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Baseline Ecological Monitoring: Comprehensive Development and Wetland Protection near Yau Mei San Tsuen

Baseline Ecological Monitoring Report (August 2015 - July 2016)

Job Ref.: 15/1070/352 HEND-YMST2
Date: October 2017

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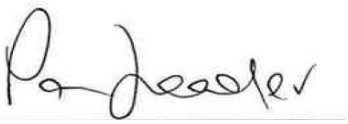
Reviewed by:	**Paul Leader**	
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1 INTRODUCTION

1.1 Project Background

1.1.1 The Project Area (hereafter the PA) covers an area of about 8.1ha. It lies between Fairview Park and the south of Palm Springs and is located to the north of Yau Pok Road. The northern portion of the PA falls within the Wetland Conservation Area (WCA). The fish ponds in this portion constitute part of a Priority Site (i.e. Deep Bay Wetland outside Ramsar Site, ranked as the ninth out of the twelve listed Priority Sites) for Enhanced Conservation under the New Nature Conservation Policy implemented in 2004.

1.1.2 The PA is within the area covered by the Approved Mai Po and Fairview Park Outline Zoning Plan (OZP) No. S/YL-MP/6 and presently zoned "Other Specified Uses annotated "Comprehensive Development and Wetland Protection Area" ("OU(CDWPA)"), which allows comprehensive low-density residential development or redevelopment provided that all the existing continuous and contiguous fish ponds within the zone are protected and conserved.

1.1.3 An EIA Report (EIA-227/2015), which contains a Wetland Restoration Plan (WRP), for a residential development within the PA was approved by Environmental Protection Department (DEP), with an Environmental Permit (EP-500/2015) granted on 12 August 2015. Following the approval of the EIA Report, a S16 planning application was submitted in line with the TPB-PG No. 12C, and approved by the Town Planning Board (TPB) with conditions on 30 September 2016. The WRP submitted for the S16 application is exactly the same as that in the EIA Report.

1.1.4 In accordance with Condition 5.6 of EP-500/2015, it is required that "the Permit Holder shall carry out baseline ecological monitoring for target species and other wetland-dependent fauna within the Project Area and Assessment Area as defined in the EIA report, during the 12 months prior to commencement of any site clearance required for wetland and/or residential construction. The baseline monitoring results should be reported in the Baseline Monitoring Report". The WRP submitted along with the EIA Report (EIA-227/2015) also states that the target species for the Wetland Restoration Area (WRA) may be revised in light of the findings of the Baseline Ecological Monitoring.

1.2 Purpose of the Report

1.2.1 This Baseline Ecological Monitoring Report presents findings of the 12-month Baseline Ecological Monitoring undertaken between August 2015 and July 2016, which is to update the ecological baseline data in order to identify the target species and serves as a basis for setting the numerical target levels of the target species (which, in turn, serve as an evaluation of the success in achieving numerical targets for the target species). These numerical targets will be proposed in the updated WRP to be submitted to the Agriculture, Fisheries and Conservation Department (AFCD) and Environmental Protection Department (EPD) for approval as described in condition no. 2.7 of the Environmental Permit (EP-500/2015).

2 SURVEY PROGRAMME AND METHODOLOGIES

2.1.1 The dates of all surveys undertaken between August 2015 and July 2016 are provided in **Table 1**, while methodologies for these surveys are described in **Appendix 1**. Survey transects are shown in the **Figure 1.**

Table 1 *Ecological survey schedule of the reporting period (number of surveys per month)*

Survey	Aug 2015	Sep 2015	Oct 2015	Nov 2015	Dec 2015	Jan 2016	Feb 2016	Mar 2016	Apr 2016	May 2016	Jun 2016	Jul 2016	Total Number of Surveys
Bird survey (day-time)	2	2	2	2	2	2	2	2	2	2	2	2	24
Bird survey at NTMDC	2	2	2	2	2	2	2	2	2	2	2	2	24
Herpetofauna survey (day-time)	1	1	1	1					1	1	1	1	8
Herpetofauna survey (night-time)	1							1	1	1	1	1	6
Odonate and butterfly survey	2	1	1	1				1	2	2	2	2	14

3 SURVEY FINDINGS

3.1 Bird Surveys

3.1.1 A total of 98 species were recorded during the surveys between August 2015 and July 2016, while 82 were recorded within the PA. **Table 2** presents the maximum number (amongst the 24 surveys) of each bird species recorded within the PA and AA during the twelve-month survey. **Appendix 2** presents the survey findings for birds in each habitat between August 2015 and July 2016.

Table 2 *Maximum number of bird species recorded at the Project Area (PA) and Assessment Area (AA) between August 2015 and July 2016.*

Common Name [1]	Scientific Name	Conservation Status [2]	Level of Concern [3]	Maximum Number[4]	
				PA	AA
Eurasian Wigeon*	*Anas penelope*	Least Concern	RC	3	
Northern Shoveler*	*Anas clypeata*	Least Concern	RC	9	21
Garganey*	*Anas querquedula*	Least Concern	-		1
Eurasian Teal*	*Anas crecca*	Least Concern	RC	2	14
Little Grebe*	*Tachybaptus ruficollis*	Least Concern	LC	1	6
Black-faced Spoonbill*	*Platalea minor*	Endangered	PGC		4
Yellow Bittern*	*Ixobrychus sinensis*	Least Concern	(LC)	4	2
Black-crowned Night Heron*	*Nycticorax nycticorax*	Least Concern	(LC)	2	1
Chinese Pond Heron*	*Ardeola bacchus*	Least Concern	PRC (RC)	17	6
Eastern Cattle Egret*	*Bubulcus coromandus*	Least Concern	(LC)	24	5
Grey Heron*	*Ardea cinerea*	Least Concern	PRC	2	18
Purple Heron*	*Ardea purpurea*	Least Concern	RC	1	
Great Egret*	*Ardea alba*	Least Concern	PRC (RC)	1	5
Intermediate Egret*	*Egretta intermedia*	Least Concern	RC	1	1
Little Egret*	*Egretta garzetta*	Least Concern	PRC (RC)	4	8
Great Cormorant*	*Phalacrocorax carbo*	Least Concern	PRC	8	14
Black Kite	*Milvus migrans*	Least Concern	(RC)	1	
Eastern Buzzard	*Buteo japonicus*	Least Concern	-		2
White-breasted Waterhen*	*Amaurornis phoenicurus*	Least Concern	-	6	8
Common Moorhen*	*Gallinula chloropus*	Least Concern	-	7	7

Common Name [1]	Scientific Name	Conservation Status [2]	Level of Concern [3]	Maximum Number[4]	
				PA	AA
Black-winged stilt*	*Himantopus himantopus*	Least Concern	RC		3
Pied Avocet*	*Recurvirostra avosetta*	Least Concern	RC		44
Little Ringed Plover*	*Charadrius dubius*	Least Concern	(LC)	1	
Greater Painted-snipe*	*Rostratula benghalensis*	Least Concern	LC	23	
Pintail/Swinhoe's Snipe*	*Gallinago stenura/Gallinago megala*	Least Concern	LC for Swinhoe's Snipe	6	1
Common Snipe*	*Gallinago gallinago*	Least Concern	-	1	2
Common Redshank*	*Tringa totanus*	Least Concern	RC		1
Marsh Sandpiper*	*Tringa stagnatilis*	Least Concern	RC		3
Common Greenshank*	*Tringa nebularia*	Least Concern	RC	1	5
Green Sandpiper*	*Tringa ochropus*	Least Concern	-	1	1
Common Sandpiper*	*Actitis hypoleucos*	Least Concern	-	2	3
Whiskered Tern*	*Chlidonias hybrida*	Least Concern	-		1
Spotted Dove	*Spilopelia chinensis*	Least Concern	-	19	9
Greater Coucal	*Centropus sinensis*	Least Concern	-	1	5
Asian Koel	*Eudynamys scolopaceus*	Least Concern	-	2	3
Plaintive Cuckoo	*Cacomantis merulinus*	Least Concern	-	1	1
Large Hawk Cuckoo	*Hierococcyx sparverioides*	Least Concern	-	1	
Savanna Nightjar	*Caprimulgus affinis*	Least Concern	-	5	5
House Swift	*Apus nipalensis*	Least Concern	-	13	20
White-throated Kingfisher*	*Halcyon smyrnensis*	Least Concern	(LC)	2	2
Common Kingfisher*	*Alcedo atthis*	Least Concern	-	1	1
Pied Kingfisher*	*Ceryle rudis*	Least Concern	(LC)	2	3
Eurasian Hoopoe	*Upupa epops*	Least Concern	-	1	
Common Kestrel	*Falco tinnunculus*	Least Concern	-	1	
Amur Falcon	*Falco amurensis*	Least Concern	-		1
Bull-headed Shrike	*Lanius bucephalus*	Least Concern	-	1	
Brown Shrike	*Lanius cristatus*	Least Concern	-	1	1
Long-tailed Shrike	*Lanius schach*	Least Concern	-	4	4
Black-naped Oriole	*Oriolus chinensis*	Least Concern	LC	1	
Black Drongo	*Dicrurus macrocercus*	Least Concern	-	6	4
Hair-crested Drongo	*Dicrurus hottentottus*	Least Concern	-	1	
Red-billed Blue Magpie	*Urocissa erythroryncha*	Least Concern	-		1
Eurasian Magpie	*Pica pica*	Least Concern	-	2	2
Collared Crow*	*Corvus torquatus*	Near Threatened	LC		2
Large-billed Crow	*Corvus macrorhynchos*	Least Concern	-	1	1
Cinereous Tit	*Parus cinereus*	-	-	5	3
Red-whiskered Bulbul	*Pycnonotus jocosus*	Least Concern	-	11	16
Chinese Bulbul	*Pycnonotus sinensis*	Least Concern	-	8	11
Sooty-headed Bulbul	*Pycnonotus aurigaster*	Least Concern	-	5	1
Barn Swallow	*Hirundo rustica*	Least Concern	-	13	25

Common Name [1]	Scientific Name	Conservation Status [2]	Level of Concern [3]	Maximum Number[4]	
				PA	AA
Red-rumped Swallow	*Cecropis daurica*	Least Concern	-	4	
Japanese Bush Warbler	*Horornis diphone*	Least Concern	-	2	
Dusky Warbler	*Phylloscopus fuscatus*	Least Concern	-	15	5
Pallas's Leaf Warbler	*Phylloscopus proregulus*	Least Concern	-	1	1
Yellow-browed Warbler	*Phylloscopus inornatus*	Least Concern	-	9	3
Oriental Reed Warbler*	*Acrocephalus orientalis*	-	-		1
Black-browed Reed Warbler*	*Acrocephalus bistrigiceps*	Least Concern	-	2	3
Zitting Cisticola	*Cisticola juncidis*	Least Concern	LC	2	3
Golden-headed Cisticola	*Cisticola exilis*	Least Concern	LC	2	
Yellow-bellied Prinia	*Prinia flaviventris*	Least Concern	-	11	16
Plain Prinia	*Prinia inornata*	Least Concern	-	7	4
Common Tailorbird	*Orthotomus sutorius*	Least Concern	-	4	2
Masked Laughingthrush	*Garrulax perspicillatus*	Least Concern	-	8	13
Japanese White-eye	*Zosterops japonicus*	Least Concern	-	10	20
Crested Myna	*Acridotheres cristatellus*	Least Concern	-	12	10
Common Myna	*Acridotheres tristis*	Least Concern	-	2	1
Red-billed Starling	*Spodiopsar sericeus*	Least Concern	GC	25	10
White-cheeked Starling	*Spodiopsar cineraceus*	Least Concern	PRC	25	1
Black-collared Starling	*Gracupica nigricollis*	Least Concern	-	14	14
White-shouldered Starling	*Sturnia sinensis*	Least Concern	(LC)	1	
Grey-backed Thrush	*Turdus hortulorum*	Least Concern	-		3
Common Blackbird	*Turdus merula*	Least Concern	-	1	2
Oriental Magpie Robin	*Copsychus saularis*	Least Concern	-	4	6
Siberian Rubythroat	*Calliope calliope*	Least Concern	-	1	
Red-throated Flycatcher	*Ficedula albicilla*	Least Concern	-		1
Daurian Redstart	*Phoenicurus auroreus*	Least Concern	-	3	1
Stejneger's Stonechat	*Saxicola stejnegeri*	-	-	11	3
Eurasian Tree Sparrow	*Passer montanus*	Least Concern	-	30	28
Scaly-breasted Munia	*Lonchura punctulata*	Least Concern	-	214	20
Eastern Yellow Wagtail	*Motacilla tschutschensis*	Least Concern	-	3	4
White Wagtail	*Motacilla alba*	Least Concern	-	4	4
Richard's Pipit	*Anthus richardi*	Least Concern	-	7	5
Olive-backed Pipit	*Anthus hodgsoni*	Least Concern	-	3	1
Red-throated Pipit	*Anthus cervinus*	Least Concern	LC	5	1
Chinese Grosbeak	*Eophona migratoria*	Least Concern	LC	1	
Chestnut-eared Bunting	*Emberiza fucata*	Least Concern	LC	1	
Little Bunting	*Emberiza pusilla*	Least Concern	-		2
Black-faced Bunting	*Emberiza spodocephala*	Least Concern	-		1
No. of bird species				**82**	**80**
No. of species of conservation importance and/or wetland-dependent birds				**38**	**45**

Notes: (1) * indicates wetland-dependent species
(2) IUCN (2016).

(3) Fellowes *et al.* (2002): LC = Local Concern; RC = Regional Concern; GC = Global 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.

(4) Maximum number was obtained amongst the abundance of the 24 surveys conducted.

3.1.2 In terms of bird species of conservation importance and/or wetland-dependent birds, 38 species were recorded within the PA, most of which are common in a Deep Bay context and recorded in low numbers on site. Black-faced Spoonbill and Collared Crow are considered Endangered and Near Threatened respectively by the IUCN Red List (2016), but both were only found in the AA rather than the PA. Amur Falcon, considered as a rare passage migrant by AFCD assessment (AFCD 2016), was observed in Pond 10 (within AA) on 24 October 2015. In the PA, a Bull-headed Shrike (rare passage migrant) was found in the agricultural habitat on 15 October 2015, while Chestnut-eared Bunting (scarce passage migrant) and Golden-headed Cisticola (scarce winter visitor) were found in the same habitat on 4 February 2016. All the four species have been previously recorded in Deep Bay or surrounding areas (e.g. Kam Tin; AFCD, 2016). These three bird species (Bull-headed Shrike, Chestnut-eared Bunting and Golden-headed Cisticola) were all recorded in agricultural land in the Project Area. Bull-headed Shrike prefers the edges of abandoned agricultural land near forest as wintering site (Carey *et al.* 2001). Chestnut-eared Bunting occurs in abandoned agricultural land (Carey *et al.* 2001). Golden-headed Cisticola occurs in areas with long grass (Carey *et al.* 2001). They are either passage migrants or winter visitors, furthermore these were not recorded in numbers considered to be of significance.

3.1.3 During the 12-month monitoring, thirty-two bird species were recorded using the NTMDC. These 32 bird species included 16 wetland-dependent species (**Table 3**). Four individuals of Black-faced Spoonbill were recorded foraging in the Section 1 of NTMDC at low tide in December 2016 (Sections 1 and 2 as shown on **Figure 1**).

Table 3 *Mean number per survey and maximum count (in brackets) of individuals of wetland-dependent birds recorded along two sections of NTMDC (August 2015-July 2016).*

Species	High Tide			Low Tide		
	Section 1	Section 2	All Sections	Section 1	Section 2	All Sections
Northern Shoveler	-	0.25(4)	0.25(4)	-	0.42(5)	0.42(5)
Black-faced Spoonbill	-	-	-	0.17(4)	-	0.17(4)
Black-crowned Night Heron	-	-	-	-	0.04(1)	0.04(1)
Chinese Pond Heron	0.08(1)	0.29(3)	0.38(3)	0.21(2)	0.08(1)	0.29(2)
Grey Heron	0.96(10)	0.38(5)	1.33(10)	1.21(10)	0.08(2)	1.29(10)
Great Egret	0.17(2)	-	0.17(2)	0.33(4)	0.04(1)	0.38(4)
Intermediate Egret	-	-	-	0.04(1)	-	0.04(1)
Little Egret	0.08(1)	0.13(2)	0.21(2)	0.5(3)	0.33(5)	0.83(5)
Great Cormorant	-	0.13(2)	0.13(2)	-	0.04(1)	0.04(1)
White-breasted Waterhen	0.04(1)	0.04(1)	0.08(1)	0.04(1)	-	0.04(1)
Black-winged stilt	0.04(1)	-	0.04(1)	-	-	-
Pied Avocet	-	0.08(1)	0.08(1)	-	0.21(3)	0.21(3)
Common Greenshank	-	-	-	0.04(1)	-	0.04(1)
Common Sandpiper	0.04(1)	0.08(1)	0.13(1)	-	0.17(3)	0.17(3)
White-throated Kingfisher	-	0.04(1)	0.04(1)	0.04(1)	0.04(1)	0.08(1)
Common Kingfisher	-	0.04(1)	0.04(1)	-	-	-

Note: A total of 12 surveys were conducted during high and low tides respectively. The mean number and maximum number were obtained from these 12 surveys respectively for the corresponding tides. Locations of the two sections are shown on **Figure 1**.

3.2 Herpetofauna Surveys

3.2.1 Seven reptile species and eight amphibian species were observed during the twelve-month monitoring in both PA and AA. **Tables 4** and **5** present the herpetofauna species recorded during the current survey period. An individual of Many-banded Krait was recorded in grassland habitat within AA on 21st April 2016. Although Many-banded Krait is considered to be of Potential Regional Concern by Fellowes *et al.* (2002), it is widely distributed throughout Hong Kong. **Appendices 3** and **4** present the survey findings for herpetofauna species between August 2015 and July 2016.

Table 4 *Maximum number of reptile species recorded at the Project Area (PA) and Assessment Area (AA) between August 2015 and July 2016*

Common Name	Scientific Name	Conservation Status by Fellowes *et al.* (2002)	Maximum Number(1)	
			PA	AA
Red-eared Slider	*Trachemys scripta*	-		1
Changeable Lizard	*Calotes versicolor*	-		1
Long-tailed Skink	*Eutropis longicaudata*	-		3
Reeves' Smooth Skink	*Scincella reevesii*	-	3	
Bowring's Gecko	*Hemidactylus bowringii*	-	2	2
Large-spotted Cat Snake	*Boiga multomaculata*	-	1	
Many-banded Krait	*Bungarus multicinctus*	PRC		1
No. of species recorded			**3**	**5**
No. of species of conservation importance			**0**	**1**

Note:
(1) Maximum number was obtained amongst the abundance of the 8 surveys conducted.

Table 5 *Maximum number of amphibian species recorded at the Project Area (PA) and Assessment Area (AA) between August 2015 and July 2016*

Common Name	Scientific Name	Conservation Status by Fellowes *et al.* (2002)	Maximum Number(1)	
			PA	AA
Asian Common Toad	*Duttaphrynus melanostictus*	-	3	18
Spotted Narrow-mouthed Frog	*Kalophrynus interlineatus*	-	10	
Asiatic Painted Frog	*Kaloula pulchra*	-	1	3
Ornate Pigmy Frog	*Microhyla fissipes*	-	5	
Paddy Frog	*Fejervarya limnocharis*	-	1	2
Günther's Frog	*Hylarana guentheri*	-	17	13
Brown Tree Frog	*Polypedates megacephalus*	-	4	5
Greenhouse Frog	*Eleutherodactylus planirostris*	-		3
No. of species recorded			**7**	**6**
No. of species of conservation importance			**0**	**0**

Note:
(1) Maximum number was obtained amongst the abundance of the 6 surveys conducted.

3.3 Odonate and Butterfly Surveys

3.3.1 A total of 28 odonate species were found during the surveys, 24 within the PA and 20 within the AA. Three dragonfly species of conservation importance were recorded, namely Coastal Glider, Ruby Darter and Scarlet Basker. They are regarded as "Local Concern" by Fellowes *et al.* (2002), but are considered Common in Hong Kong (Tam *et al.* 2011) (**Table 6**). **Appendix 5** presents the odonate species recorded during the current survey period.

Table 6 *Maximum number of odonate species recorded at the Project Area (PA) and Assessment Area (AA) between August 2015 and July 2016*

Common Name	Scientific Name	Conservation Status by Fellowes *et al.* (2002)	Status in Hong Kong (Tam *et al.* 2011)	Maximum Number(1)	
				PA	AA
Orange-tailed Midget	*Agriocnemis femina*	-	Abundant		20
Wandering Midget	*Agriocnemis pygmaea*	-	Common		1
Orange-tailed Sprite	*Ceriagrion auranticum*	-	Abundant	15	127
Common Bluetail	*Ischnura senegalensis*	-	Abundant	7	1
Yellow Featherlegs	*Copera marginipes*	-	Abundant	1	
Pale-spotted Emperor	*Anax guttatus*	-	Common	4	4
Lesser Emperor	*Anax parthenope*	-	Common	1	
Common Flangetail	*Ictinogomphus pertinax*	-	Common	3	1
Golden Flangetail	*Sinictinogomphus clavatus*	-	Common	1	
Elusive Adjutant	*Aethriamanta brevipennis*	-	Uncommon	6	4
Blue Dasher	*Brachydiplax chalybea*	-	Common	11	9
Asian Amberwing	*Brachythemis contaminata*	-	Abundant	3	
Crimson Darter	*Crocothemis servilia*	-	Abundant	2	4
Coastal Glider	*Macrodiplax cora*	Local Concern	Common	1	2
Russet Percher	*Neurothemis fulvia*	-	Common	1	
Pied Percher	*Neurothemis tullia*	-	Common	1	4
Red-faced Skimmer	*Orthetrum chrysis*	-	Abundant	1	1
Common Red Skimmer	*Orthetrum pruinosum*	-	Abundant	1	
Green Skimmer	*Orthetrum sabina*	-	Abundant	9	6
Wandering Glider	*Pantala flavescens*	-	Abundant	232	77
Pied Skimmer	*Pseudothemis zonata*	-	Common	3	
Ruby Darter	*Rhodothemis rufa*	Local Concern	Common	1	1
Variegated Flutterer	*Rhyothemis variegata*	-	Common	176	75
Evening Skimmer	*Tholymis tillarga*	-	Common	9	7
Saddlebag Glider	*Tramea virginia*	-	Abundant	5	5
Crimson Dropwing	*Trithemis aurora*	-	Abundant	1	
Scarlet Basker	*Urothemis signata*	Local Concern	Common		2
Dingy Dusk-darter	*Zyxomma petiolatum*	-	Common		1
			No. of species recorded	**24**	**20**
			No. of species of conservation importance	**2**	**3**

Note:
(1) Maximum number was obtained amongst the abundance of the 14 surveys conducted.

3.3.2 During the butterfly surveys, a total of 43 species were found, 32 within the PA and 31 within the AA. Two species of conservation importance was recorded (within the PA): Small Cabbage White was recorded in Agricultural Land A8 on 29 March 2016, while one Swallowtail was recorded in on 23 June 2016 in Agricultural Land A3. Both are considered Rare by Chan *et al.* (2011). Small Cabbage White has been recorded in vegetable fields on Lantau and New Territories (including Kam Tin), whereas Swallowtail has been recorded in woodside areas or shrubland on Lantau, Hong Kong Island and Northern New Territories (Lo & Hui 2010; Chan *et al.* 2011). Since the two species were recorded only once within the PA, there was little evidence that the PA was their permanent foraging ground. **Table 7** and **Appendix 6** present the butterfly species recorded between August 2015 and July 2016.

Table 7 *Maximum number of butterfly species recorded at the Project Area (PA) and Assessment Area (AA) between August 2015 and July 2016*

Common Name	Scientific Name	Conservation Status by Fellowes *et al.* (2002)	Status in Hong Kong (Chan *et al.*2011)	Maximum Number[(1)]	
				PA	AA
Bush Hopper	*Ampittia dioscorides*	-	Uncommon	1	
Formosan Swift	*Borbo cinnara*	-	Common		1
Contiguous Swift	*Polytremis lubricans*	-	Common		2
Chinese Dart	*Potanthus confucius*	-	Uncommon	1	1
Indian Palm Bob	*Suastus gremius*	-	Uncommon	1	
Greenish Palm Dart	*Telicota ancilla*	-	Uncommon	1	
Common Hedge Blue	*Acytolepis puspa*	-	Common		1
Tailed Cupid	*Everes lacturnus*	-	Common		1
Dark Cerulean	*Jamides bochus*	-	Common	1	7
Long-tailed Blue	*Lampides boeticus*	-	Common		1
Pale Grass Blue	*Pseudozizeeria maha*	-	Very Common	2	5
Slate Flash	*Rapala manea*	-	Common	1	
Chocolate Royal	*Remelana jangala*	-	Common		1
Common Tiger	*Danaus genutia*	-	Common	2	1
Blue-spotted Crow	*Euploea midamus*	-	Very Common	4	1
Glassy Tiger	*Parantica aglea*	-	Common	1	1
Blue Tiger	*Tirumala limniace*	-	Common	1	
Angled Castor	*Ariadne ariadne*	-	Common	3	
White-edged Blue Baron	*Euthalia phemius*	-	Common	1	1
Red-ring Skirt	*Hestina assimilis*	-	Common	1	2
Great Egg-fly	*Hypolimnas bolina*	-	Common	2	3
Peacock Pansy	*Junonia almana*	-	Common	1	
Chocolate Pansy	*Junonia iphita*	-	Common	2	
Common Sailer	*Neptis hylas*	-	Very Common	1	2
Short-banded Sailer	*Phaedyma columella*	-	Common		1
Common Palmfly	*Elymnias hypermnestra*	-	Common	2	3
Dark-brand Bush Brown	*Mycalesis mineus*	-	Very Common	8	2
South China Bush Brown	*Mycalesis zonata*	-	Common	1	1
Common Five-ring	*Ypthima baldus*	-	Very Common	1	1
Tailed Jay	*Graphium agamemnon*	-	Common	1	1

Common Name	Scientific Name	Conservation Status by Fellowes *et al.* (2002)	Status in Hong Kong (Chan *et al.*2011)	Maximum Number(1)	
				PA	AA
Common Jay	*Graphium doson*	-	Common		1
Red Helen	*Papilio helenus*	-	Very Common	1	1
Great Mormon	*Papilio memnon*	-	Very Common		1
Paris Peacock	*Papilio paris*	-	Very Common	1	
Common Mormon	*Papilio polytes*	-	Very Common	6	5
Spangle	*Papilio protenor*	-	Very Common		2
Swallowtail	*Papilio xuthus*	-	Rare	1	
Lemon Emigrant	*Catopsilia pomona*	-	Common	5	7
Common Grass Yellow	*Eurema hecabe*	-	Very Common	8	11
Common Gull	*Cepora nerissa*	-	Common	1	
Great Orange Tip	*Hebomoia glaucippe*	-	Common		1
Indian Cabbage White	*Pieris canidia*	-	Very Common	51	19
Small Cabbage White	*Pieris rapae*	-	Rare	1	
No. of species recorded				**32**	**31**
No. of species of conservation importance				**2**	**0**

Note:
(1) Maximum number was obtained amongst the abundance of the 14 surveys conducted.

4 DISCUSSION OF BASELINE ECOLOGICAL MONITORING RESULTS

4.1.1 The 12-month baseline ecological monitoring as required by the EP was conducted between August 2015 and July 2016; it covered bird survey, herpetofauna survey and odonate and butterfly surveys. The fauna monitoring results suggested that the PA continues to support a relatively low number of fauna of conservation importance and/or wetland-dependence species.

5 REVIEW OF TARGETS

5.1 General

5.1.1 Based on the WRP submitted along with the EIA Report, to qualify as a Target Species a species must fulfill the following requirement:

- Species of Conservation Importance based upon criteria provided by IUCN Species Survival Commission (2012), BirdLife International (2006 and web updates) and/or Fellowes *et al*. (2002), which was recorded during the baseline ecological monitoring in numbers considered to be of significance.

5.1.2 All data from the baseline ecological monitoring were reviewed to determine whether or not there were species (especially wetland-dependent species) which, although not of conservation importance, were recorded in particularly high numbers in a local context. The aim of this review was to determine whether or not the site is of importance to species in the context of their distribution and abundance in Deep Bay or Hong Kong as a whole, which in turn, although not of conservation importance, would be significantly impacted by the proposed development.

5.1.3 In the following sections, the results of the surveys undertaken for the EIA Study and the Baseline Ecological Monitoring are reviewed.

5.2 Birds

Table 8 *Bird species of conservation importance recorded during transect surveys in the Project Area in the EIA report and the Baseline Ecological Monitoring, and their respective number of surveys recorded, mean and maximum count.*

Species	Conservation Status in Hong Kong [1]	EIA Study			Baseline Ecological Monitoring		
		No. of Surveys [2]	Mean[2]	Max[2]	No. of Surveys [2]	Mean[2]	Max[2]
Eurasian Wigeon *Anas penelope*	RC	-	-	-	1	0.13	3
Northern Shoveler *Anas clypeata*	RC	-	-	-	5	0.92	9
Eurasian Teal *Anas crecca*	RC	-	-	-	1	0.08	2
Little Grebe *Tachybaptus ruficollis*	LC	-	-	-	1	0.04	1
Yellow Bittern *Ixobrychus sinensis*	(LC)	1	0.08	1	4	0.38	4
Black-crowned Night Heron *Nycticorax nycticorax*	(LC)	1	0.08	1	2	0.13	2
Chinese Pond Heron *Ardeola bacchus*	PRC (RC)	8	3.58	9	24	4.29	17
Eastern Cattle Egret *Bubulcus coromandus*	(LC)	-	-	-	15	4.17	24
Grey Heron *Ardea cinerea*	PRC	2	0.25	2	5	0.25	2
Purple Heron *Ardea purpurea*	RC	-	-	-	4	0.17	1
Great Egret *Ardea alba*	PRC (RC)	4	0.33	1	2	0.08	1
Intermediate Egret *Egretta intermedia*	RC	-	-	-	4	0.17	1
Little Egret *Egretta garzetta*	PRC (RC)	9	2.75	18	12	0.88	4
Great Cormorant *Phalacrocorax carbo*	PRC	-	-	-	1	0.33	8
Black Kite *Milvus migrans*	(RC)	-	-	-	1	0.04	1
Little Ringed Plover *Charadrius dubius*	(LC)	5	6.58	25	1	0.04	1
Greater Painted-snipe *Rostratula benghalensis*	LC	1	0.08	1	2	1.17	23
Pintail/Swinhoe's Snipe *Gallinago stenura/Gallinago megala*	LC for Swinhoe's Snipe	2	0.42	3	5	0.67	6
Common Greenshank *Tringa nebularia*	RC	-	-	-	1	0.04	1
Wood Sandpiper *Tringa glareola*	LC	2	0.25	2	-	-	-
White-throated Kingfisher *Halcyon smyrnensis*	(LC)	4	0.33	1	5	0.25	2
Pied Kingfisher *Ceryle rudis*	(LC)	-	-	-	1	0.08	2
Black-naped Oriole *Oriolus chinensis*	LC	-	-	-	1	0.04	1
Zitting Cisticola	LC	2	0.42	4	5	0.25	2

Species	Conservation Status in Hong Kong (1)	EIA Study			Baseline Ecological Monitoring		
		No. of Surveys (2)	Mean(2)	Max(2)	No. of Surveys (2)	Mean(2)	Max(2)
Cisticola juncidis							
Golden-headed Cisticola *Cisticola exilis*	LC	-	-	-	1	0.08	2
Red-billed Starling *Spodiopsar sericeus*	GC	1	0.42	5	3	1.63	25
White-cheeked Starling *Spodiopsar cineraceus*	PRC	1	0.08	1	3	1.13	25
Daurian Starling *Agropsar sturninus*	LC	1	0.08	1	-	-	-
White-shouldered Starling *Sturnia sinensis*	(LC)	1	1	12	1	0.04	1
Red-throated Pipit *Anthus cervinus*	LC	7	10.08	30	3	0.29	5
Chinese Grosbeak *Eophona migratoria*	LC	1	0.08	1	1	0.04	1
Chestnut-eared Bunting *Emberiza fucata*	LC	-	-	-	1	0.04	1

Notes:

(1) Conservation status follows Fellowes *et al.* (2002): GC = Global Concern, PRC = Potential Regional Concern, RC = Regional Concern, LC = Local Concern. Status in parentheses indicates that this evaluation is based on communal roosting/breeding populations;

(2) Twelve bird surveys were conducted in the EIA study while 24 bird surveys were conducted during the 12-month baseline ecological monitoring (i.e. the present study). The mean number and maximum number were obtained from the number of surveys conducted respectively in the EIA study and the present study.

5.2.1 The WRP submitted along with the EIA Report listed Little Egret, Chinese Pond Heron, Greater Painted-snipe and Red-throated Pipit as bird target species. Inevitably there are some differences in the numbers recorded between the two surveys detailed in **Table 8**. Of these, numbers of Little Egret and Red-throated Pipit were lower during the baseline ecological monitoring.

5.2.2 Numbers of Red-throated Pipit however were much lower, dropping from a mean of 10.08 per survey in the EIA Study to 0.29 per survey in the Baseline Ecological Monitoring. As this is not a wetland-dependent species and the intent of the zoning of the site as OU(CDWPA) is to protect fishpond habitats and the wetland-dependent species they support, it is proposed that this species be dropped as a target species.

5.2.3 An average of 4.17 Eastern Cattle Egrets was recorded in the Baseline Ecological Monitoring; this species was not recorded in the EIA Study. This is a wetland-dependent species and one that is declining in the Deep Bay area. As such, this species could be considered as a target species. However, this species qualifies as being of Local Concern only on the basis of breeding populations (Fellowes *et al.* 2002), and was largely recorded outside of the breeding season with most birds recorded during the spring and autumn migration periods (see **Table 9**). Furthermore, the nearest egretry with breeding Eastern Cattle Egrets (Mai Po Marshes Nature Reserve), contained only five nests of this species in 2016 (Anon 2016). Hence, Eastern Cattle Egret is not considered to qualify as a target species.

Table 9 *Number of surveys and mean per survey recorded for Eastern Cattle Egret in the Project Area during the Baseline Ecological Monitoring.*

	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16
Number of Surveys Recorded[1]	1	2	2	2	1	-	1	2	2	2	-	-
Mean per Survey Recorded	10.0	18.0	5.0	2.0	0.5	-	1.5	3.0	6.5	3.5	-	-

Note:
1. Two surveys were conducted each month during the baseline ecological monitoring.

5.2.4 Red-billed Starling was recorded within the Project Area in three surveys (December 2015, February and March 2016; out of 24 surveys throughout the baseline ecological monitoring survey period) with the maximum count of 25 individuals in one survey. Although this species is a wetland associated species, it was not recorded regularly in the Project Area and 25 individuals recorded in one occasion is not considered as significant. The peak count in Hong Kong is 11,260; furthermore this is highly mobile, flocking species, and is widespread in Hong Kong, particularly associated with the open country, and wetland and anthropogenic habitats (e.g. agricultural lands, fishponds). In the context of the relatively low numbers recorded and the infrequency of records, Red-billed Starling is not considered to qualify as a target species. However, the wooded areas and grassy bunds proposed in the WRA can provide suitable habitats for this species.

5.2.5 White-cheeked Starling was recorded within the Project Area in three surveys (August, February and March; out of 24 surveys throughout the baseline ecological monitoring survey period) with the maximum count of 25 individuals in one survey. Although this species is a wetland associated species, it was not recorded regularly in the Project Area and 25 individuals recorded in one occasion is not considered as significant. The peak count in Hong Kong is 430; furthermore this is highly mobile, flocking species, and is widespread in Hong Kong, particularly associated with the open country, and wetland and anthropogenic habitats (e.g. agricultural lands, fishponds). In the context of the relatively low numbers recorded and the infrequency of records, White-cheeked Starling is not considered to qualify as a target species. However, the wooded areas and grassy bunds proposed in the WRA can provide suitable habitats for this species.

5.2.6 Three scarce bird species (Bull-headed Shrike, Chestnut-eared Bunting and Golden-headed Cisticola) were all recorded in agricultural land in the Project Area. They are either passage migrants or winter visitors, furthermore, these were not recorded in numbers considered to be of significance, therefore they do not qualify as target species.

5.2.7 No additional bird species (as identified in the WRP submitted along with the EIA Report) were considered to qualify as target species. A summary of the bird target species is provided in **Table 10**.

Table 10 *Bird Target species for the WRA based on findings of Baseline Ecological Monitoring.*

Species	Comments based on Baseline Ecological Monitoring	Conservation Status
Chinese Pond Heron *Ardeola bacchus*	Regularly recorded in the PA with counts up to 17 birds.	Potential Regional Concern. Breeding/roosting sites of Regional Concern (Fellowes *et al.* 2002)
Little Egret *Egretta garzetta*	Regularly recorded in the PA with counts up to 4 birds.	Potential Regional Concern. Breeding/roosting sites of Regional Concern

Species	Comments based on Baseline Ecological Monitoring	Conservation Status
		(Fellowes *et al.* 2002)
Greater Painted-snipe *Rostratula benghalensis*	Only two observations in the PA but up to 23 recorded.	Local Concern (Fellowes *et al.* 2002)

Target levels

5.2.8 The WRP submitted along with the EIA Report for the project states that the Baseline Ecological Monitoring would provide the baseline for evaluation of the success in achieving numerical targets for the target species to be achieved during the operation of the WRA. This is calculated as the mean number of birds per survey recorded during the Baseline Ecological Monitoring (i.e. the total number of each species recorded on all surveys divided by the number of surveys). The target levels for the target species are presented in **Table 11**.

Table 11 *Target level for the Bird Target Species based on findings of Baseline Ecological Monitoring.*

Species	Target Level (mean per survey)[1]
Chinese Pond Heron	4.3
Little Egret	0.9
Greater Painted-snipe	1.2

Note: 1. Rounded to 1 decimal place.

5.2.9 During the operation of the WRA, on-going levels will be calculated on the basis of an annual rolling mean for each species (i.e. the total number of individuals of each species recorded on all surveys in the previous 12-month period divided by the number of surveys during that period). This will allow for the marked seasonality in some of the target species (see **Appendix 2**).

5.3 Reptiles

Table 12 *Reptile species of conservation importance recorded during transect surveys in the PA in EIA report and the Baseline Ecological Monitoring, and their respective number of surveys recorded, mean and maximum count.*

Species	Conservation Status in HK(1)	EIA Study			Baseline Ecological Monitoring		
		No. of surveys(2)	Mean(2)	Max(2)	No. of surveys(2)	Mean(2)	Max(2)
Many-banded Krait *Bungarus multicinctus*	PRC; EN	1	0.25	1	-	-	-

Notes:

(1) Conservation Status follows Fellowes *et al.* (2002) and CSIS (2016). Fellowes *et al.* (2002): PRC = Potential Regional Concern; CSIS (2016): EN = Endangered.

(2) Four night-time surveys were conducted in the EIA study while 6 surveys were conducted during the 12-month baseline ecological monitoring (i.e. the present study). The mean number and maximum number were obtained from the number of surveys conducted respectively in the EIA study and the present study.

5.3.1 No reptile species were considered to qualify as target species.

5.4 Amphibians

Table 13 *Amphibian species of conservation importance recorded during transect surveys in the PA in EIA report and the Baseline Ecological Monitoring, and their respective number of surveys recorded, mean and maximum count.*

Species	Conservation Status[1]	EIA Study			Baseline Ecological Monitoring		
		No. of surveys[2]	Mean[2]	Max[2]	No. of surveys[2]	Mean[2]	Max[2]
Spotted Narrow-mouthed Frog *Kalophrynus interlineatus*	NT	1	0.17	2	2	1.07	10

Notes:

(1) Conservation status follows Fellowes *et al.* (2002) and CSIS (2016). CSIS (2016): NT = Near Threatened.

(2) Twelve amphibian surveys were conducted in the EIA study while 14 surveys were conducted during the 12-month baseline ecological monitoring (i.e. the present study). The mean number and maximum number were obtained from the number of surveys conducted respectively in the EIA study and the present study.

5.4.1 Eight amphibian species were recorded in the Baseline Ecological Monitoring, seven of which were found within the PA. One of these species, Spotted Narrow-mouthed Frog is of conservation importance, and all the others are common and widespread in the New Territories (Chan *et al*. 2005). A maximum of ten Spotted Narrow-mouthed Frogs was recorded during the daytime survey within the PA (up from a maximum of two in the EIA Study), while moderate numbers of Ornate Pigmy Frog *Microhyla ornata* and Paddy Frog *Fejervarya limnocharis* were recorded during the wet season night-time surveys in the agriculture habitat within the PA.

5.4.2 Amphibians have low mobility and cannot easily re-locate to habitats which are separated by anthropogenic features, and some species may not easily escape from construction activities. Development of the site may therefore result in significant mortality or habitat fragmentation, resulting in impacts to the amphibian community. Although the species are common in Hong Kong and the impacts would not be significant in a Hong Kong context, it is proposed to relocate as many amphibians as possible into the WRA to minimise direct mortality and to facilitate the early establishment of a viable amphibian community within the WRA. Amphibians have therefore been **retained** as a target group for the restored wetlands during the review process.

Target levels

5.4.3 The mean per survey of the amphibian species recorded within the Project Site is listed in **Table 14**. As the amphibians will be retained as a target group, the target level is set for this fauna group as a whole and presented in **Table 14**. The target level is the annual mean (per survey) of this fauna group. This is calculated as the mean number of amphibians (of all species) per survey recorded during the Baseline Ecological Monitoring (i.e. the total number of individuals of all amphibian species recorded on all surveys divided by the number of surveys in the year under evaluation).

Table 14 *Target level for amphibians based on the findings of Baseline Ecological Monitoring*

Species	Mean per Survey
Asian Common Toad	0.50
Spotted Narrow-mouthed Frog	1.07
Asiatic Painted Frog	0.07
Ornate Pigmy Frog	0.43
Paddy Frog	0.07
Günther's Frog	3.93
Brown Tree Frog	0.64
Target Level (mean per survey of this fauna group)[1]	**6.7**

Note: 1. Rounded to 1 decimal place.

5.4.4 During the operation of the WRA, on-going levels will be calculated on the basis of an annual mean for the faunal group (i.e. the total number of individuals of all amphibian species recorded on all surveys in the wet season divided by the number of surveys in the year under evaluation).

5.5 Butterflies

Table 15 *Butterfly species of conservation importance recorded during transect surveys in the PA in the EIA report and the Baseline Ecological Monitoring, and their respective number of surveys recorded, mean and maximum count.*

Species	Conservation Status in HK(1)	EIA Study			Baseline Ecological Monitoring		
		No. of surveys(2)	Mean(2)	Max(2)	No. of surveys(2)	Mean(2)	Max(2)
Danaid Egg-fly *Hypolimnas misippus*	LC	2	0.25	1	-	-	-
Swallowtail *Papilio xuthus*	R	-	-	-	1	0.07	1
Small Cabbage White *Pieris rapae*	R	-	-	-	1	0.07	1

Notes:

(1) Conservation Status follows Fellowes *et al.* (2002) and Chan *et al.* (2011). Fellowes *et al.* (2002): LC = Local Concern; Chan *et al.* (2011): R = Rare.

(2) Eight butterfly surveys were conducted in the EIA study while 14 surveys were conducted during the 12-month baseline ecological monitoring (i.e. the present study). The mean number and maximum number were obtained from the number of surveys conducted respectively in the EIA study and the present study.

5.5.1 The number of both Swallowtail and Small Cabbage White recorded during the baseline ecological monitoring is not of significance and as such neither qualified as target species. Existing *Citrus* spp., which is the larval foodplant of Swallowtail, will be retained as far as practical, otherwise new *Citrus* spp. will be planted within the WRA to provide potential larval foodplant to this species. No butterfly species were considered to qualify as target species.

5.6 Odonates

Table 16 *Odonate species of conservation importance recorded during transect surveys in the Project Area (PA) in the EIA report and the the Baseline Ecological Monitoring, and their respective number of surveys recorded, mean and maximum count.*

Species	Conservation Status in HK(1)	EIA Study			Baseline Ecological Monitoring		
		No. of surveys(2)	Mean(2)	Max(2)	No. of surveys(2)	Mean(2)	Max(2)
Coastal Glider *Macrodiplax cora*	LC	1	0.13	1	2	0.21	2
Ruby Darter *Rhodothemis rufa*	LC	-	-	-	3	0.21	1

Notes:

(1) Conservation status follows Fellowes *et al.* (2002): LC = Local Concern ;

(2) Eight odonate surveys were conducted in the EIA study while 14 surveys were conducted during the 12-month baseline ecological monitoring (i.e. the present study). The mean number and maximum number were obtained from the number of surveys conducted respectively in the EIA study and the present study.

5.6.1 No odonate species were considered to qualify as target species.

5.7 Habitat Requirements for the Target Species

5.7.1 Habitat requirements for each of the Revised Target Species are given below and summarised in **Table 17**.

Little Egret

5.7.2 Little Egrets are found in Hong Kong throughout the year, primarily in the northeast and northwest New Territories. Habitat utilization has been studied by Young (1994), Young and Chan (1997) and Cornish (1996). These studies showed that Little Egrets in Hong Kong feed primarily in fishpond and intertidal areas. Little Egrets also feed opportunistically on stranded fish in ponds which are being drained, and are often the most abundant bird species in such circumstances. Breeding birds typically forage within 3 km of egretries (Young 1994).

Chinese Pond Heron

5.7.3 Chinese Pond Herons are found throughout the year in Hong Kong, and although widespread, most records are from the New Territories. Habitat utilization has been studied in Hong Kong by Young (1994) who showed that birds breeding at the Mai Po Village egretry fed mainly around fishponds. Individuals typically forage solitarily along the edges of open water areas or in areas with sparse or short vegetation. Chinese Pond Herons utilize communal day or night roosting sites in areas with medium-sized trees or tall bamboo, either immediately adjacent to, or overhanging, ponds or creeks. They eat small fish, but also invertebrates and amphibians (Carey *et al*. 2001).

Greater Painted-snipe

5.7.4 Greater Painted-snipe is a passage migrant and winter visitor, with a small breeding population which is extremely localised and has previously declined (Carey *et al*. 2001). Although formerly widespread this species is now largely restricted to freshwater agricultural land and in recent years has bred at a few sites in the northwest New Territories, notably Long Valley and Kam Tin but has recently also spread to Mai Po and Lok Ma Chau.

5.7.5 Greater Painted-snipe prefers areas with low, dense herbaceous vegetation and shallow water (0-10cm). It is able to make use of suitable ephemeral wetlands, and is also regularly forced to abandon sites that dry out during the dry season. However, areas of suitable habitat that contain even small areas that remain wet in the dry season may support relatively high numbers and often have birds throughout the year.

Amphibians

5.7.6 Most amphibians favour permanent or, particularly, seasonal marsh habitats (from which predatory fish are absent), with good development of emergent and/or edge vegetation and variable, but generally shallow water depth.

Table 17 *Summary of the habitats to be provided for the Target Species in the WRA.*

Target Species	Shallow Water	Reedbed	Marsh	Grassy Bund	Wooded Bund	Bamboo Clump	Gravel
Little Egret	F	F		R	R	R	R
Chinese Pond Heron	F	F	F	R	R	R	
Greater Painted-snipe	F		B, F, R				
Amphibians	F, B		F, B, R	F, R	D		

Note: habitat important for B = Breeding: F = Foraging; R = Roosting/resting; D = Dispersal.

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0 50 100 200 300 400 Meters

Royal Springs

Palm Springs

Fairview Park

Ngau Tam Mei Main Drainage Channel

Section 1

Section 2

Legend

- Project Area
- Assessment Area
- Transect for Baseline Monitoring
- Agricultural Land
- Active Dry Agricultural Land
- Pond
- Marsh
- Reedbed/ Marsh
- Reedbed
- Stream
- Drainage Channel
- Grassland
- Seasonally Wet Grassland
- Seasonally Wet Reedbed/Grassland
- Grassland/ Shrubland
- Secondary Woodland
- Plantation
- Village Area
- Wasteground
- Developed Area
- Open Storage
- Road

ecology arboriculture landscape aec

Project Title:

Comprehensive Development and Wetland Protection near Yau Mei San Tsuen

Figure Title:

Transect for Ecological Baseline Monitoring

Drawn by:	JH	Scale:	1:5,400 on A4
Checked By:	EW	Date:	22 Sep 2017
Approved by:	PJL		
Figure Number:	Figure 1	Revision:	0

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Appenidx 1 Survey Methodologies.

Bird Surveys

Bird surveys were conducted along transects covering the representative areas of each habitat type within the PS and AA during early mornings (when birds are most active). All birds sighted/heard along transects were recorded and quantified as far as possible. Any nest/breeding activities will also be noted. Special attention was paid to the use of wetland habitats within and in the immediate vicinity of the PA by the currently proposed target species (i.e. Little Egret, Chinese Pond Heron and Greater Painted-snipe and amphibians) and other waterbirds. For the Ngau Tam Mei Drainage Channel (NTMDC), surveys were timed to cover both high and low tide periods.

Herpetofauna Surveys

Day-time herpetofauna surveys were carried out along fixed survey route by direct observation and active searching at potential refuges (such as leaf litter, ground holes, underneath logs or metallic plates, stagnant/running water bodies etc.) for the signs or presence of adult, tadpoles, eggs, or shed body parts. Night-time surveys were also conducted for nocturnal reptiles and amphibians.

Odonate and Butterfly Surveys

Odonates and butterfly surveys were conducted by direct observation and active search from transects within the PA and AA in suitable weather conditions. All odonates and butterflies encountered were recorded, identified and counted as far as practical.

Appendix 2 Bird Species Recorded between August 2015 and July 2016.

Table A2-1 *Mean (per survey) and Maximum Number (amongst 24 surveys) of Bird Species Recorded in Project Area and Assessment Area between August 2015 and July 2016.*

Common Name [1]	Scientific Name	Conservation Status [2]	Level of Concern [3]	Project Area					Assessment Area												
				Agricultural Land	Grassland/ Shrubland	Marsh	Pond	Reedbed	Agricultural Land	Developed Area	Drainage Channel	Grassland	Grassland/ Shrubland	Plantation	Pond	Reedbed	Reedbed/ Marsh	Road	Seasonally Wet Grassland	Stream	Village Area
Eurasian Wigeon*	*Anas penelope*	LC	RC				0.13(3)														
Northern Shoveler*	*Anas clypeata*	LC	RC	0.21(5)			0.71(9)				0.67(5)				1.58(21)						
Garganey*	*Anas querquedula*	LC	-												0.04(1)						
Eurasian Teal*	*Anas crecca*	LC	RC				0.08(2)								1.42(14)						
Little Grebe*	*Tachybaptus ruficollis*	LC	LC				0.04(1)								0.92(6)				0.08(2)		
Black-faced Spoonbill*	*Platalea minor*	EN	PGC								0.17(4)										
Yellow Bittern*	*Ixobrychus sinensis*	LC	(LC)			0.08(2)	0.29(2)								0.13(2)						
Black-crowned Night Heron*	*Nycticorax nycticorax*	LC	(LC)	0.08(2)			0.04(1)				0.04(1)				0.13(1)						
Chinese Pond Heron*	*Ardeola bacchus*	LC	PRC (RC)	3.46(17)		0.04(1)	0.67(8)	0.13(16)	0.08(2)		0.83(3)	0.25(3)	0.04(1)		0.92(6)	0.04(1)	0.29(3)				
Eastern Cattle Egret	*Bubulcus coromandus*	LC	(LC)	4.17(24)								0.29(5)			0.04(1)				0.04(1)		
Grey Heron*	*Ardea cinerea*	LC	PRC	0.17(1)			0.08(1)				3.75(16)	0.29(4)			0.58(2)		0.04(1)				
Purple Heron*	*Ardea purpurea*	LC	RC				0.17(1)														
Great Egret*	*Ardea alba*	LC	PRC (RC)	0.08(1)					0.04(1)		0.83(5)				0.25(2)						
Intermediate Egret*	*Egretta intermedia*	LC	RC	0.17(1)							0.04(1)	0.04(1)			0.04(1)						
Little Egret*	*Egretta garzetta*	LC	PRC (RC)	0.83(4)			0.04(3)				1.33(8)	0.08(1)			0.42(2)		0.08(1)	0.04(1)			
Great Cormorant*	*Phalacrocorax carbo*	LC	PRC				0.33(8)				0.17(2)				2.67(12)						
Black Kite	*Milvus migrans*	LC	(RC)	0.04(1)																	
Eastern Buzzard	*Buteo japonicus*	LC	-												0.08(2)						
White-breasted Waterhen*	*Amaurornis phoenicurus*	LC	-	0.42(6)		0.08(1)	0.17(1)				0.17(2)				0.58(2)		0.25(2)	0.04(1)		0.08(1)	
Common Moorhen*	*Gallinula chloropus*	LC	-	0.25(5)		0.08(2)	0.79(4)								0.63(2)		0.04(1)				
Black-winged stilt*	*Himantopus himantopus*	LC	RC								0.04(1)				0.13(2)						
Pied Avocet*	*Recurvirostra avosetta*	LC	RC								0.29(3)				8.38(43)						
Little Ringed Plover*	*Charadrius dubius*	LC	(LC)	0.04(1)																	
Greater Painted-snipe*	*Rostratula benghalensis*	LC	LC	1.17(23)																	
Pintail/Swinhoe's Snipe*	*Gallinago stenura/ Gallinago megala*	LC/LC	LC for Swinhoe's Snipe	0.67(6)																	
Common Snipe*	*Gallinago gallinago*	LC	-	0.04(1)								0.04(1)			0.13(2)						
Common Redshank*	*Tringa totanus*	LC	RC												0.04(1)						
Marsh Sandpiper*	*Tringa stagnatilis*	LC	RC												0.21(3)						
Common Greenshank*	*Tringa nebularia*	LC	RC	0.04(1)							0.04(1)				0.75(5)						
Green Sandpiper*	*Tringa ochropus*	LC	-	0.08(1)											0.04(1)						
Common Sandpiper*	*Actitis hypoleucos*	LC	-	0.17(2)							0.29(3)				0.04(1)						
Whiskered Tern*	*Chlidonias hybrida*	LC	-									0.04(1)									
Spotted Dove	*Spilopelia chinensis*	LC	-	5.08(19)			0.58(5)	0.08(1)	0.13(1)	0.17(2)	0.08(2)	0.38(4)	0.13(3)	0.04(1)	0.88(3)		0.21(2)	0.33(3)	0.13(2)	0.04(1)	0.42(6)
Greater Coucal	*Centropus sinensis*	LC	-	0.17(1)			0.04(1)				0.17(2)	0.04(1)	0.13(2)		0.04(1)		0.04(1)		0.08(2)		0.04(1)

Common Name [1]	Scientific Name	Conservation Status [2]	Level of Concern [3]	Project Area					Assessment Area												
				Agricultural Land	Grassland/ Shrubland	Marsh	Pond	Reedbed	Agricultural Land	Developed Area	Drainage Channel	Grassland	Grassland/ Shrubland	Plantation	Pond	Reedbed	Reedbed/ Marsh	Road	Seasonally Wet Grassland	Stream	Village Area
Asian Koel	*Eudynamys scolopaceus*	LC	-	0.42(2)			0.08(1)			0.08(1)					0.13(2)		0.04(1)	0.29(2)	0.04(1)		
Plaintive Cuckoo	*Cacomantis merulinus*	LC	-	0.04(1)											0.04(1)						
Large Hawk Cuckoo	*Hierococcyx sparverioides*	LC	-	0.04(1)																	
Savanna Nightjar	*Caprimulgus affinis*	LC	-		0.21(5)							0.42(5)						0.13(2)			
House Swift	*Apus nipalensis*	LC	-	0.58(13)								0.96(20)			0.25(6)						
White-throated Kingfisher*	*Halcyon smyrnensis*	LC	(LC)	0.25(2)					0.04(1)		0.13(1)				0.08(1)				0.04(1)		
Common Kingfisher*	*Alcedo atthis*	LC	-	0.04(1)			0.13(1)				0.04(1)							0.04(1)		0.08(1)	
Pied Kingfisher*	*Ceryle rudis*	LC	(LC)	0.08(2)											0.17(3)				0.08(2)		
Eurasian Hoopoe	*Upupa epops*	LC	-	0.04(1)																	
Common Kestrel	*Falco tinnunculus*	LC	-	0.04(1)																	
Amur Falcon	*Falco amurensis*	LC	-												0.04(1)						
Bull-headed Shrike	*Lanius bucephalus*	LC	-	0.04(1)																	
Brown Shrike	*Lanius cristatus*	LC	-	0.08(1)													0.04(1)				
Long-tailed Shrike	*Lanius schach*	LC	-	1.33(4)			0.17(2)	0.08(1)	0.04(1)			0.21(4)	0.13(2)	0.04(1)	0.29(1)		0.13(1)	0.13(2)			
Black-naped Oriole	*Oriolus chinensis*	LC	LC	0.04(1)																	
Black Drongo	*Dicrurus macrocercus*	LC	-	0.83(6)			0.04(1)		0.08(1)			0.38(4)			0.04(1)		0.13(1)				
Hair-crested Drongo	*Dicrurus hottentottus*	LC	-	0.04(1)																	
Red-billed Blue Magpie	*Urocissa erythroryncha*	LC	-																		0.04(1)
Eurasian Magpie	*Pica pica*	LC	-	0.21(2)							0.04(1)	0.04(1)			0.04(1)			0.08(2)			0.04(1)
Collared Crow*	*Corvus torquatus*	NT	LC									0.04(1)						0.08(2)			
Large-billed Crow	*Corvus macrorhynchos*	LC	-	0.04(1)			0.04(1)				0.04(1)				0.04(1)			0.04(1)			
Cinereous Tit	*Parus cinereus*	-	-	0.17(2)			0.21(3)			0.04(1)				0.13(3)	0.17(1)		0.13(2)	0.04(1)			0.08(2)
Red-whiskered Bulbul	*Pycnonotus jocosus*	LC	-	1.54(11)			1(7)		0.04(1)	0.33(3)			0.17(4)	0.08(2)	1.08(6)		0.25(4)	0.5(6)		0.38(5)	1.17(10)
Chinese Bulbul	*Pycnonotus sinensis*	LC	-	1.13(4)		0.08(2)	1.04(6)		0.38(4)	0.46(4)	0.21(2)	0.25(2)	0.08(2)		0.96(5)		0.17(3)	0.67(6)	0.08(2)	0.13(2)	0.29(4)
Sooty-headed Bulbul	*Pycnonotus aurigaster*	LC	-	0.29(5)								0.04(1)									
Barn Swallow	*Hirundo rustica*	LC	-	1.38(13)		0.08(2)	0.13(1)				1.04(12)	0.25(3)	0.25(4)		1.08(11)		0.29(6)	0.46(5)			0.13(3)
Red-rumped Swallow	*Cecropis daurica*	LC	-	0.17(4)																	
Japanese Bush Warbler	*Horornis diphone*	LC	-	0.04(1)		0.04(1)															
Dusky Warbler	*Phylloscopus fuscatus*	LC	-	1.42(10)		0.17(2)	1.58(5)	0.04(1)			0.17(3)	0.08(1)			0.54(2)		0.25(3)			0.08(2)	
Pallas's Leaf Warbler	*Phylloscopus proregulus*	LC	-	0.04(1)											0.13(1)						
Yellow-browed Warbler	*Phylloscopus inornatus*	LC	-	0.21(2)		0.13(2)	0.58(5)								0.21(2)		0.04(1)				0.08(1)
Oriental Reed Warbler*	*Acrocephalus orientalis*	-	-									0.04(1)			0.08(1)						
Black-browed Reed Warbler*	*Acrocephalus bistrigiceps*	LC	-	0.13(2)			0.17(2)								0.17(3)		0.17(3)				
Zitting Cisticola	*Cisticola juncidis*	LC	LC	0.25(2)					0.08(2)			0.04(1)			0.04(1)						
Golden-headed Cisticola	*Cisticola exilis*	LC	LC	0.08(2)																	
Yellow-bellied Prinia	*Prinia flaviventris*	LC	-	0.71(4)		0.08(1)	1.33(7)	0.04(1)	0.08(1)	0.04(1)	0.58(6)	0.29(2)	0.08(2)	0.04(1)	1.92(7)		0.29(2)	0.21(2)	0.04(1)	0.04(1)	0.08(2)
Plain Prinia	*Prinia inornata*	LC	-	1.58(7)		0.21(2)	0.58(3)	0.08(2)	0.08(2)		0.17(1)	0.21(3)	0.21(4)		0.33(2)		0.17(2)	0.13(2)			
Common Tailorbird	*Orthotomus sutorius*	LC	-	0.46(4)		0.04(1)	0.17(2)	0.04(1)							0.33(2)			0.13(1)	0.04(1)	0.04(1)	0.04(1)
Masked Laughingthrush	*Garrulax perspicillatus*	LC	-	0.58(4)		0.25(6)	0.58(6)		0.13(1)			0.13(3)		0.42(10)	0.42(6)			1.5(10)		0.04(1)	0.25(3)

Common Name [1]	Scientific Name	Conservation Status [2]	Level of Concern [3]	Project Area					Assessment Area												
				Agricultural Land	Grassland/ Shrubland	Marsh	Pond	Reedbed	Agricultural Land	Developed Area	Drainage Channel	Grassland	Grassland/ Shrubland	Plantation	Pond	Reedbed	Reedbed/ Marsh	Road	Seasonally Wet Grassland	Stream	Village Area
Japanese White-eye	*Zosterops japonicus*	LC	-	1.21(10)			0.46(5)			0.25(5)		0.42(10)		0.42(10)	2.83(20)		0.08(2)	0.5(5)	0.04(1)	0.21(5)	0.46(5)
Crested Myna	*Acridotheres cristatellus*	LC	-	2.54(12)			0.04(1)			0.13(3)	0.54(5)	0.29(3)	0.04(1)	0.13(3)	0.46(7)		0.17(2)	1.33(7)			
Common Myna	*Acridotheres tristis*	LC	-	0.08(2)											0.04(1)						0.04(1)
Red-billed Starling	*Spodiopsar sericeus*	LC	GC	1.63(25)											0.79(10)		0.08(2)				
White-cheeked Starling	*Spodiopsar cineraceus*	LC	PRC	1.13(25)					0.04(1)												
Black-collared Starling	*Gracupica nigricollis*	LC	-	4.63(11)		0.08(1)	0.25(2)	0.46(5)	0.42(3)	0.04(1)	0.17(3)	0.63(6)	0.17(4)		0.79(6)		0.13(1)	1.17(5)	0.04(1)		0.04(1)
White-shouldered Starling	*Sturnia sinensis*	LC	(LC)	0.04(1)																	
Grey-backed Thrush	*Turdus hortulorum*	LC	-															0.13(3)			
Common Blackbird	*Turdus merula*	LC	-				0.04(1)								0.17(2)		0.04(1)				0.04(1)
Oriental Magpie Robin	*Copsychus saularis*	LC	-	0.75(4)			0.08(2)		0.21(2)	0.08(2)				0.08(2)	0.25(2)			0.38(4)		0.13(1)	0.33(2)
Siberian Rubythroat	*Calliope calliope*	LC	-	0.04(1)																	
Red-throated Flycatcher	*Ficedula albicilla*	LC	-													0.04(1)					
Daurian Redstart	*Phoenicurus auroreus*	LC	-	0.38(3)								0.08(1)			0.04(1)		0.04(1)				
Stejneger's Stonechat	*Saxicola stejnegeri*	-	-	2.13(10)			0.71(10)		0.04(1)		0.04(1)	0.13(2)			0.13(2)		0.17(2)				
Eurasian Tree Sparrow	*Passer montanus*	LC	-	2.58(30)				0.08(2)		0.21(5)	0.25(4)	0.17(3)	1.13(20)	0.04(1)	0.04(1)			0.33(5)			
Scaly-breasted Munia	*Lonchura punctulata*	LC	-	20.29(214)		0.17(4)	0.71(13)		0.46(8)		0.67(8)	0.92(15)	0.63(15)		1.54(20)		0.25(6)	0.04(1)			
Eastern Yellow Wagtail	*Motacilla tschutschensis*	LC	-	0.33(3)								0.25(4)			0.08(1)				0.08(2)		
White Wagtail	*Motacilla alba*	LC	-	0.96(4)							0.38(4)				0.08(1)			0.08(1)		0.04(1)	
Richard's Pipit	*Anthus richardi*	LC	-	1.71(7)					0.04(1)			0.08(1)			0.13(3)				0.08(2)		
Olive-backed Pipit	*Anthus hodgsoni*	LC	-	0.25(3)												0.04(1)					0.04(1)
Red-throated Pipit	*Anthus cervinus*	LC	LC	0.29(5)								0.04(1)									
Chinese Grosbeak	*Eophona migratoria*	LC	LC				0.04(1)														
Chestnut-eared Bunting	*Emberiza fucata*	LC	LC	0.04(1)																	
Little Bunting	*Emberiza pusilla*	LC	-												0.08(2)						
Black-faced Bunting	*Emberiza spodocephala*	LC	-								0.04(1)				0.04(1)						
No. of species recorded				**73**	**1**	**14**	**39**	**9**	**18**	**11**	**32**	**34**	**13**	**10**	**66**	**3**	**28**	**26**	**14**	**12**	**18**
No. of species of conservation importance and/or wetland-dependent birds				**31**	**0**	**3**	**15**	**1**	**5**	**0**	**16**	**11**	**1**	**0**	**29**	**1**	**7**	**4**	**2**	**2**	**0**

Note:
(1) * indicates wetland-dependent species.
(2) IUCN (2016). IUCN Red List of Threatened Species. (available online at http://www.iucnredlist.org): EN = Endangered; NT = Near Threatened; LC = Least Concern.
(3) Fellowes *et al.* (2002): LC = Local Concern; RC = Regional Concern; GC = Global 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.

Table A2-2 *Mean per survey (two surveys conducted each month) of the Bird Target Species recorded within the Project Area during the Ecological Baseline Monitoring.*

	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16	Jul-16
Chinese Pond Heron	12.5	11.0	8.0	1.5	2.0	2.0	1.0	2.0	2.0	2.5	1.0	2.5
Little Egret	2.5	2.5	0.5	-	-	-	1.0	0.5	-	1.5	0.5	1.0
Greater Painted-snipe	-	2.5	11.5	-	-	-	-	-	-	-	-	-
Red-throated Pipit	-	-	2.5	-	-	-	1.0	-	-	-	-	-

Appendix 3 Maximum Number (amongst eight surveys and other records during site visits other than reptile surveys) of Reptile Species Recorded in Project Area and Assessment Area between August 2015 and July 2016.

Common Name	Scientific Name	Level of Concern[1]	Conservation Status[2]	Project Area			Assessment Area					
				Agricultural Land	Marsh	Pond	Agricultural Land	Drainage Channel	Grassland	Road	Stream	Village Area
Red-eared Slider	*Trachemys scripta*	-	-					1				
Changeable Lizard	*Calotes versicolor*	-	-							1		
Long-tailed Skink	*Eutropis longicaudata*	-	-							2	1	1
Reeves' Smooth Skink	*Scincella reevesii*	-	-		1	2						
Bowring's Gecko	*Hemidactylus bowringii*	-	-	2			1			2		1
Large-spotted Cat Snake	*Boiga multomaculata*	-	-			1						
Many-banded Krait	*Bungarus multicinctus*	EN	PRC						1			
No. of species recorded				**1**	**1**	**2**	**1**	**1**	**1**	**3**	**1**	**2**
No. of species of conservation imporatnce				**0**	**0**	**0**	**0**	**0**	**1**	**0**	**0**	**0**

Note:
(1) CSIS (2016): EN = Endangered.
(2) Fellowes *et al*. (2002): PRC = Potential Regional Concern.

Appendix 4 Maximum Number (amongst six surveys and other records during site visits other than amphibian surveys) of Amphibian Species Recorded in Project Area and Assessment Area between August 2015 and July 2016.

Common Name	Scientific Name	Level of Concern[1]	Conservation Status[2]	Project Area				Assessment Area									
				Agricultural Land	Marsh	Pond	Reedbed	Agricultural Land	Developed Area	Drainage Channel	Grassland	Pond	Reedbed	Reedbed/Marsh	Road	Stream	Village Area
Asian Common Toad	*Duttaphrynus melanostictus*	-	-	1	1	4	1	1			1				7	4	12
Spotted Narrow-mouthed Frog	*Kalophrynus interlineatus*	NT	-		10												
Asiatic Painted Frog	*Kaloula pulchra*	-	-			1			3								2
Ornate Pigmy Frog	*Microhyla fissipes*	-	-		1	5											
Paddy Frog	*Fejervarya limnocharis*	-	-		1												2
Günther's Frog	*Hylarana guentheri*	-	-	7	9	39						3	2	6	8	5	4
Brown Tree Frog	*Polypedates megacephalus*	-	-	1	4	4				1		3			3	2	4
Greenhouse Frog	*Eleutherodactylus planirostris*	-	-								1						5
No. of species recorded				**3**	**6**	**5**	**1**	**1**	**1**	**1**	**2**	**2**	**1**	**1**	**3**	**3**	**6**
No. of species of conservation importance				**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Note:
(1) CSIS (2016): NT = Near Threatened.
(2) Fellowes *et al*. (2002).

Appendix 5 Mean (per survey) and Maximum Number (amongst 14 surveys) of Odonate Species Recorded in Project Area and Assessment Area between August 2015 and July 2016.

Common Name	Scientific Name	Level of Concern [1]	Conservation Status [2]	Project Area					Assessment Area											
				Agricultural Land	Grassland/ Shrubland	Marsh	Pond	Reedbed	Agricultural Land	Drainage Channel	Grassland	Grassland/ Shrubland	Plantation	Pond	Reedbed	Reedbed/ Marsh	Road	Seasonally Wet Grassland	Stream	Village Area
Orange-tailed Midget	*Agriocnemis femina*	-	Abundant				3.21(20)													
Wandering Midget	*Agriocnemis pygmaea*	-	Common				0.07(1)													
Orange-tailed Sprite	*Ceriagrion auranticum*	-	Abundant	2.29(25)		0.71(4)	34.14 (103)							0.64(9)		0.14(1)	1.14(10)		0.64(7)	0.36(2)
Common Bluetail	*Ischnura senegalensis*	-	Abundant	0.07(1)			0.07(1)							0.36(3)		0.36(4)				0.07(1)
Yellow Featherlegs	*Copera marginipes*	-	Abundant																0.07(1)	
Pale-spotted Emperor	*Anax guttatus*	-	Common	0.14(2)			0.43(2)			0.14(1)			0.07(1)	0.43(3)		0.21(2)	0.07(1)			
Lesser Emperor	*Anax parthenope*	-	Common													0.07(1)				
Common Flangetail	*Ictinogomphus pertinax*	-	Common	0.07(1)			0.14(1)			0.07(1)				0.71(3)		0.07(1)				
Golden Flangetail	*Sinictinogomphus clavatus*	-	Common											0.07(1)						
Elusive Adjutant	*Aethriamanta brevipennis*	-	Uncommon	0.14(1)			0.29(3)							0.5(6)					0.14(1)	
Blue Dasher	*Brachydiplax chalybea*	-	Common	1(6)		0.14(1)	2.07(7)	0.07(1)						0.5(3)		1.14(8)	0.07(1)		0.07(1)	0.14(1)
Asian Amberwing	*Brachythemis contaminata*	-	Abundant											0.71(2)					0.21(1)	
Crimson Darter	*Crocothemis servilia*	-	Abundant	0.64(3)	0.07(1)		0.14(1)	0.14(1)	0.29(1)		0.07(1)			0.14(1)					0.07(1)	
Coastal Glider	*Macrodiplax cora*	LC	Common	0.14(2)													0.07(1)			
Russet Percher	*Neurothemis fulvia*	-	Common														0.07(1)			
Pied Percher	*Neurothemis tullia*	-	Common	0.64(4)		0.07(1)	0.14(1)									0.07(1)				
Red-faced Skimmer	*Orthetrum chrysis*	-	Abundant	0.14(1)												0.07(1)				
Common Red Skimmer	*Orthetrum pruinosum*	-	Abundant											0.07(1)						
Green Skimmer	*Orthetrum sabina*	-	Abundant	0.93(6)	0.29(4)		0.07(1)			0.07(1)	0.29(4)	0.07(1)		0.57(1)			0.36(2)		0.36(3)	
Wandering Glider	*Pantala flavescens*	-	Abundant	12.86 (77)	0.29(3)	0.07(1)	1.14(6)	0.5(5)	1.57(15)	5.43(32)	0.21(1)			4.57(38)		0.07(1)	23.71 (145)		1.57(20)	1.07(13)
Pied Skimmer	*Pseudothemis zonata*	-	Common											0.5(2)		0.07(1)				
Ruby Darter	*Rhodothemis rufa*	LC	Common	0.07(1)			0.07(1)												0.07(1)	
Variegated Flutterer	*Rhyothemis variegata*	-	Common	9.71(50)	0.14(2)	1(8)	7(21)	0.14(1)	0.21(3)	3.86(40)	1.21(15)	0.21(2)		8.86(94)	0.14(2)	3.86(20)	11.71 (80)	0.14(2)	0.86(3)	
Evening Skimmer	*Tholymis tillarga*	-	Common	0.5(7)			0.07(1)							0.64(9)						
Saddlebag Glider	*Tramea virginia*	-	Abundant	0.21(2)			1(5)	0.07(1)			0.07(1)			0.43(4)		0.14(2)	0.14(1)			
Crimson Dropwing	*Trithemis aurora*	-	Abundant											0.07(1)						
Scarlet Basker	*Urothemis signata*	LC	Common	0.07(1)			0.14(2)													
Dingy Dusk-darter	*Zyxomma petiolatum*	-	Common			0.07(1)														
No. of species recorded				**17**	**4**	**6**	**17**	**5**	**3**	**5**	**5**	**2**	**1**	**17**	**1**	**12**	**9**	**1**	**10**	**4**
No. of species of conservation importance				**3**	**0**	**0**	**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**1**	**0**	**1**	**0**

Note:
(1) Fellowes *et al.* (2002): LC = Local Concern.
(2) Tam *et al.* (2011).

Appendix 6 Mean (per survey) and Maximum Number (amongst 14 surveys) of Butterfly Species Recorded in Project Area and Assessment Area between August 2015 and July 2016.

Common Name	Scientific Name	Level of Concern[1]	Conservation Status[2]	Project Area					Assessment Area									
				Agricultural Land	Grassland/ Shrubland	Marsh	Pond	Reedbed	Agricultural Land	Developed Area	Drainage Channel	Grassland	Grassland/ Shrubland	Plantation	Pond	Reedbed/Marsh	Road	Stream	Village Area
Bush Hopper	*Ampittia dioscorides*	-	Uncommon			0.07(1)													
Formosan Swift	*Borbo cinnara*	-	Common															0.07(1)	
Contiguous Swift	*Polytremis lubricans*	-	Common														0.07(1)		0.07(1)
Chinese Dart	*Potanthus confucius*	-	Uncommon				0.07(1)											0.07(1)	
Indian Palm Bob	*Suastus gremius*	-	Uncommon				0.07(1)												
Greenish Palm Dart	*Telicota ancilla*	-	Uncommon			0.07(1)													
Common Hedge Blue	*Acytolepis puspa*	-	Common																0.07(1)
Tailed Cupid	*Everes lacturnus*	-	Common														0.07(1)		
Dark Cerulean	*Jamides bochus*	-	Common				0.07(1)											0.21(3)	0.29(4)
Long-tailed Blue	*Lampides boeticus*	-	Common														0.07(1)	0.07(1)	
Pale Grass Blue	*Pseudozizeeria maha*	-	Very Common	0.64(2)		0.07(1)	0.29(1)	0.14(1)	0.36(4)			0.07(1)		0.07(1)	0.14(1)		0.57(4)	0.14(1)	0.07(1)
Slate Flash	*Rapala manea*	-	Common				0.07(1)												
Chocolate Royal	*Remelana jangala*	-	Common												0.07(1)				
Common Tiger	*Danaus genutia*	-	Common	0.07(1)			0.07(1)												0.07(1)
Blue-spotted Crow	*Euploea midamus*	-	Very Common	0.21(2)		0.07(1)	0.07(1)										0.07(1)		
Glassy Tiger	*Parantica aglea*	-	Common	0.07(1)			0.07(1)	0.07(1)									0.07(1)	0.07(1)	
Blue Tiger	*Tirumala limniace*	-	Common	0.07(1)															
Angled Castor	*Ariadne ariadne*	-	Common	0.29(3)															
White-edged Blue Baron	*Euthalia phemius*	-	Common	0.07(1)										0.07(1)				0.07(1)	
Red-ring Skirt	*Hestina assimilis*	-	Common	0.07(1)		0.07(1)												0.14(2)	
Great Egg-fly	*Hypolimnas bolina*	-	Common	0.14(2)			0.07(1)				0.07(1)	0.07(1)					0.29(2)	0.07(1)	0.07(1)
Peacock Pansy	*Junonia almana*	-	Common			0.07(1)													
Chocolate Pansy	*Junonia iphita*	-	Common	0.07(1)		0.07(1)	0.07(1)												
Common Sailer	*Neptis hylas*	-	Very Common	0.14(1)			0.07(1)							0.07(1)		0.07(1)		0.07(1)	
Short-banded Sailer	*Phaedyma columella*	-	Common														0.07(1)		
Common Palmfly	*Elymnias hypermnestra*	-	Common	0.07(1)			0.21(2)								0.14(2)	0.07(1)	0.21(1)	0.14(1)	0.21(2)
Dark-brand Bush Brown	*Mycalesis mineus*	-	Very Common	0.43(4)		0.43(3)	1.21(5)							0.07(1)	0.14(1)		0.29(1)	0.21(1)	0.21(1)
South China Bush Brown	*Mycalesis zonata*	-	Common			0.07(1)											0.07(1)		
Common Five-ring	*Ypthima baldus*	-	Very Common				0.07(1)											0.07(1)	0.07(1)
Tailed Jay	*Graphium agamemnon*	-	Common				0.07(1)								0.07(1)				
Common Jay	*Graphium doson*	-	Common															0.14(1)	
Red Helen	*Papilio helenus*	-	Very Common				0.07(1)	0.07(1)									0.07(1)	0.07(1)	
Great Mormon	*Papilio memnon*	-	Very Common																0.07(1)
Paris Peacock	*Papilio paris*	-	Very Common				0.07(1)												
Common Mormon	*Papilio polytes*	-	Very Common	0.5(2)		0.14(1)	1.14(4)		0.07(1)	0.07(1)					0.29(2)		0.29(1)	0.5(2)	0.21(1)
Spangle	*Papilio protenor*	-	Very Common							0.14(1)					0.07(1)	0.07(1)			0.07(1)

Common Name	Scientific Name	Level of Concern[1]	Conservation Status[2]	Project Area					Assessment Area									
				Agricultural Land	Grassland/ Shrubland	Marsh	Pond	Reedbed	Agricultural Land	Developed Area	Drainage Channel	Grassland	Grassland/ Shrubland	Plantation	Pond	Reedbed/Marsh	Road	Stream	Village Area
Swallowtail	*Papilio xuthus*	-	Rare	0.07(1)															
Lemon Emigrant	*Catopsilia pomona*	-	Common	0.43(2)	0.07(1)		0.36(2)	0.07(1)			0.07(1)				0.21(1)	0.14(1)	0.71(5)	0.07(1)	0.29(2)
Common Grass Yellow	*Eurema hecabe*	-	Very Common	1.5(7)	0.07(1)		0.14(1)		0.07(1)		0.29(2)	0.07(1)				0.14(1)	1.07(9)		
Common Gull	*Cepora nerissa*	-	Common				0.07(1)												
Great Orange Tip	*Hebomoia glaucippe*	-	Common									0.07(1)					0.14(1)		
Indian Cabbage White	*Pieris canidia*	-	Very Common	5.71(47)		0.21(2)	1.14(5)	0.14(1)				0.43(3)	0.07(1)		0.64(4)	0.14(1)	1.21(5)	1.36(10)	0.64(4)
Small Cabbage White	*Pieris rapae*	-	Rare	0.07(1)															
No. of species recorded				**19**	**2**	**11**	**22**	**5**	**3**	**2**	**3**	**5**	**1**	**4**	**9**	**6**	**17**	**18**	**14**
No. of species of conservation importance				**2**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**	**0**

Note:
(1) Fellowes *et al.* (2002).
(2) Chan *et al.* (2011).