connectivity and movement corridor of the MPV Egretry and the wider wetland habitats. This "eco-interface" would be anticipated to allow and encourage flight movement, thus minimising impact from the partial obstruction.

Maintaining Flight Corridor Across LMC BCP

10.11.6.6 A flight corridor was also observed to the south of Ha Wan Tsuen Night Roost, supporting various east-west flight paths across LMC BCP and over to the Loop, used by other cormorants and ardeids within the Assessment Area which were not roosting in the Ha Wan Tsuen night roost (**Figures 10.6C** and **10.6D** refer). A large proportion of cormorants and ardeids along this flight corridor were recorded flying at heights of 21-30m or >30m above ground (**Section 10.6.2.64** refers).

10.11.6.7 The Project would incorporate a flight corridor with width of about 300m. This flight corridor would comprise the proposed AFCD Fisheries Research Centre (near the Loop), "GIC" sites (reserved for a pumping station, HKPF Weigh Station and Customs dog base) and the proposed NBAs within I&T sites near STEMDC to preserve a corridor for flight movement between the east and the west (**Figure 10.6C** and **10.6D** refer). Minimal building structure with small area is anticipated at the AFCD Fisheries Research Centre and the "GIC" sites, with maximum building height of 15 mPD. No aboveground building structures would be established above the STEMDC and the NBA.

10.11.6.8 According to the recorded flight paths in current survey, 73.2% (Flight Paths B, C, D) and 43.4% (Flight Path G) of the flight paths could be preserved through the incorporation of this 300 m flight corridor in dry season and wet season respectively. Details of the recorded flight paths and flight heights are presented in **Appendix 10.5** and **Figure 10.6**. The proposed flight corridor and the NBA also provide a wider connectivity with wetland habitat in the vicinity, connecting to the LMC meander on the east, and the proposed "Ecological Area" under the Loop. Noisy construction works (with the use of PME) within the 300 m wide flight corridor should cease at least an hour before sunset, and shall commence at least two hours after sunrise on the following day (making reference to the time of sunrise and sunset from the Hong Kong Observatory) during dry season (October to March) to avoid the period of highest utilisation of the flight corridor.

10.11.6.9 To further promote flight movement, stepping height of the building structures adjacent to the flight corridor would also be implemented, with building height of not more than +35 mPD also proposed on both north and south sides of the flight corridor to encourage usage of this corridor and minimise potential obstruction impact.

10.11.7 Impact on Dry Agricultural Land

Enhancement Measure to Promoting Environmental Capacity

10.11.7.1 The Project will incur the permanent loss of 10.36 ha dry agricultural land throughout the Project area, including the loss of 0.85 ha dry agricultural land in the northern portion and that of 9.51 ha in the southern portion. The dry agricultural land at present supported moderate abundance and richness of wildlife, and its loss is anticipated to result in low to moderate ecological impacts. Habitat compensation is not considered necessary for the loss of agricultural land. Nonetheless, enhancement measures have been proposed for the loss of ecological function performed by these dry agricultural lands, and to promote urban wildlife after completion of works during operation phase. These measures primarily involve landscaping and greening, such as rooftop gardening and greening at Open Space. To attract butterfly species to the area, nectar plants, such as Golden Dewdrops (*Duranta erecta*), Pentas (*Pentas lanceolata*) and Chinese Ixora (*Ixora chinensis*), can be planted in these gardens to serve as a valuable food source. These enhancement measures would therefore increase the ecological function of these gardens.

10.11.8 Impact on Woodland Habitat

Avoiding Loss of Woodland at Pang Loon Tei

10.11.8.1 As discussed in **Section 10.11.2.5**, the Project boundary has avoided the loss of woodland south of Pang Loon Tei, the adjacent habitats, and the ecological resources (including various mammal species of conservation importance), upon initial findings and early development of the Project (**Figure 10.3H** refers). Aside from the avoidance of this woodland habitat, some small amount of woodland loss would still arise from the Project, with compensation measures proposed below.

Woodland Compensation

10.11.8.2 The Project will incur the permanent loss of 1.70 ha woodland throughout the Project area, including the loss of 1.64 ha woodland of moderate value in the northern portion and 0.06 ha woodland of low to moderate value in the southern portion. To compensate for the unavoidable loss of woodland, woodland compensation would be provided based on “no net loss” and “like for like” basis or by providing a compensation area with equivalent or higher ecological function. Compensatory planting would be performed for the loss of the 1.64 ha woodland of moderate value. Suitable sites were identified mainly based on its present ecological value and connectivity with present wooded area. Other factors that were taken into consideration included topography, soil condition and the risk of hill fire.

10.11.8.3 In light of a paucity of suitable area for on-site compensation within the Project area, off-site woodland compensation is considered instead. A suitable area was identified near the compensatory woodland for the Development of Lok Ma Chau Loop project (CEDD & PlanD, 2013a). This compensatory woodland is situated within the Green Belt zone and was originally of grassland habitat of low ecological value (ibid.). The establishment of a compensatory woodland therein could increase the total area of the compensatory woodland and strengthen ecological connectivity with adjacent wooded area. A compensatory woodland with an extensive area and integrity could foster natural succession and enhance habitat quality, which could potentially raise the overall ecological value of the area. Besides, as the existing grassland was of low ecological value, the impact of tree planting and maintenance works are anticipated to bring only low impacts.

10.11.8.4 Native species of different growth form with high market availability are preferred for compensatory planting (refer to **Table 10.47**). In addition, individuals of Incense Tree and Cycad-fern that necessitate transplantation could be settled in this compensatory woodland, while seedlings of Luofushan Joint-fir could also be propagated here. At maturity, the compensatory woodland would create a habitat with multiple layers,

including a canopy, a middle layer and an understory. Such habitat complexity would enhance overall ecological value. Compensatory planting would be provided sequentially upon the completion of works within the Project area. To facilitate successful establishment of the compensatory woodland, a detailed Woodland Compensation Plan should be prepared by local ecologists / botanist with at least 5 years of relevant experience. The Woodland Compensation Plan should include implementation details, management requirement and monitoring requirements (e.g., methodology, schedule, frequency of monitoring, and monitoring parameters). The Woodland Compensation Plan should be submitted to relevant Government departments (including AFCD and EPD) for approval at least two months before commencement of planting. Upon completion of planting, monitoring and maintenance works (e.g., irrigation, weeding, pruning, control of pests and diseases, replacement planting and repair of damage) should be implemented and regularly performed.

Table 10.47 Flora Species to be Considered for Woodland Compensatory Planting

Flora Species	Growth Form
Acronychia pedunculata	Tree
Alangium chinense	Tree or shrub
Aquilaria sinensis	Tree
Bischofia javanica	Tree
Bridelia tomentosa	Shrub or small tree
Canthium dicoccum	Tree or shrub
Celtis sinensis	Tree
Cinnamomum camphora	Tree
Cleistocalyx nervosum	Tree
Daphniphyllum calycinum	Tree
Elaeocarpus chinensis	Tree or small tree
Ficus microcarpa	Tree
Garcinia oblongifolia	Tree
Litsea glutinosa	Tree
Machilus pauhoi	Tree
Mallotus paniculatus	Tree or shrub
Phyllanthus emblica	Tree or shrub
Schefflera heptaphylla	Tree
Schima superba	Tree
Sterculia lanceolata	Semi-deciduous tree
Viburnum odoratissimum	Shrub or small tree

10.11.9 Impact on Species of Conservation Importance

Avoiding Direct Loss of Species of Conservation Importance

10.11.9.1 As described in **Sections 10.8.1.43 – 10.8.1.57**, some species of conservation importance were recorded within the Project boundary which may be subject to direct impacts, particularly species with relatively low mobility (e.g. flora, nesting avifauna / chicks, amphibians, and freshwater fauna species) which may be more susceptible to injury / mortality from proposed works.

10.11.9.2 A few individuals of the flora species of conservation importance Incense Tree, were recorded at a patch of woodland (between Chau Tau and Lok Ma Chau Tsuen) and at mixed woodland and plantation habitats on Kam Kwai Leng, which would be zoned as "GB.1.2" and "GB.5.1" (**Figure 10.7B** refers). As habitat and vegetation would be

preserved at these "GB" zones, direct impact to the Incense Trees would be avoided. Direct impact on other flora species of conservation importance shall be further avoided / minimised by mitigation measures such as pre-construction surveys and transplantation of the species, further discussed below.

10.11.9.3 Breeding / nesting behaviour of Little Ringed Plover, White-shouldered Starling and White-throated Kingfisher were recorded within the Project site. Potential direct injury / mortality on the breeding pairs and chicks shall be avoided by pre-construction surveys and nest control, further discussed below. Some amphibian and freshwater fauna species of conservation importance were also recorded within the Project site (amphibians Chinese Bullfrog and Spotted Narrow-mouthed Frog, freshwater fish Rose Bitterling, and two freshwater crab *Cryptopotamon anacoluthon* and *Somanniathelphusa zanklon*), recorded from recent surveys and from previous study under CEDD & PlanD (2021a). Potential direct injury / mortality on the community of these species shall be avoided by pre-construction surveys and translocation of these species, further discussed below.

Flora Species of Conservation Importance

10.11.9.4 Three flora species of conservation importance namely Cycad-fern, Incense Tree and Luofushan Joint-fir were recorded within Project area which would be subjected to direct loss. Transplantation is recommended as far as possible for Cycad-fern and Incense Tree to minimise the direct impact to this species. Prior to the commencement of the construction phase, a detailed vegetation survey would be conducted by a qualified botanist / ecologist to confirm the locations and health condition of Cycad-fern and Incense Tree. All the healthy individuals suitable for transplantation would be identified and rescued. They would be transplanted to suitable receptor site outside Project area, ideally at wooded habitats such as mixed woodland, plantation, shrubland or woodland outside the Project area, including the proposed location for woodland compensation as described in **Section 10.11.8**. Pre-construction survey, screening / selection of receptor site(s) and preparation of a Protection and Transplantation Proposal describing details of the transplantation methodologies would be prepared by qualified botanist / ecologist and submitted for approval prior to transplantation.

10.11.9.5 Transplantation of Luofushan Joint-fir is not recommended because it is impractical to segregate the species (a woody climber) from adjacent plants individuals for transplantation. Transplantation of this species may induce severe shading stress to the existing vegetation in receptor site if massive mature clusters are transplanted. Nonetheless, mitigation for Luofushan Joint-fir is recommended in compensation manner. Seedling planting of Luofushan Joint-fir is recommended in receptor site(s). However, it should be planted in low density to reduce its shading stress to the receptor site(s) in future. The shading stress would be acceptable as Luofushan Joint-fir is a common native species in Hong Kong which does not show any aggressiveness or adverse impact to local ecosystem. Prior to the commencement of the construction phase, a detailed vegetation survey, collection of seeds, screening / selection of receptor site(s) and preparation of a Protection and Seedling Planting Proposal should be prepared by qualified botanist / ecologist for approval.

Fauna Species of Conservation Importance

10.11.9.6 Fauna species of conservation importance were recorded within the footprint of Project area. While no adverse direct impacts are expected on fauna groups with relatively high mobility (e.g. avifauna, mammals, butterflies and odonates), direct injury / mortality to slow-moving fauna or aquatic fauna (e.g. nesting avifauna, freshwater fauna and herpetofauna) is anticipated. Mitigation measures such as nest control for avifauna and translocation for other fauna groups should be implemented, further discussed below.

Breeding Ground of Avifauna Species of Conservation Importance

10.11.9.7 Breeding / nesting behaviour of Little Ringed Plover, White-shouldered Starling and White-throated Kingfisher were recorded within the Project area during survey period. Both Little Ringed Plover and White-shouldered Starling were recorded near pond habitats, which may be subject to potential impact from pond filling; while White-throated Kingfisher were recorded using the mud wall tunnels on Ngau Tam Shan, which may be subject to potential impact from the construction of the water reservoirs and associated site formation works. Although avifauna are highly mobile and are not expected to be injured by construction works, the nesting pairs, chicks and eggs are more susceptible to construction works. The breeding season vary among these three avifauna species but are all typically within spring and summer (March to July). In order to avoid direct injury to the breeding pairs, chicks and eggs, nest control measures should be implemented in non-breeding season (late August to early February) to discourage breeding behaviour within Project area prior to construction works.

10.11.9.8 To avoid nesting of Little Ringed Plover in drained ponds, drained ponds should be covered by black pond liner immediately to discourage Little Ringed Plover from nesting on the drained ponds. To discourage nesting of White-shouldered Starling, box attached to electric pole should be sealed / removed in non-breeding season. To discourage nesting of White-throated Kingfisher, the mud wall and mud wall tunnels within Project area on Ngau Tam Shan should be sealed in non-breeding season. Prior to nest control measures, the drained pond, box and mud wall tunnel should be checked carefully by qualified ecologists to ensure no avifauna / eggs are present. Preparation of Nest Control Proposal, pre-construction survey, and the nest control measures mentioned should be conducted by qualified ecologist with at least 10 years relevant experience to ensure the control measures and the subsequent works would not injure any breeding pairs, chicks or eggs.

Freshwater Fauna Species of Conservation Importance

10.11.9.9 A population of Rose Bitterling was recorded in ponds and adjacent semi-natural watercourse in Lok Ma Chau, located within the Project boundary. These habitats of Rose Bitterling would be subject to unavoidable direct loss. Pre-construction survey would be conducted for this species of conservation importance, followed with measures to capture and translocate individuals of Rose Bitterling to nearby suitable habitat(s) which are free from development pressure. Existing examples of Rose Bitterling translocation include the Development of Kwu Tung North and Fanling North New Development Areas, Phase 1, the subsequent EM&A Reports (CEDD, 2022; CEDD, 2020), and unpublished Rose Bitterling Monitoring Reports under the project (CEDD, Unpublished Data). Long-term survival of the translocated Rose Bitterling individuals was observed at the receptor sites, described in the unpublished Rose Bitterling Monitoring Reports, suggesting the feasibility of translocation as mitigation measure for this species.

10.11.9.10 Qualified ecologist with at least 5 years relevant experience (on freshwater fauna) should prepare a detailed Translocation Proposal for approval. The plan should include, but not limited to, the methodology of capture, translocation, and details of receptor sites, making reference to the aforementioned examples. For example, considering the Rose Bitterling has a spawning symbiosis relationship with Chinese Pond Mussel, translocation of Chinese Pond Mussel should also be included in the scope of translocation; while mud should also be deposited to support the mussel, etc. Wetland compensation area in Hoo Hok Wai (CEDD, 2019) or other nearby inactive / abandon fishponds in Lok Ma Chau and Hoo Hok Wai which are located away from development could be considered as potential receptor sites. The potential receptor sites should be in similar size compared to the original fishponds (approximately 0.42 ha / pond). The abiotic (temperature, pH, salinity, level of dissolved oxygen, turbidity and pollution) and ecological (vegetation, presence of invasive fish / predators) parameters of receptor site(s) should be examined prior to translocation. Screening and selection of potential receptor sites would be included in the Translocation Proposal, conducted by qualified ecologist before the commencement of construction phase.

10.11.9.11 Moreover, two freshwater crab species of conservation importance (*Cryptopotamon anacoluthon* and *Somanniathelphusa zanklon*) recorded in current survey and literature review would be directly affected by the Project. Capture and translocation are recommended for both crab species. Pre-construction survey focusing the locations where they were previously recorded in Project area should be conducted, identified individuals should be captured and translocate to suitable receptor sites. Hillside unpolluted natural / semi-natural watercourses south of Pang Loon Tei, east of Saddle Pass and north of Chau Tau might be potential receptor sites. Preparation of Translocation Proposal, screening / selection of receptor sites and capture – release process should be conducted by qualified ecologist with relevant experience.

Herpetofauna Fauna Species of Conservation Importance

10.11.9.12 Several herpetofauna species of conservation importance were recorded in Project area and would be subjected to habitat loss and potentially direct injury / mortality. Translocation is suggested for amphibian species of conservation importance; however, it is impractical for the reptiles which are highly mobile, cryptic and potential dangerous such as venomous snakes and skinks. Chinese Bullfrog and Spotted Narrow-mouthed Frog were recorded in current survey and literature review, they were scattered in wetland habitats across the Project area. Similar capture – release approach described above would also be adopted for amphibians. Both adults and tadpole shall be included in the scope of translocation. The pre-construction survey, capture and release should be conducted during night-time in wet season when amphibian is relatively active to maximise capture rate. Amphibian could be identified and spotted by their calls and secondarily by active searching. Potential suitable receptor site(s) include wetlands in Lok Ma Chau Tsuen and wetlands in Hoo Hok Wai. Preparation of Translocation Proposal, screening / selection of receptor sites and capture – release process should be conducted by qualified ecologist with relevant experience.

10.11.9.13 Post-transplantation, post-plantation and post-translocation monitoring programs for the mentioned flora / fauna species are required for determining the success of mitigation. Direct observation and counting, mark-recapture and active search would be potential methodology for the monitoring programs depend on the target species. Detailed methodology, schedule and frequency of monitoring program would be provided in the corresponding Translocation Proposal.

Other Fauna Species of Conservation Importance

10.11.9.14 As discussed in **Section 10.11.9.6**, other fauna species of conservation importance (e.g. avifauna, mammals, butterflies, and odonates) are of relatively high mobility, and the proposed development is not anticipated to result in significant ecological impacts on these species.

10.11.9.15 The mammal species Eurasian Otter was of particular interest due to the small and scattered populations of this species, while their declining populations are also considered to be on the verge of local extinction (Li & Chan, 2017). No record of this species was made within the Assessment Area from the 12-month ecological survey, and from joint-monitoring conducted in recent years (WWF and KFBG, pers. comm.). Nonetheless, a recent literature has revealed record of otter spraints made in 2018 / 2019, suggesting its historical presence and potential activity range across the Project area (McMillan et al., 2023) (**Section 10.5.2.7** refers). While no significant ecological impacts are anticipated on the low occurrence of this species, a conservative approach has been adopted, and this potential movement corridor across the Project area was considered under the Revised RODP with the inclusion of a wildlife corridor (further detailed in **Section 10.11.11**). Further pre-construction site check will be included under a conservative approach on this highly elusive species (**Section 10.13.1.22** refers).

10.11.10 Potential Injury / Mortality on Other Wildlife

Minimising Direct Injury / Mortality of Wildlife

10.11.10.1 Other than the avifauna species recorded mainly near the northern portion of the Project site, other fauna species were mostly widespread and common in Hong Kong. These species were recorded to be subject to existing regular disturbance from nearby developed area / wasteland (e.g. heavy road traffic and highway, open storage, workshops, and brownfield). Species with high mobility were anticipated to disperse and migrate upon construction activities. Furthermore, proper screening (e.g. hoarding or barrier) would be provided to restrict construction activities within the Project sites, to minimise potential direct injury to nearby wildlife by confining the construction activities, and to avoid the wildlife from accidentally entering the Project site.

Minimising Bird Collision

10.11.10.2 As discussed in **Section 10.8.3.4**, risk of bird collision may increase with the use of transparent / reflective building façade. Considering the presence of avifauna species of conservation importance and the commuting activity of birds in the vicinity, the potential bird collision should be avoided by using low reflective materials (e.g. tinted glass, low reflective window film) and appropriate architectural features on building structures within the proposed Development, subject to detailed design stage. Non-transparent panels should also be used as noise enclosure, as well as adopting non-glaring tinted materials, or superimposing dark patterns at the majority of glazing along noise barriers, as per *Guidelines on Design of Noise Barriers* (EPD & HyD, 2003) and *Practice Notes No. BSTR/PN/003 (Revision E) Noise Barriers with Transparent Panels* (HyD, 2020), to avoid and minimise bird mortality from collision.

10.11.11 Habitat Fragmentation and Impact on Animal Movement Corridor

Wildlife Corridor

10.11.11.1 An existing wildlife corridor was constructed under the Sheung Shui to Lok Ma Chau Spur Line project, allowing free movement of mammals underneath San Sam Road (EPD, 2015). However, the existing wildlife corridor is within Project footprint which would be lost upon the commencement of construction activities. In order to maintain the movement corridor of non-flying mammal species of conservation importance (e.g. East Asian Porcupine, Red Muntjac and Small Indian Civet), wildlife corridors are proposed in the Revised RODP in both northern and southern portions of the Project area to mitigate for the habitat fragmentation. Moreover, movement of Eurasian Otter is taken into consideration in the proposed wildlife corridor, where water feature would be incorporated on the northern portion. A preliminary design is recommended based on existing baseline conditions (**Figure 10.10A** refers). Details of the design may be subject to change during the future detailed design stage.

Northern Portion

10.11.11.2 Under the Revised RODP, wildlife corridors have been incorporated to provide opportunity for ecological linkage between STEMDC, Ha Wan Tsuen and Lok Ma Chau. This wildlife corridor should comprise underground sections (concrete underpasses across proposed roads) and aboveground sections which would be provided within the AFCD Fisheries Research Centre to provide connection between the AFCD Fisheries Research Centre and the STEMDC. Indicative locations of these proposed wildlife corridors are presented in **Figure 10.10A**.

Underpass connecting the separated "OU(I&T) 6.1.1" and "OU(I&T) 1.1.1"

10.11.11.3 The underpasses are proposed to link the segregated parcels of "OU(I&T) 6.1" (proposed AFCD Fisheries Research Centre) and further west towards "OU(I&T) 1.1.1" adjacent to

the STEMDC. These underpasses will be situated across Ha Wan Tsuen East Road and San Sham Road respectively. It is projected to be a concrete box culvert and have a length of approximately 30 and 75 meters respectively, subject to detailed design

Wildlife Corridor (aboveground) at OU(I&T) 6.1.1

10.11.11.4 The "OU(I&T) 6.1.1" is composed of two separated land parcels (western and eastern side). Both parcels would form the AFCD Fisheries Research Centre, with the eastern parcel situated adjacent to the LMC Meander.

10.11.11.5 Along the northern boundary of the Fisheries Research Centre, a 10 m wide buffer area should be retained as an aboveground wildlife corridor and connecting the underpasses, and to the LMC Meander. The width of the wildlife corridor has been determined by referencing to the relevant mitigation guidelines for otters concerning development pressure (NIEA, 2011). Potential design of this 10 m wide wildlife corridor (at the Fisheries Research Centre) should include suitable design and material (e.g. cobblestone road), with landscaping features (e.g. dense shrubs and trees) on both sides to provide vegetation that can serve as a form of soft fencing and to minimise disturbance (such as human activities, glare from artificial lights, noise) from the surrounding environment, subject to detailed design.

Wildlife Corridor (aboveground) adjacent to STEMDC

10.11.11.6 A 10 m wide buffer area is proposed as the aboveground wildlife corridor situated along the northern boundary of NBA at "OU(I&T).1.1.1" and the "Amenity" land use adjacent to STEMDC. Recommended design at this section of the aboveground corridor could include a watercourse, with gabion riverbank and ledges installed along the two sides of the watercourse (which would be favourable for wildlife movement use), subject to detailed design. Aside from serving as a wildlife corridor, water feature in this section would be beneficial to overall wildlife use such as avifauna and potentially encourage the movement of Eurasian Otter. For further optional enhancement, landscape planting of dense shrubs and trees and other water features (e.g. pond and reedbed) is also recommended at the NBA adjacent to the 10 m wide wildlife corridor to attract wildlife and act as soft fencing (subject to detail design of the future land use).

Fencing

10.11.11.7 Continuous fencing of suitable height should be installed to prevent roadkill of target species and other wildlife near San Sham Road and Ha Wan Tsuen East Road. Fencing could also funnel wildlife toward the underpass. The proposed extent of the fencing is presented in **Figure 10.10A**.

Southern Portion

10.11.11.8 Under the Project, wildlife corridors have been incorporated to provide opportunity for ecological linkage between wooded habitats preserved with proposed "GB". This wildlife corridor would be comprised of underground sections (two underpasses under proposed roads) and aboveground sections. The proposed wildlife corridor is presented in **Figure 10.10B**.

Underpass

10.11.11.9 Both underpasses are proposed to be a concrete box culvert., connecting "GB 5.3" and "GB 5.2" and approximately 30 m in length, while the underpass connecting the "GB 5.2" and "GB 5.1" would be approximately 45 m in length.

Aboveground wildlife corridor

10.11.11.10 In order to maintain ecological linkage between "GB 5.4" and "GB 5.3", a 6 m wide corridor would be retained. This aboveground wildlife corridor would be vegetated either by retaining the original vegetation or through landscape planting of native flora species, depending on the detailed design in later stage.

Green Belt

10.11.11.11 The proposed "GB" would retain the original vegetated habitats including mixed woodland, woodland, plantation, grassland and shrubland. Mammal species of conservation importance were recorded in some of the "GB" zone. No further construction of corridor is required in the "GB" zone.

Fencing

10.11.11.12 Continuous fencing should be installed to prevent roadkill of target species and other wildlife near traffic roads. Fencing could also funnel wildlife toward the underpass. The proposed extent of the fencing is presented in **Figure 10.10B**.

10.11.12 Other Potential Impact from Construction Disturbance

Minimising Construction Disturbance to Habitats, Sites of Conservation Importance and Wildlife

10.11.12.1 Mitigation measures should be implemented to minimise the disturbance impacts (e.g. noise, glare and dust) to the adjacent habitats and their associated wildlife arising from the construction activities, including but not limited to the following:

- Noise mitigation measures by effective placing of site hoarding, temporary noise barriers and material stockpiles where practicable as screening, shut down of machines and plants that are in intermittent use, and the use of quality power mechanical equipment (PME) to limit noise emissions at source. Machines and plant known to emit strong directional noise should, wherever practicable, be orientated so that the noise is directed away from the nearby habitats. QMP and other machines and plants should be covered by noise enclosure to further reduce noise impact (**Section 4** refers).
- A balance between lighting for safety, and avoiding excessive lighting can be achieved through the use of directional lighting to avoid light spill into sensitive areas (e.g. construction activities near the egretries and ardeid night roosts), hoarding provision, and control night-time lighting periods, particularly for the works site(s) located in proximity, and during peak season of activities (e.g. breeding season of the egretries, peak roosting season of ardeids at night roosts during dry season), hence minimising the potential indirect impact on the community of the breeding and night-roosting ardeids.
- Dust suppression measures (such as regular spraying of haul roads, proper storage of construction materials, covering trucks or transporting waste in enclosed containers, and environmental control measures as stipulated in the Air Pollution Ordinance (Construction Dust) Regulation) to avoid and minimise emission and dispersal dust, which would cover vegetation and potentially discourage usage of nearby wildlife.
- For construction activities at pond habitats within the Wetland Conservation Area, percussive piling works and demolition using excavator mounted breakers should be avoided from November to March. Where such construction activities are unavoidable, additional agreement with relevant Government departments (including EPD and AFCD) should be sought prior to the commencement of works.

Good Site Practice

10.11.12.2 Good site practices should be strictly followed to avoid / minimise adverse impacts arising from the construction activities. Recommendations for good site practices during the construction phase include:

- Nomination of approved personnel, such as a site manager, to be responsible for implementation of good site practices, arrangements for waste collection and effective disposal to an appropriate facility;
- Training of site personnel in site cleanliness, concepts of waste reduction, reuse and recycling, proper waste management and chemical waste handling procedures;
- Provision of sufficient waste reception/ disposal points, and regular collection of waste;
- Adoption of appropriate measures to minimise windblown litter and dust during transportation of waste by either covering trucks or by transporting wastes in enclosed containers;
- Provision of regular cleaning and maintenance programme for drainage systems, sumps and oil interceptors;
- Adoption of a recording system for the amount of wastes generated, recycled and disposed (including the disposal sites); and
- Preparation of Waste Management Plan (WMP), as part of the Environmental Management Plan (EMP)

Minimising Water Quality Impacts

10.11.12.3 As stated in the Water Quality section, good site practices during the construction phase should be adopted to avoid any pollution entering any nearby watercourses. Practices to minimise surface run-off and to reduce suspended solid levels should be undertaken during construction (**Section 5** refers):

- 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;
- General refuse and construction waste should be collected and disposed of in a timely and appropriate manner;
- Drainage arrangements should include sediment traps to collect and control construction run-off;
- Silt removal facilities, channels and manholes should be maintained, and the deposited silt and grit should be removed regularly, at the onset of and after each rainstorm to prevent local flooding;
- All works and storage areas should be restricted to the site boundary;
- All vehicles and plant should be cleaned before they leave a construction site to minimise the deposition of earth, mud, debris on roads; and
- Regular check of the construction boundary to avoid unmitigated impacts imposed on nearby watercourse.

Minimising Operation Phase Disturbance with Eco-Interface

10.11.12.4 As described in **Section 10.11.3.38**, an “eco-interface” area with width of about 35 m was proposed along the northwest of the Project boundary, between the proposed Project area in San Tin and the wider pond habitats in San Tin and Sam Po Shue; while another “eco-interface” area with width of about 20 m was also proposed along the east of STEMDC, creating a buffer between the “OU(I&T)” land use and the watercourse STEMDC. The “eco-interface” (in the form of landscape buffer) would further minimise disturbance from land uses within the Project area during the operation phase, by

providing a buffer area between the development and the adjacent wetland habitats and associated fauna. Further description of this "eco-interface" (as a landscape buffer) is also provided at **Section 14** (Landscape and Visual Impact).

10.11.13 Enhancement Measures

Promoting Wildlife Usage at Eco-Interface

10.11.13.1 While the proposed "eco-interface" area would provide minimisation measure between the Project and the wider pond habitats in San Tin and Sam Po Shue, the "eco-interface" could provide opportunities for further enhancement measure to promote wildlife usage. Installation of artificial nest boxes and bat boxes are recommended in both "eco-interface" areas (including the 35 m wide "eco-interface" along Project area in San Tin and near Sam Po Shue, and the 20 m wide "eco-interface" along the east of STEMDC) to attract avifauna and bat species including species of conservation importance such as White-shouldered Starling and Japanese Pipistrelle. Location and selection of nest box and bat box would be subject to detailed design.

River Revitalisation

10.11.13.2 Under the Revised RODP (**Figure 10.7** refers), major watercourse including WC-N3 and WC-S3 (i.e. STEMDC) and WC-N8 (i.e. STWMDC) would be reinstated and revitalised, while details of the revitalisation would be available after detailed design. Opportunities for ecological enhancement (e.g. bioengineering, creating meanders) would be explored to improve its ecological value. Provision of natural substrate that would encourage colonisation of flora and freshwater fauna in the bottom and banks of the revitalised watercourses would be considered, subject to detailed design of the proposed revitalisation measures. Vegetation species to be planted along the riparian zone would be selected on the basis that it would benefit the wildlife recorded in the vicinity. Fauna species recorded from recent surveys and previous studies would be potentially benefit from the revitalised watercourse (e.g. foraging ground for avifauna species, drinking site for bat species). Maintenance works (e.g. weeding, de-silting, replacement planting, repair of damage, etc.) should also be conducted as necessary.

Enhanced Connectivity at Green Belts

10.11.13.3 With the inclusion of the proposed wildlife corridors, enhanced connectivity is anticipated between Green Belts to benefit wildlife usage (detailed in **Section 10.11**). Other Green Belts were also retained under the Revised RODP (**Figure 10.7B** refers). While some Green Belts on the southern portion of the Project area was not recorded with particular mammal species of conservation importance (e.g. GB.3.1 and GB.5.5), similar underpass structures are proposed to connect these Green Belts in order to provide enhanced connectivity for general wildlife (e.g. future urban wildlife within the Revised RODP), provided in **Figure 10.10C**. No specific ecological monitoring would be required for this enhancement feature.

Greening Opportunity

10.11.13.4 Greening opportunities should be explored to promote the overall habitat quality and ecological connection. Native tree, shrub and herb species should be considered as far as possible, with consideration of market availability, for landscape planting and buffer planting in the Project area and Project boundary. Furthermore, native host plants and nectar plants should preferentially be considered in the planting plan to provide a butterfly-friendly environment. Beside planting host and nectar plant for attracting butterfly, *Livistona chinensis* could also be planted to create favorable roosting habitat for Short-nosed Fruit Bats recorded in the present study, and native fruits trees with food sources (e.g. *Ficus microcarpa*, *F. subpisocarpa*, *F. variegata*, *Dimocarpus longan*, *Clausena lansiums*) be planted to attract birds. Buffer planting together with nectar plants and host plants is highly recommended especially in the south of Pang Loon Tei, close to "CA" zone in the hillside, where a high diversity of butterfly species was recorded.

10.12 EVALUATION OF RESIDUAL IMPACTS

10.12.1.1 Potential ecological impacts arising from the Project have been evaluated in accordance with the criteria under the relevant Annexes of the EIAO-TM, as presented in **Section 10.9**. The proposed mitigation measures for these ecological impacts are presented in **Section 10.11**, while a table of potential ecological impacts, corresponding mitigation measures, and potential residual impacts summarised in **Table 10.41**. A summary of the ecological impacts and potential residual impacts are provided below.

10.12.1.2 Direct impact from the permanent loss of habitats under the proposed Project development are identified and presented in **Table 10.23**. While potential ecological impacts may arise from the loss of pond and other wetland habitats, as well as woodland habitats, mitigation measures have been proposed accordingly in the above sections, including compensation measures (e.g. proposed enhanced wetland, woodland compensation) and minimisation measures (e.g. pond filling works will be phased to tie in with the phased development of the SPS WCP, with working group formed to coordinate the progress). With the implementation of the proposed mitigation measures, loss of habitats arising from the Project will be compensated, hence residual ecological impacts from habitat loss are not anticipated. Furthermore, with the proposed enhanced wetland and the incorporation of further minimisation measures and enhancement opportunities (e.g. incorporation of “eco-interface”, revitalisation of the STEMDC, landscape planting within the proposed development), overall habitat quality in the majority of the Project boundary is anticipated to be improved (e.g. improved water quality via river revitalisation, “eco-interface” as landscape buffer which would also minimise disturbance).

10.12.1.3 MPLV Egretry, San Tin Open Storage Area Night Roost and Ha Wan Tsuen Night Roost were recorded within the proposed Project footprint, while mitigation measures have also been proposed accordingly for these ecological resources, including the preservation of MPLV Egretry and establishment of “Open Space” with associated enhancement measures; as well as the compensation of San Tin Open Storage Area Night Roost and Ha Wan Tsuen Night Roost by re-providing roosting substratum in the vicinity. With the proper implementation of the proposed mitigation measures, the residual impacts on these resources are anticipated to be low and of acceptable level.

10.12.1.4 The construction and operation of the proposed development would result in potential disturbance and obstruction of the flight paths from egretries and night roosts. Mitigation measures were proposed to maintain the flight corridor for these flight paths, including the refinement of the Revised RODP and incorporation of NBA. Residual impacts on the potential disturbance and obstruction to the flight paths are anticipated to be of low and an acceptable level.

10.12.1.5 Species of conservation importance were recorded within the Project site. Mitigation measures were proposed accordingly in above sections (e.g. transplantation of vegetation species of conservation importance, translocation of amphibian and freshwater fauna species of conservation importance, pre-construction site check and nest control for breeding avifauna species of conservation importance, and incorporation of wildlife corridor for the non-flying mammal species recorded within the Project site as well as potential usage of Eurasian Otter). Residual impacts on these species of conservation importance are not anticipated.

10.13 ENVIRONMENTAL MONITORING AND AUDIT

10.13.1.1 Key mitigation measures on specific ecological resources were recommended above, which include wetland compensation, mitigation for egretries, mitigation for night roosts, inclusion of flight corridor, woodland compensation, transplantation / translocation / nest control of species of conservation importance, and establishment of wildlife corridor. These measures should be monitored and audited by local ecologist(s) with relevant experience to ensure proper implementation and, where appropriate, to monitor the performance of the proposed mitigation measures (e.g. monitoring upon the establishment of compensation areas may extend into operation phase). Furthermore,

monthly site audit should be carried out throughout the construction phase to ensure recommended avoidance, minimisation, and pollution control measures are properly implemented. In case of non-compliance, contractor should be informed to strengthen the proposed measures accordingly. Details of EM&A requirements are discussed in the standalone **EM&A Manual**.

Wetland Compensation

Monitoring on Construction Phase Disturbance

10.13.1.2 During the construction phase of the Project, ecological monitoring should be conducted to monitor the ecological disturbance arising from the construction activities under the Project, to verify the assumption adopted under the ecological assessment, including the assumption of Exclusion Zone (EZ) and Reduced Density Zone (RDZ). In turn, the effectiveness of the proposed minimisation measures should also be reviewed under part of the ecological monitoring on construction phase disturbance. Where necessary, the need for further or more effective mitigation measures shall be considered. The target indicator waterbird species that were adopted during formulation of mitigation measures (refer to **Section 10.11.3.17**) shall be focused during ecological monitoring. Details of construction disturbance monitoring (e.g. monitoring period, location, frequency, and parameters) are provided in the standalone **EM&A Manual**.

Monitoring on Wetland Enhancement

10.13.1.3 Enhanced wetland of 288 ha in the proposed SPS WCP would be established as a mitigation measure for the unavoidable loss of wetland habitats under the Project. The implementation details of the enhanced wetland, the associated management and monitoring requirements (e.g. monitoring location, frequency and parameters) will be provided in the subsequent HCMP. The HCMP should be submitted for approval from relevant Government departments (including AFCD and EPD), at least three months before the commencement of pond filling works.

10.13.1.4 A working group will be formed between CEDD (as San Tin Technopole's works agent) and AFCD (as SPS WCP's sponsoring department) to coordinate the progress of pond filling and SPS WCP implementation. With the coordination of the working group, ecological monitoring will be conducted to monitor the effectiveness of the proposed mitigation measures (i.e., ecological function enhancement measures). For example, the abundance and/or density of target indicator waterbird species shall be monitored. The standalone **EM&A Manual** further outlines the requirement and details to be included in the HCMP (e.g. monitoring period, location, frequency, parameters, and target levels).

10.13.1.5 The working group shall consult and regularly report to relevant stakeholders. Further enhancement measures shall be conducted under the coordination of the working group, where necessary, such as when the proposed ecological function enhancement measures show lower abundance and/or density of target indicator waterbird species than the mitigation target. Follow-up actions shall be investigated and implemented in liaison with the working group, where necessary. The follow-up actions associated with the ecological monitoring shall be provided in detail in the subsequent HCMP. The HCMP should be submitted for approval from relevant Government departments (including AFCD and EPD), at least three months before the commencement of pond filling works.

Egretry Monitoring

Pre-construction Egretry Survey

10.13.1.6 Two egretries (MPLV Egretry and MPV Egretry) were recorded within / adjacent to Project boundary during recent ecological survey (2022) and buffer area(s) of 100 m from the footprint of both egretries were proposed (**Figure 10.11** refers). Pre-construction

surveys are necessary to confirm the latest boundary of the egretries before commencement of the construction works, and the 100 m buffer area should be verified according to the latest site observation on the egretries. The Pre-construction Egretry Survey shall be conducted once per month during breeding season (between March and September) by qualified ecologist with 5 years relevant experience. A Pre-construction Egretry Survey Report should be submitted to relevant Government departments (including AFCD and EPD) for approval no later than two months before the commencement of works within the buffer area. Details of the Pre-construction Egretry Survey and the requirement of the subsequent Pre-construction Egretry Survey Report are provided in the standalone **EM&A Manual**.

10.13.1.7 An "Open Space" with enhancement features was proposed to preserve the MPLV Egretry. Upon the Pre-construction Egretry Survey, an Egretry Habitat Enhancement and Management Plan including the details of design plan, site preparation works, works schedule and management plan should be prepared by qualified ecologist with relevant experience and submitted to relevant Government departments (including AFCD and EPD) for approval no later than two months before the commencement of works within the buffer area.

Egretry Monitoring Survey

10.13.1.8 During construction phase, egretry monitoring survey should be conducted monthly for both MPLV Egretry and MPV Egretry during breeding season (between March and early September). Upon the completion of enhancement work at the "Open Space", egretry monitoring survey should be conducted monthly for the first three breeding seasons (between March and early September, for three years) of the operation phase. The monitoring survey should be conducted by qualified ecologist with 5 years relevant experience. The monitoring results should be reported in the monthly EM&A Reports. A further Method Statement on construction activities near the egretries and necessary tree crown pruning works shall be submitted to AFCD for approval in advance of the works.

Night Roost Monitoring

Pre-construction Night Roost Survey

10.13.1.9 Two night roosts (Ha Wan Tsuen Night Roost and San Tin Open Storage Area Night Roost) were identified within the Project boundary during recent ecological survey (2022) and encroachment into the footprint of night roosts is unavoidable (**Figures 10.6B** to **10.6D** refer). As such, compensation measure via the re-provision of roosting substratum have been proposed for both night roosts, to be located within the Project area.

10.13.1.10 Pre-construction surveys are necessary to confirm the latest boundary and details of the night roosts, as well as the 100 m buffer area before commencement of the construction works. The pre-construction survey shall be conducted once per month between September and March by qualified ecologist with 5 years relevant experience. A Pre-construction Night Roost Survey Report should be submitted to relevant Government departments (including AFCD and EPD) for approval no later than two months before the commencement of works within the buffer area. Details of the Pre-construction Night Roost Survey and the requirement of the subsequent Pre-construction Night Roost Survey Report are provided in the standalone **EM&A Manual**.

Night Roost Monitoring

10.13.1.11 While roosting substratum at the two night roosts would be felled during construction phase, re-provision of roosting substratum at the proposed Fisheries Research Centre (**Figures 10.6C** and **10.6D** refer) and along STWMDC (**Figure 10.6B** refers) would be completed before dry season, prior to the arrival of the overwintering ardeid and Great Cormorant. Felling of trees at both night roosts should only be conducted in wet season (April – September) when no roosting individuals are expected.

10.13.1.12 Night roost monitoring survey should be conducted at the original roosting sites until commencement of tree felling works, and upon re-provision of roosting substratum, conducted in the night roost re-provision sites and nearby area to investigate the effect of night roost re-provision site and confirm the locations of roosting ardeid and Great Cormorant, if any. Upon the successful establishment of the re-provided night roosts, a similar buffer area of 100 m should also be implemented at the footprint of the re-provided night roosts, where noisy construction activities should be subject to timing control. Details of the Night Roost Monitoring Survey, and the requirement for the monthly EM&A Reports (e.g. presentation of monitoring results and evaluation of the usage of the night roosts) are provided in the standalone **EM&A Manual**.

Flight Corridor Monitoring

Monitoring of Avifauna usage across the Proposed 300m wide Flight Corridor

10.13.1.13 A 300 m wide flight corridor across the LMC BCP would be retained under the Revised RODP, while noisy construction activities (with the use of PME) within this flight corridor would also be subject to timing control during dry season (October to March). Given the potential importance of this flight corridor, its bird usage should be monitored to ensure no adverse impacts arises from construction activities. Construction phase monitoring should be conducted, focusing on the composition of bird species and their abundance using the flight corridor, observed from suitable vantage point(s) such as the LMC Lookout. The flight line monitoring survey should be conducted during hours of peak usage (e.g. before sunrise) and conducted monthly when construction activities occur within this flight corridor. Details of the flight line monitoring, and the requirement for further minimisation measures are detailed in the standalone **EM&A Manual**.

Woodland Compensation Monitoring

10.13.1.14 For the unavoidable loss of woodland arising from the Project, compensatory planting was proposed as a mitigation measure, while the proposed location(s) and detailed design is subject to further agreement. A detailed Woodland Compensation Plan should be prepared by local ecologist / botanist with at least 5 years relevant experience to form the basis of the proposed compensatory planting. The Woodland Compensation Plan should include implementation details, management requirement, and monitoring requirements (e.g., methodology, schedule, frequency of monitoring, and monitoring parameters) of the compensatory planting area. The Woodland Compensation Plan should be submitted to relevant Government departments (including AFCD and EPD) for approval at least two months before commencement of planting.

10.13.1.15 Upon the completion of compensatory planting, a three-year monitoring by local ecologist / botanist with at least 5 years relevant experience is recommended to ensure proper establishment of this compensatory woodland. The associated monitoring and maintenance works (e.g., irrigation, weeding, pruning, control of pests and diseases, replacement planting and repair of damage) should be implemented and regularly performed, where required. Requirement of the Woodland Compensation Plan, and the subsequent woodland monitoring are provided in the standalone **EM&A Manual**.

Transplantation / Seedling Planting of Flora Species of Conservation Importance

10.13.1.16 All flora species of conservation importance (e.g. Cycad-fern *Brainea insignis*, Incense Tree *Aquilaria sinensis*, and Luofushan Joint-fir *Gnetum luofuense*) should be protected as far as practicable. As a mitigation measure, all the unavoidably affected individuals of Incense Tree and Cycad Fern should be preserved on site, or transplanted to nearby suitable habitat(s) prior to the commencement of site clearance as a last resort. Seedling planting of Luofushan Joint-fir in nearby suitable habitat(s) prior to the commencement of site clearance is recommended if on-site preservation is not feasible. A detailed Pre-construction Vegetation Survey should be conducted by a suitably qualified botanist / ecologist with at least 5 years relevant experience to identify and record the affected individuals prior to the commencement of any site clearance works. A Protection and

Transplantation / Seedling Planting Proposal including the subsequent monitoring visit for the affected individuals should be prepared and conducted by a suitably qualified ecologist / botanist with at least 5 years relevant experience. The Proposal should be submitted for approval from relevant Government departments (including AFCD and EPD) at least two months before works commencement.

10.13.1.17 Upon the transplantation / seedling planting of the identified individuals, a post-transplantation / post-seedling planting monitoring should be implemented to monitor the health conditions and survival of the transplanted individuals. Details of post-transplantation monitoring are provided in the standalone **EM&A Manual**.

Translocation of Fauna Species of Conservation Importance

10.13.1.18 Fauna species of conservation importance with low mobility should also be preserved as far as practicable, including two amphibian species Chinese Bullfrog and Spotted Narrow-mouthed Frog, one freshwater fish species Rose Bitterling (with the symbiotic freshwater Chinese Pond Mussel for the fish species, and two freshwater crab species *Cryptopotamon anacoluthon* and *Somanniathelphusa zanklon*. The species should be translocated to nearby suitable habitat(s) prior to the commencement of site clearance, while preliminary receptor sites are suggested in **Section 10.11**. A detailed pre-construction survey should be conducted by a suitably qualified ecologist to identify and record the affected individuals prior to the commencement of any site clearance works. A Translocation Proposal including the subsequent monitoring visits for the affected individuals should be prepared and conducted by a suitably qualified ecologist with at least 5 years relevant experience. The Proposal should be submitted for approval from relevant Government departments (including AFCD and EPD) at least two months before works commencement.

10.13.1.19 Upon the translocation of the identified individuals, a three-year post-translocation monitoring should be implemented to investigate the survival of translocated individuals as best as possible. Details of post-translocation monitoring are provided in the standalone **EM&A Manual**.

Pre-Construction Site Check and Nest Control

10.13.1.20 Breeding / nesting behaviour of Little Ringed Plover, White-shouldered Starling and White-throated Kingfisher were recorded within the Project Area during the survey period (2022). As a mitigation measure, nest control measures should be implemented to avoid direct injury / impact on breeding / nesting behaviour of the three avifauna species of conservation importance observed in Project area. Specific nest control measures for the species are discussed in **Section 10.11**. Pre-construction survey should be conducted in breeding season (March to July), with attention should be given to the specific breeding habitats of these species, to identify the locations and condition of the nest of these species within Project area. All breeding / nesting behaviour of any avifauna species of conservation importance identified and associated detailed nest control measures should be presented in the Pre-construction Survey Report, which shall be submitted for approval from relevant Government departments (including AFCD and EPD) no later than two months before commencement of work that involves the removal the breeding / nesting locations. The pre-construction survey and nest control measures should be conducted by qualified local ecologist with at least 10 years relevant experience to avoid injuring any breeding pairs, chicks and eggs. Details of pre-construction site check and nest control are provided in the standalone **EM&A Manual**.

Wildlife Corridor

10.13.1.21 Wildlife corridors are proposed in northern portion (between Ha Wan Tsuen and STEMDC, across LMC BCP) and in southern portion (near Shek Wu Wai Village, connecting future Green Belts) to minimize habitat fragmentation, while the detailed design of the wildlife corridor would be provided separately in design phase. To maintain the function of the wildlife corridor, monitoring of the wildlife corridor shall be conducted

during the first three years upon establishment. The conditions of the constructed wildlife corridor (e.g. structural integrity, vegetation overgrown, any observable usage) shall be monitored bi-monthly, while any potential usage of the wildlife corridor by mammal species (e.g. Eurasian Otter and Small Indian Civet) should also be recorded (e.g. with the use of camera traps). Maintenance work such as weeding, screening, and repairing broken fencing / structure should be conducted by the Project Proponent and the Contractor, where necessary, during the period of monitoring of the wildlife corridor conditions.

Pre-Construction Site Check for Eurasian Otter

10.13.1.22 While no sightings for Eurasian Otter have been made from recent surveys and from regular monitoring by WWF and KFBG, the overall wetland habitat was suggested to historically support a small population of Eurasian Otters and provide ecological connection, as evidenced by the presence of scats (Mcmillan et al., 2023). Considering the elusive nature of this species, pre-construction site check(s) for this species shall be considered under a conservative approach. Pre-construction site check(s) for signs of otter usage (e.g. presence of scats, and in particular, presence of otter holts or dens) shall be conducted prior to the commencement of construction activities at the wetland habitats on the northern portion of the Project site (e.g., San Tin, Sam Po Shue, and Lok Ma Chau). Where signs of otters were observed from pre-construction site checks or during construction, construction activities in the area shall be ceased, and the need for further mitigation measures shall be considered in liaison with relevant departments (e.g., AFCD). Details of pre-construction site check for Eurasian Otters are provided further in the standalone **EM&A Manual.**

Other Minimisation Measures

10.13.1.23 As described in **Section 3** and **Section 4**, EM&A programmes were recommended to ensure compliance in regard of the potential air quality and noise impacts (e.g. potential dust emission during construction phase, and potential noise exceedance from construction noise). Monitoring requirements for construction dust emission and construction noise monitoring are further stated at **Section 3** and **Section 4** respectively. Regular site environmental audit during construction phase is also recommended to ensure proper implementation of mitigation measures and good site practices. Details of the EM&A programme are provided in a stand-alone EM&A Manual.

10.13.1.24 As described in **Section 5**, water quality monitoring and regular site inspections would be undertaken during the construction to ensure that the recommended mitigation measures for water quality are properly implemented. Details on monitoring requirement for water quality is further stated in the Water Quality Impact Assessment (**Section 5**) and the stand-alone EM&A Manual.

10.14 CONCLUSION

10.14.1.1 Ecological impact assessment for the Project has been conducted following the EIA Study Brief No. ESB-340/2021 and the guidelines of the EIAO-TM Annexes 8 and 16. The Assessment Area was sub-divided into northern and southern portions, separated along Fanling Highway and San Tin Highway. A total of 16 habitat types were identified within the Assessment Area, with wetland habitats including mitigation wetland, pond (includes fishponds), marsh / reed, natural watercourse, modified watercourse, semi-natural watercourse, seasonally wet grassland, wet agricultural land, and non-wetland habitats including dry agricultural land, woodland, mixed woodland, plantation, shrubland, grassland, village / orchard, and developed area / wasteland. Wetland habitats were mostly concentrated on the northern portion while wooded habitats were mostly on the southern portion.

10.14.1.2 Within the Project boundary, sites of conservation importance were identified, including the Wetland Conservation Area (WCA), Wetland Buffer Area (WBA), Conservation Area (CA), Priority Site for Enhanced Conservation (Priority Site), and Site of Special Scientific Interest (SSSI). All of these encroached sites of conservation importance are located on the northern portion of the Project site. Direct impacts on these sites of conservation importance and associated wetland habitats would arise from the proposed development. A wetland compensation strategy has been developed to achieve the compensation requirement in accordance with the EIAO-TM, by enhancement of ecological function and capacity of the existing habitats to sufficiently compensate the wetland loss arising from the development of San Tin Technopole and achieve no-net-loss in ecological function and capacity of the wetlands concerned. The location of the proposed enhanced wetland was preliminarily identified within the future Sam Po Shue Wetland Conservation Park (SPS WCP) and is anticipated to improve the connectivity of wetland habitats in the region, while conservation strategies to be implemented within the SPS WCP are anticipated to provide ecological enhancement.

10.14.1.3 Permanent loss of some habitats would arise from the proposed development. Habitats within the Project site were mainly made up of developed area / habitat (which was generally of very low ecological value), followed by ponds (which was assessed to range from low to high ecological values, depending on the location and the conditions of the ponds). Considering the size of the potential impact on pond habitats (direct permanent loss of contiguous pond habitat on the north portion of Project area of about 89 ha, and indirect disturbance impact to adjacent contiguous pond habitat of about 63 ha), adverse ecological impacts may arise without mitigation measures. Other wetland habitats (including relatively scattered ponds on the southern portion, reed / marsh, watercourses, etc.) within the Project site would also be subject to direct loss. The Government will develop the Sam Po Shue Wetland Conservation Park (SPS WCP) with a proposed area of approximately 338 ha to create environmental capacity for the development of San Tin Technopole. Among the 338 ha, while 10 ha is reserved for supporting facilities such as visitor center and other basic infrastructure, the Government will enhance the ecological function and capacity of 288 ha of wetlands and fisheries resources of 40 ha of fishponds by establishing the SPS WCP with active conservation management and modernised aquaculture to compensate for the loss of pond and other wetland habitats and fisheries resources arising from the development of San Tin Technopole and to achieve no-net-loss in ecological function and capacity of the wetlands concerned. Among the 288 ha, there will be 253 ha of “ecologically enhanced fishponds” compensating for pond habitat loss, and 35 ha of “enhanced freshwater wetland habitat” compensating for other freshwater wetland habitat loss. The Government aims to start the development of SPS WCP in around 2026/2027 for completion by 2039 or earlier to tie in with the full operation of San Tin Technopole. For the site formation works of the first batch of land at San Tin Technopole targeted for commencement in late 2024, no pond filling will be involved. On current planning, pond filling works will not start until 2026/27, and the pace of pond filling will tie in with the development progress of the SPS WCP. To this end, a working group will be formed between CEDD (as San Tin Technopole’s works agent) and AFCD (as SPS WCP’s sponsoring department) to coordinate the progress of pond filling and SPS WCP implementation. Enhancement measures (in the form of improvement of tidal

channel at Mai Po Nature Reserve, and removal of exotic mangrove species in the Deep Bay area) would also be implemented. Furthermore, interim wetland enhancement works would also be conducted at suitable ponds in the Inner Deep Bay area prior to the commencement of pond filling works.

10.14.1.4 Aside from wetland habitat, small areas of woodland (about 1.70 ha) would be subject to direct loss under the proposed development. A woodland compensation plan would be formulated and submitted prior to the commencement of construction at the woodland habitat. With the proposed compensation measures, no unacceptable ecological impact is anticipated to arise from the loss of habitats under the proposed development.

10.14.1.5 A total of two egretries and five night roosts were observed to be active within the Assessment Area, including the MPLV Egretry, San Tin Open Storage Area Night Roost and Ha Wan Tsuen Night Roost, which were recorded within the Project boundary; while MPV Egretry was recorded immediately adjacent to the west of the Project boundary. Other night roosts (namely Sam Po Shue Night Roost, Lin Barn Tsuen Night Roost, and Tam Kon Chau Night Roost) were recorded at considerable distances from the Project site and are not anticipated to be subject to adverse ecological impacts. Mitigation measures were proposed for the direct impacts on the MPLV Egretry and both night roosts within the Project site. For the encroachment of the MPLV Egretry, an "Open Space" was proposed under the Revised RODP, preserving the core area of the MPLV Egretry, the roosting substratum, and the associated vegetation. Enhancement measures (e.g. water features and planting of mature trees) were also proposed at the "Open Space" located adjacent to the MPLV Egretry to promote ardeid usage. To further minimise construction disturbance on both MPLV and MPV Egretries, a 100 m buffer area should be set up around both egretries. The breeding season at the egretry lasts from March to early-September. Construction activities within this 100 m buffer area for the egretries should only be conducted outside the breeding season, from late-September to February in the following year, unless AFCD's prior approval on construction method has been obtained and appropriate mitigation measures have been proposed and adopted. While the loss of San Tin Open Storage Area Night Roost and Ha Wan Tsuen Night Roost would be unavoidable, roosting area would be re-provided at the "Open Space" along the bank of the diverted WC-N8 (STWMDC) and adjacent to the proposed AFCD Fisheries Research Centre respectively, under the Revised RODP. The re-provided night roost would comprise water features and mature individuals of native tree species that are currently used as a roosting substratum. These features should be established prior to the dry season (prior to the arrival of overwintering birds) in order to provide suitable roosting opportunities. To further minimise construction disturbance on the night roosts, similar minimisation measures should be implemented, with a 100 m buffer area should be set up around the existing night roosts (prior to removal of roosting substratum), and around the re-provision night roosts (upon the re-provision of roosting substratum). During dry season (October to March), timing control of construction activities would be implemented within this 100 m buffer area for night roosts. Noisy construction activities (with the use of PME) should cease at least an hour before sunset, and shall commence at least an hour after sunrise on the following day, making reference to the time of sunrise and sunset from the Hong Kong Observatory. Potential ecological impacts on the egretries and night roost would be mitigated with the above measures.

10.14.1.6 Major flight paths were observed traversing through the Project site, including flight paths from the MPLV Egretry, and an east-west flight corridor across LMC BCP. These flight corridors were maintained under the Project, with the incorporation of NBA (about 70 m wide flight corridor connecting the MPLV Egretry to the wetland habitats on the north; and about 300 m wide east-west flight corridor across the LMC BCP by NBA and stringent building height control), and associated limitation of building heights (e.g. stepping height of the building structures adjacent to the 300 m wide flight corridor), in order to avoid obstruction and minimise the potential disturbance of the recorded flight corridors. Flight lines recorded at the MPV Egretry would also be preserved via a 35m wide NBA (in the form of an "eco-interface") along the northwest of the project boundary, with landscape buffer between the proposed development and the wetland habitats on the northwest;

while building height of the proposed AFCD Wetland Conservation Park Management Office (located near the MPV Egretry) will also be restricted to two storeys.

10.14.1.7 Plant species of conservation importance (Cycad-fern, Incense Tree and Luofushan Joint-fir) were recorded within the Project boundary. A detailed vegetation survey should be conducted prior to the commencement of construction works to identify potentially affected plant individuals. All identified individuals would be labelled and fenced off on-site for better preservation, or in case of unavoidable loss, for transplantation or seedling planting according to the Protection and Transplantation / Seedling Planting Proposal. Fauna species of conservation importance with low mobility (two amphibian species Chinese Bullfrog and Spotted Narrow-mouthed Frog, freshwater fish species Rose Bitterling, and two freshwater crab species *Cryptopotamon anacoluthon* and *Somanniathelphusa zanklon*) and breeding / nesting behaviour of three avifauna species (Little Ringed Plover, White-shouldered Starling, and White-throated Kingfisher) were also recorded within the Project boundary. Due to the low mobility of these species and/or potential breeding individuals, translocation or nest control measures should be implemented to ensure the preservation of these individuals. Detailed pre-construction surveys should be conducted for these species, followed by translocation of the low mobility species, or nest control measures for the potential breeding / nesting avifauna, in accordance with the Translocation Proposal and Nest Control Proposal.

10.14.1.8 Movement corridor of wildlife (including non-flying mammal species) has also been considered and maintained under the Project, in both northern and southern portions of the Project site to mitigate for potential impacts due to habitat fragmentation. Wildlife corridors (that comprise both aboveground and underpass elements) were incorporated in the Project between the Loop and the proposed SPS WCP (on the north) and between wooded habitats (on the south). These wildlife corridors would provide opportunity for ecological linkage, allowing movement of non-flying mammals. Furthermore, while there were no recent records of Eurasian Otters from recent surveys and monitoring, a literature has revealed records of otter spraints, suggesting their historical presence and potential activity range across the Project area. The proposed wetland enhancement at SPS WCP and the incorporation of wildlife corridor would provide benefit to otters and promote potential usage. Pre-construction site check for Eurasian Otters was also proposed to minimise potential impact to the species.

10.14.1.9 A range of mitigation measures and good site practise has been proposed to reduce the disturbance impacts (e.g. noise, glare and dust) and water quality impacts on habitats, site of conservation and wildlife during construction phase. The proposed “eco-interface” (in the form of landscape buffer) would further minimise disturbance from land uses within the Project area during the operation phase.

10.14.1.10 With the implementation of the aforementioned mitigation measures, no unacceptable ecological impacts are anticipated to arise from the Project on the ecological resources recorded within the Project site and the Assessment Area.

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