



Proposed Comprehensive Development at Wo Shang Wai Yuen Long

Biannual EM&A Report on Ecology for
May – Oct 2013 (Rev A)
December 2013

Heng Shung Construction Co. Ltd.

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**Pursuant to Condition 4.6 of Environmental Permit No. EP-311/2008/D,
this Biannual EM&A Report on ecological aspects for May to October
2013 has been reviewed, certified by the Environmental Team Leader
(ETL) and verified by the Independent Environmental Checker (IEC).**

Certified by:



Terence Kong
Environmental Team Leader (ETL)
Mott MacDonald Hong Kong Ltd.

Date

13 December 2013

Verified by:



David Yeung
Independent Environmental Checker (IEC)
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Date

30 Jan 2014

Contents

Chapter	Title	Page
1	Introduction	1
1.1	Background	1
1.2	Survey Area	1
1.3	EM&A Requirements on Ecological Impact	1
2	Ecological Monitoring	3
2.1	Introduction	3
2.2	Monitoring of Birds	3
2.3	Monitoring of Herpetofauna	4
2.4	Monitoring of Dragonflies and Butterflies	4
2.5	Monitoring of Mammals	4
2.6	Monitoring of Water Quality	4
2.7	Monitoring of Soil Quality	5
3	Ecological Issues	6
3.1	Vegetation Management	6
3.2	Wildlife Management	6
4	Conclusions	7
4.1	Summary of Findings	7
4.2	WRA Performance for the Target Species	8
5	References	10
5.1	List of References	10

Tables

Table 1.1:	Summary of Ecological Impact EM&A Requirements	2
Table 4.1:	Summary of Ecological Monitoring in WRA and Survey Area	7
Table 4.2:	Annual Mean of the Three Bird Target Species Recorded at the WRA between May 2010 and Oct 2013	8

List of Figures

Figure 1.1 Survey Area and Transect Walked

List of Appendices

Appendix A	Schedule of Ecological Monitoring
Appendix B	Summary of Bird Surveys
Appendix C	Summary of Herpetofauna Monitoring, Mammals and Insects Surveys
Appendix D	Summary of Water Quality Monitoring

1 Introduction

1.1 Background

In March 2005, the Project Proponent, Profit Point Enterprises Limited, acquired the development site at Wo Shang Wai in Yuen Long. An Environmental Impact Assessment (EIA) was then carried out and approved under the EIA Ordinance (EIAO), and the Environmental Permit (EP-311/2008) for construction of the comprehensive development in Wo Shang Wai was first granted by EPD on 9 September 2008 and has been subsequently varied, with the current version (EP-311/2008/D) issued by EPD on 20 March 2013.

The Project involves the residential development and associated infrastructure and wetland restoration area and linear landscape area. The construction works under the Environmental Permit commenced on 12 May 2010. The site formation construction works of the Wetland Restoration Area (hereafter WRA) were completed on 15 November 2010, while the 30-month establishment period of the WRA was concluded in October 2012 – this indicated that planting works as scheduled in the approved Wetland Restoration and Creation Scheme (WRCS; Nov 2009) were complete, except along the western and southern boundary where the planting is affected by the existing site boundary and noise barrier, and for which a Variation to Environmental Permit (EP-311/2008/C) to defer planting at the location was approved. This factor remains applicable in the current valid EP (EP-311/2008/D) which also includes specific mitigation measures to minimise certain identified noise impacts during the operation phase of the Project.

Mott MacDonald Hong Kong Ltd. (“MMHK”) has been commissioned by the Contractor, Heng Shung Construction Co. Ltd., to undertake the Environmental Team (ET) services to carry out environmental monitoring and audit (EM&A) for both pre-construction and construction phases of the Proposed Comprehensive Development at Wo Shang Wai, Yuen Long.

According to the EP Condition 4.6, the EM&A results on ecological aspects during the construction phase should be reported to the EIA Subcommittee of the ACE, EPD and AFCD on a biannual basis. This is the 7th Biannual EM&A report and it summarises the findings on EM&A results of ecological aspects during the period from 1 May to 31 October 2013. This report documents surveys and management activities conducted in the Survey Area and WRA from 1 May to 31 October 2013, which is based on ecological surveys and advices on management which were undertaken by the appointed ecological consultant (Green Power/Ecological Resource Centre) during the reporting period.

1.2 Survey Area

Surveys were conducted within 500m of the Project area. The WRA was surveyed since early September 2010. The survey area and transect are provided in [Figure 1.1](#).

1.3 EM&A Requirements on Ecological Impact

The EM&A programme requires environmental monitoring of ecology as specified in the approved EM&A Manual. A summary of ecological impact EM&A requirements is presented in **Table 1.1**:

Table 1.1: Summary of Ecological Impact EM&A Requirements

Descriptions	Locations	Frequencies
Birds	Within the Project Area and Assessment Area of 500m	Weekly
Dragonflies and Butterflies	Within the Project Area and Assessment Area of 500m	Once per month during Mar and Sep to Nov, and twice per month during Apr to Aug
Herpetofauna	Within the Project Area and Assessment Area of 500m	Daytime: Once per month during Apr to Nov Night-time: Once per month during Mar to Aug
Water quality of Wetland Restoration Area (WRA)	WRA	After filling of WRA with water, monthly for in situ water quality and every six months (end of wet season and end of dry season) for laboratory testing
Site Inspections	Within the Project Area and Assessment Area of 500m	Weekly

2 Ecological Monitoring

2.1 Introduction

In accordance with the EM&A requirements, monitoring of birds, dragonflies and butterflies, and herpetofauna was carried out during the reporting period. In addition, monitoring of mammals was also conducted concurrently with other surveys and the results were reported although it is not required by the EM&A manual. The dates of surveys are summarised in [Appendix A](#).

2.2 Monitoring of Birds

Monitoring was undertaken following the survey methodology and frequency outlined in the EM&A Manual (Table 7-1). Since September 2010, monitoring included the newly formed cells to monitor faunal usage of this area. All bird species of conservation importance and/or wetland dependent were identified and enumerated. Flying birds were not recorded unless they were foraging and/or associated with the habitat (such as swifts). Further, notable bird observations during other surveys were also recorded.

Bird surveys were conducted on a weekly basis throughout the period. A total of 46 bird species were recorded in the Survey Area (excluding the WRA) in May to October 2013, 28 of which were species of conservation importance and/or wetland-dependence. A summary of survey data is provided in [Appendix B](#).

A total of 46 species were recorded in the WRA in the survey periods, 25 of which were species of conservation importance and/or wetland-dependent species. Of all three target species (i.e. Little Egret (*Egretta garzetta*), Eastern Cattle Egret (*Bubulcus coromandus*) and Chinese Pond Heron (*Ardeola bacchus*)), two were recorded in the WRA (Little Egret and Chinese Pond Heron). The WRA has attracted a number of species of conservation interest, including Yellow Bittern, *Ixobrychus sinensis* (this species is listed by Fellowes et al. as of “Local Concern” in 2002) and one local concern wetland dependence species, Black-crowned Night Heron, *Nycticorax nycticorax*; indicating that the WRA was effective in providing habitat suitable for species of interest. Outside routine surveys, a chick of White-breasted Waterhen, *Amaurornis phoenicurus*, was observed in the WRA, indicating that the WRA was effective in providing suitable breed ground for this wetland-dependence species..

The fishponds to the north of the WRA are at a greater distance from the residential portion and any disturbance impact(s) from the construction works which would have first affected the WRA. Further, 25 bird species of conservation importance and/or wetland-dependence, were observed using the site, including some bird species which are highly sensitive to disturbance and two bird target species (i.e. Little Egret and Chinese Pond Heron). Thus, the WRA is considered to be effective both in acting as a buffer against potential disturbance impacts from the construction site and in providing suitable wetland habitats at the fringe of the Deep Bay system.

2.3 Monitoring of Herpetofauna

Monitoring was undertaken following the survey methodology in the EM&A Manual. Day-time herpetofauna surveys were conducted once a month in May 2013 and October 2013. Further, notable herpetofauna observations during other surveys were also recorded.

Gunther's Frog, *Rana guentheri*, was recorded in the Survey Area (excluding WRA) in the reporting period.

A total of one amphibian species and two reptile species were recorded during the survey period within the WRA. A Softshell Turtle, *Trionychidae* sp. was recorded outside survey within the WRA. A summary of survey data is provided in [Appendix C](#).

2.4 Monitoring of Dragonflies and Butterflies

Monitoring of dragonflies and butterflies was conducted twice-monthly in May 2013 to October 2013. Further, notable dragonfly and butterfly observations during other surveys were recorded.

A total of 11 dragonfly species and seven butterfly species were recorded using the ponds in the survey area (excluding WRA) in the survey period. At the WRA, a higher diversity of dragonfly species (18 species) and butterfly species (16 species) were recorded. A summary of the survey findings is provided in [Appendix C](#).

2.5 Monitoring of Mammals

Monitoring of mammals was conducted concurrently with other surveys. No mammal was recorded in the Survey Area within the survey period.

A Small Asian Mongoose, *Herpestes javanicus*, was recorded in the WRA during regular survey. Japanese Pipistrelle, *Pipistrellus abramus* were recorded outside survey within the WRA. A summary of the survey findings is provided in [Appendix C](#).

2.6 Monitoring of Water Quality

Monthly water quality monitoring continued during the reporting period. Monitoring parameters followed that in the EM&A Manual. During the reporting period, pH of some Cells reached the Action Level. No measures are proposed at the moment, but the condition will be monitored. Monitoring data are presented in [Appendix D](#).

2.7 Monitoring of Soil Quality

Pedology samples were collected on 31 May 2013 for laboratory analysis of soil quality. Monitoring data are presented in [Appendix D](#).

3 Ecological Issues

3.1 Vegetation Management

Vegetation management activities undertaken at the site primarily involved watering of plants, tree pruning, weeding and grass cutting.

Removal of exotic vegetation in all cells was undertaken; these included but not limited to *Ipomoea* sp., *Mikania* sp., *Mimosa* sp., *Pennisetum* sp. and *Typha* sp..

3.2 Wildlife Management

Golden Apple Snails were removed on an “as-seen” basis.

All fire ant nests were treated with an approved pesticide and covered with overturn baskets for a week. All treated fire ant nests were inactive within one week of treatment.

4 Conclusions

4.1 Summary of Findings

Ecological monitoring between 1 May 2013 and 31 October 2013 was carried out following the survey methodology and frequency outlined in the EM&A Manual.

Summary of survey findings are listed as follows (**Table 4.1**):

Table 4.1: Summary of Ecological Monitoring in WRA and Survey Area

Species	Number recorded in Survey Area (excluding WRA)	Number recorded in WRA
Birds (total)	46	46
Birds (of conservation importance and/or wetland-dependence)	28	25
Amphibians	1	1
Reptiles	0	3
Mammals	0	2
Dragonflies	11	18
Butterflies	7	16

A total of 46 bird species, 1 amphibian species, 3 reptile species, 2 mammal species, 18 dragonfly species and 16 butterfly species were recorded in the WRA, including 25 bird species of conservation importance and/or wetland-dependence, while all dragonfly species are wetland-dependent. These findings indicate that the WRA is supporting wetland-dependent birds and other species of conservation importance.

Survey findings indicate that the WRA is attracting the three target species to varying degrees. During the survey period (i.e. May 2013 to October 2013), the site was particularly attractive to Little Egret, which was recorded on nearly-weekly basis, with monthly means ranging from 0.5 to 3.6 birds per survey. Chinese Pond Heron was recorded four out of six months in regular survey under review (May 2013 to October 2013) with monthly means ranging from 0.5 to 2.0 bird per survey. Eastern Cattle Egret was least attracted to the site, no Eastern Cattle Egret was recorded under review period (May 2013 to October 2013).

With the completion of planting as scheduled in the approved HCMP in August 2012, establishment work at the WRA is considered complete (except along the western and southern boundary where the planting is affected by the existing site boundary and noise barrier, and for which a previous Variation to Environmental Permit (EP-311/2008/C) to defer planting at the location was approved by EPD and remains applicable in the current valid EP (EP-311/2008/D)), and the 30-month establishment period concluded in October 2012. A review of the performance of the WRA in terms of target species attraction during and after the 30-month establishment period is provided in Section 4.2 below.

It should be noted that the high planting density was intended to ensure a rapid establishment of the site prior to occupation intake, and not intended to be maintained as a long-term tree density at the WRA. It is a standard arboricultural practice to apply appropriate horticultural/arboricultural maintenance methods in the subsequent five or six years after initial planting to remove less desired specimens to facilitate the successful growth of those which are of higher landscape and/or ecological value. Further, some fine

tuning of planting locations and tree/shrub mix is required in order to fulfill the design intent of the habitat structure at WRA after reviewing the site configuration following site formation. Vegetation management hereafter should largely consist of maintenance of planted trees and shrubs for the creation of suitable habitats for target species and long-term habitat structure of the site.

4.2 WRA Performance for the Target Species

The provision, maintenance and operation of a WRA are a requirement under the Environmental Permit for compensation for predicted ecological impacts to species of conservation importance. Three bird target species were identified during the EIA process; these are Little Egret, Eastern Cattle Egret and Chinese Pond Heron. Target levels of these species are the annual mean number recorded during the Baseline Ecological Monitoring (i.e. a mean of 5.5 Little Egret, 1.3 Eastern Cattle Egret and 1.3 Chinese Pond Heron over a 12-month period). Thus, the ecological impact of the project to the species concerned is considered to have been fully compensated for when the target level for each of the three species is achieved.

The 30-month establishment period of the WRA was concluded in October 2012 – this indicated that planting works as scheduled in the approved Wetland Restoration and Creation Scheme (WRCS; Nov 2009) was complete, except as described in Section 4.1 above.

Of all three target species, two were recorded using the site including Chinese Pond Heron and Little Egret during the reporting period (May 2013 – October 2013). Among all target species, Little Egret was recorded most regularly (recorded in all six months), followed by Chinese Pond Heron (recorded in 4 out of 6 months) and no Eastern Cattle Egret was recorded during the reporting period. **Table 4.2** below presents the target level achievement of the three target bird species during and after the establishment period.

Table 4.2: Annual Mean of the Three Bird Target Species Recorded at the WRA between May 2010 and Oct 2013

Common Name	Scientific Name	Conservation Status ⁽²⁾	May 2010 – Apr 2011	May 2011 – Apr 2012	May 2012 – Apr 2013	Nov 2012 – Oct 2013
Little Egret	<i>Egretta garzetta</i>	PRC, (RC)	1.6	1.0	0.9	1.4
Eastern Cattle Egret	<i>Bubulcus coromandus</i>	(LC)	0.0	1.2	0.0	0.0
Chinese Pond Heron	<i>Ardeola bacchus</i>	PRC, (RC)	0.2	2.7	1.3	0.8

Note:

(1) Values in **bold** indicate that the Target Level was achieved.

(2) Conservation Status follows that of Fellowes et. al. (2002). See Appendix B (Table B3).

Based on **Table 4.2** above, the target levels for Chinese Pond Heron, Little Egret and Eastern Cattle Egret have not been achieved between November 2012 and October 2013. It is noted that November 2012 to October 2013 was the first full annual period since the 30-month establishment period of the WRA was concluded.

Actions will be taken to increase the WRA utilization by birds in the coming winter, including:

1. lowering the water level;
2. restocking the Cell in the WRA; and
3. installing flooding platform.

Results of these actions will be closely monitored.

A total of 104 bird species have been recorded within the WRA since completion of site formation. Of the 104 species, 70 were species of conservation importance and/or wetland dependence - indicating that the WRA provides suitable habitat for these species despite the construction work within the residential portion of the Project Site. A list of the bird species recorded at the WRA since completion of site formation is provided in [Appendix B](#) (Table B4 & B5).

The site continuously attracts bird species of conservation importance, indicating that the WRA not only provides a buffer for potential disturbance during construction phase, it is also a valuable habitat for wetland dependent species and species of conservation importance.

5 References

5.1 List of References

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- Young, J.J. & Yiu, V., 2002. *Butterfly Watching In Hong Kong*. Wan Li Book Co. Ltd., Hong Kong.

Appendix A. Schedule of Ecological Monitoring

May 2013	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Mammals			✓				✓							✓							✓							✓			
Birds			✓				✓							✓							✓							✓			
Herpetofauna														✓																	
Dragonflies & Butterflies			✓											✓														✓			
Water Quality																								✓							
Inspection Visits			✓							✓				✓										✓							✓
Jun 2013	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Mammals				✓										✓				✓							✓						
Birds				✓										✓				✓							✓						
Herpetofauna																		✓													
Dragonflies & Butterflies				✓														✓													
Water Quality																										✓					
Inspection Visits				✓			✓							✓				✓			✓				✓			✓			
Jul 2013	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Mammals			✓						✓							✓							✓							✓	
Birds			✓						✓							✓							✓							✓	
Herpetofauna			✓						✓																						
Dragonflies & Butterflies									✓														✓								
Water Quality																						✓									
Inspection Visits			✓		✓				✓			✓				✓							✓			✓				✓	

Proposed Comprehensive Development at Wo Shang Wai Yuen Long

Biannual EM&A Report on Ecology for May – Oct 2013 (Rev A)



Aug 2013	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Mammals		✓				✓							✓							✓							✓				
Birds		✓				✓							✓							✓							✓				
Herpetofauna																				✓											
Dragonflies & Butterflies						✓														✓											
Water Quality																												✓			
Inspection Visits		✓				✓			✓				✓			✓				✓			✓				✓			✓	
Sep 2013	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	
Mammals			✓			✓				✓			✓				✓							✓			✓				
Birds			✓							✓							✓							✓							
Herpetofauna										✓																					
Dragonflies & Butterflies										✓																					
Water Quality																										✓					
Inspection Visits			✓			✓				✓			✓				✓							✓			✓				
Oct 2013	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
Mammals				✓				✓							✓							✓						✓			
Birds				✓				✓							✓							✓						✓			
Herpetofauna								✓																							
Dragonflies & Butterflies															✓																
Water Quality																			✓												
Inspection Visits				✓				✓			✓				✓			✓				✓			✓			✓			

Note:

1. Light grey cells indicate public holidays, Saturdays or Sundays.
2. Dark cells indicate that no survey was required during the relevant month.

Appendix B. Summary of Bird Surveys

Table B1. Summary of bird monitoring (for species of conservation importance and/or wetland-dependence) within the Survey Area (excluding the WRA)

Common Name ⁽⁴⁾	Scientific Name ⁽⁴⁾	Conservation Status ⁽²⁾	May Mean ⁽³⁾	Jun Mean ⁽³⁾	Jul Mean ⁽³⁾	Aug Mean ⁽³⁾	Sep Mean ⁽³⁾	Oct Mean ⁽³⁾
Little Grebe	<i>Tachybaptus ruficollis</i>	LC, (1)	5.8	4.0	3.8	3.6	8.5	10.8
Great Cormorant	<i>Phalacrocorax carbo</i>	PRC, (1)						2.4
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	(LC), (1)	1.2	0.8	3.0	0.2		
Yellow Bittern	<i>Ixobrychus sinensis</i>	LC, (1)					0.3	
Eastern Cattle Egret	<i>Bubulcus coromandus</i>	(LC), (1)		0.3				1.2
Chinese Pond Heron	<i>Ardeola bacchus</i>	PRC, (RC), (1)	4.2	6.8	10.6	16.8	12.3	11.8
Little Egret	<i>Egretta garzetta</i>	PRC, (RC), (1)	9.0	9.3	10.0	30.2	19.0	39.2
Intermediate Egret	<i>Egretta intermedia</i>	RC, (1)	0.6					0.2
Grey Heron	<i>Ardea cinerea</i>	PRC, (1)					1.8	7.2
Great Egret	<i>Egretta alba</i>	PRC, (RC), (1)	4.0	2.8	12.4	11.6	9.5	18.4
Black-faced Spoonbill	<i>Platalea minor</i>	PGC, (1)						2.2
Tufted Duck	<i>Aythya fuligula</i>	LC, (1)	0.4					
Black Kite	<i>Milvus migrans</i>	RC	0.2	0.3		0.4	0.8	0.4
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	(1)		1.0	1.6	0.2	1.5	2.0
Common Moorhen	<i>Gallinula chloropus</i>	(1)	0.2					
Black-winged Stilt	<i>Himantopus himantopus</i>	(RC), (1)						4.6
Pied Avocet	<i>Recurvirostra avosetta</i>	RC, (1)						9.6
Green Sandpiper	<i>Tringa ochropus</i>	(1)	0.6					1.0
Common Sandpiper	<i>Actitis hypoleucos</i>	(1)	0.2			1.6	2.6	2.0
Whiskered Tern	<i>Chlidonias hybrid</i>	LC, (1)	1.2					
Pied Kingfisher	<i>Ceryle rudis</i>	(LC), (1)				0.2		0.2

Proposed Comprehensive Development at Wo Shang Wai Yuen Long

Biannual EM&A Report on Ecology for May – Oct 2013 (Rev A)



Common Name ⁽⁴⁾	Scientific Name ⁽⁴⁾	Conservation Status ⁽²⁾	May Mean ⁽³⁾	Jun Mean ⁽³⁾	Jul Mean ⁽³⁾	Aug Mean ⁽³⁾	Sep Mean ⁽³⁾	Oct Mean ⁽³⁾
Common Kingfisher	<i>Alcedo atthis</i>	(1)	0.8	1.5	1.2	1.4	2.5	2.6
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	LC, (1)		0.3	0.4			
Eastern Yellow Wagtail	<i>Motacilla tschutschensis</i>	(1)	0.8					1.4
White Wagtail	<i>Motacilla alba</i>	(1)	3.2	3.8	2.2	3.6	4.5	8.6
White-shouldered Starling	<i>Sturnus sinensis</i>	(LC), (1)	0.6	0.8	0.6	0.8		
Zitting Cisticola	<i>Cisticola juncidis</i>	LC, (1)						0.2
Collared Crow	<i>Corvus torquatus</i>	LC, (1)		0.8	0.6			0.6
No. of species recorded			16	13	11	12	11	21

Note:

(1) Indicates wetland-dependent or wetland-associated species.

(2) Conservation status follows that of Fellowes et al. (2002) and BirdLife International listing (2010). See Table B3.

(3) Refers to the mean number of individuals recorded in each survey in the Survey Area (excluding the WRA)

(4) Follows HK bird list (dated 2013-3-25)

Table B2. Summary of bird monitoring (for species of conservation importance and/or wetland-dependence) in the WRA

Common Name ⁽⁴⁾	Scientific Name ⁽⁴⁾	Conservation Status ⁽²⁾	May Mean ⁽³⁾	Jun Mean ⁽³⁾	Jul Mean ⁽³⁾	Aug Mean ⁽³⁾	Sep Mean ⁽³⁾	Oct Mean ⁽³⁾
Little Grebe	<i>Tachybaptus ruficollis</i>	LC, (1)	1.5	0.5		0.6	0.5	1.2
Great Cormorant	<i>Phalacrocorax carbo</i>	PRC, (1)						0.2
Grey Heron	<i>Ardea cinerea</i>	PRC, (1)					✓	1.0
Great Egret	<i>Egretta alba</i>	PRC, (RC), (1)		0.8	0.6			0.6
Little Egret	<i>Egretta garzetta</i>	PRC, (RC), (1)	0.6	1.8	0.4	3.4	0.5	2.2
Chinese Pond Heron	<i>Ardeola bacchus</i>	PRC, (RC), (1)			0.8	2.0	0.5	1.4
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	(LC), (1)		0.3				✓
Yellow Bittern	<i>Ixobrychus sinensis</i>	LC, (1)	1.0	2.5	0.2	1.4	1.3	0.8
Black Kite	<i>Milvus migrans</i>	RC, (1)	0.2	0.3		1.2	0.8	0.2

Proposed Comprehensive Development at Wo Shang Wai Yuen Long

Biannual EM&A Report on Ecology for May – Oct 2013 (Rev A)



Common Name ⁽⁴⁾	Scientific Name ⁽⁴⁾	Conservation Status ⁽²⁾	May Mean ⁽³⁾	Jun Mean ⁽³⁾	Jul Mean ⁽³⁾	Aug Mean ⁽³⁾	Sep Mean ⁽³⁾	Oct Mean ⁽³⁾
Japanses Quail	<i>Coturnix japonica</i>	LC, (1)						✓
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	(1)	✓	1.8	0.2	0.2	✓	0.8
Black-winged Stilt	<i>Himantopus himantopus</i>	(RC), (1)			0.2	0.6	✓	0.2
Kentish Plover	<i>Charadrius alexandrinus</i>	(RC), (1)			0.8			
Little Ringed Plover	<i>Charadrius dubius</i>	(LC), (1)						✓
Spotted Redshank	<i>Tringa erythropus</i>	RC, (1)						✓
Green Sandpiper	<i>Tringa ochropus</i>	(1)						1
Wood Sandpiper	<i>Tringa glareola</i>	-						✓
Common Sandpiper	<i>Actitis hypoleucos</i>	(1)	0.2		✓	0.6	✓	0.8
Eurasian Eagle Owl *	<i>Bubo bubo</i>	RC					✓	
Pied Kingfisher	<i>Ceryle rudis</i>	(LC), (1)				✓		
Common Kingfisher	<i>Alcedo atthis</i>	(1)	0.6	0.3	0.4	0.4	0.8	1.0
Eastern Yellow Wagtail	<i>Motacilla tschutschensis</i>	(1)	0.2					0.4
White Wagtail	<i>Motacilla alba</i>	(1)	1.0		1.2	0.4	3.5	2.8
White-shouldered Starling	<i>Sturnus sinensis</i>	(LC), (1)			0.2			
Collared Crow	<i>Corvus torquatus</i>	LC, (1)						0.2
No. of species recorded			9	8	11	11	12	21

Note:

(1) Indicates wetland-dependent or wetland-associated species.

(2) Conservation status follows that of Fellowes et al. (2002) and BirdLife International listing (2010). See Table B3.

(3) Refers to the mean number of individuals recorded in each survey in the Survey Area (excluding the WRA)

(4) Follows HK bird list (dated 2013-3-25)

✓ Indicates the species is recorded outside regular surveys

Table B3. Conservation Status Categories of Bird Species

Code	Category	Brief/Description	Source
GC	Global Concern	Habitat loss/damage in Hong Kong would pose significant threat to global survival	Fellowes <i>et al.</i> (2002)
RC	Regional Concern	Habitat loss/damage in Hong Kong would pose significant threat to regional survival.	
LC	Local Concern	Habitat loss/damage in Hong Kong would pose significant threat to local survival.	
PGC	Potential Global Concern	Large, secure population in Hong Kong is of global significance.	
PRC	Potential Regional Concern	Large, secure population in Hong Kong is of regional significance.	
CR	Critically Endangered	Best available evidence indicates that it meets any of the criteria A to E for Critically Endangered, and it is therefore considered to be facing an extremely high risk of extinction in the wild.	BirdLife International (2010)
EN	Endangered	Best available evidence indicates that it meets any of the criteria A to E for Endangered, and it is therefore considered to be facing a very high risk of extinction in the wild.	
VU	Vulnerable	Best available evidence indicates that it meets any of the criteria A to E for Vulnerable, and it is therefore considered to be facing a high risk of extinction in the wild.	
NT	Near Threatened	Does not qualify for Critically Endangered, Endangered or Vulnerable now, but is close to qualifying for or is likely to qualify for a threatened category in the near future.	

Table B4. Summary of Bird Species Recorded at the WRA and their Respective Monthly Mean between September 2010 and October 2012

Common name	Scientific name	Conservation status	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12
Little Grebe	<i>Tachybaptus ruficollis</i>	LC, (1)					0.5						1	3.8	0.8	0.5	0.5		0.6		1.4	1.6	0.8	1	1.3	0.2		0.2
Great Cormorant	<i>Phalacrocorax carbo</i>	PRC, (1)					0.8									0.3	0.3	0.4	1.2	0.7	0.2							
Grey Heron	<i>Ardea cinerea</i>	PRC, (1)			1	1.6	2	2	0.4							1	2.5	1.8	0.8	2.3	0.8				0.3			0.4
Purple Heron	<i>Ardea purpurea</i>	RC, (1)														0.3	0.3											
Great Egret	<i>Ardea alba</i>	PRC, (1)				0.4	14	2	0.2	0.5	0.3	0.5	0.3		1.5	1.8	0.8	1.2	0.6	0.7	0.6	0.6	1	0.3		0.4	0.5	1.5
Intermediate Egret	<i>Egretta intermedia</i>	RC, (1)					1.7	0.8	0.2						1.5	1.5	1.5	1	0.6	0.7	0.6	0.6				0.3	0.9	
Little Egret	<i>Egretta garzetta</i>	PRC, (1)				1.8	8	2	0.4	0.5	0.8	0.3	0.3	1	1	0.5	1.5	1.6	1.4	2	1.6					0.8	0.3	1.2
Eastern Cattle Egret	<i>Bubulcus coromandus</i>	(LC), (1)										0.3	11.8		1.3	0.3			0.4					0.3		0.2		
Chinese Pond Heron	<i>Ardeola bacchus</i>	PRC, (1)			1	0.2				0.3	0.3	0.3	1.5	4.2	7.8	4.5	5.3	2.4	0.3	2.3	2.6	1.4	0.8	1	0.8	2	1.8	2.2
Yellow Bittern	<i>Ixobrychus sinensis</i>	(LC), (1)														0.3	0.3											
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	LC, (1)																										
Eurasian Spoonbill^	<i>Platalea leucorodia</i>	LC, (1)																										
Black-faced Spoonbill	<i>Platalea minor</i>	PGC, EN, (1)					0.3	10.3											0.4									
Mandarin Duck	<i>Aix galericulata</i>	(1)														0.3												
Eurasian Wigeon	<i>Anas penelope</i>	RC, (1)				1.6	2.5																					
Eurasian Teal	<i>Anas crecca</i>	RC, (1)					1																					
Northern Pintail	<i>Anas acuta</i>	RC, (1)				0.2	7																					
Northern Shoveler	<i>Anas clypeata</i>	RC, (1)																										
Tufted Duck	<i>Aythya fuligula</i>	LC, (1)																										
Garganey^	<i>Anas querquedula</i>	(1)																										
Western Osprey	<i>Pandion haliaetus</i>	RC, (1)				0.2																						
Black Kite	<i>Milvus migrans</i>	(RC) 0.8					0.8	0.3	0.2		0.3				0.3				0.2			0.2	0.5					0.4
Eastern Buzzard	<i>Buteo japonicus</i>	-							0.2																			
Common Kestrel	<i>Falco tinnunculus</i>	-			1	0.4	1	0.3	0.4																			
Eurasian Hobby^	<i>Falco subbuteo</i>	(LC), (1)																										
Peregrine Falcon	<i>Falco peregrinus</i>	-																										
Imperial Eagle	<i>Aquila heliaca</i>	-																										
Japanese Quail	<i>Coturnix japonica</i>	LC, (1)																										
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	(1)									0.5	0.8	1.3	2.6	1.3	1.5	0.3			0.4				0.5	1	0.5		
Common Moorhen	<i>Gallinula chloropus</i>	(1)																							0.2			
Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	LC, (1)															0.3											
Greater Painted-snipe	<i>Rostratula benghalensis</i>	LC, (1)								0.5																		
Black-winged Stilt	<i>Himantopus himantopus</i>	RC, (1)	8													1												
Pied Avocet	<i>Recurvirostra avosetta</i>	RC, (1)				0.2														0.2								
Oriental Pratincole	<i>Glareola maldivarum</i>	LC, (1)								2.5																		
Little Ringed Plover	<i>Charadrius dubius</i>	LC, (1)	3		24.5	7.4	3.8	9	6.8	10.5	5.5	0.5		0.2						1	0.6							
Kentish Plover^	<i>Charadrius alexandrinus</i>	RC, (1)																										

Common name	Scientific name	Conservation status	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12
Spotted Redshank^	<i>Tringa erythropus</i>	RC, (1)																										
Common Redshank^	<i>Tringa totanus</i>	RC, (1)																										
Marsh Sandpiper^	<i>Tringa stagnatilis</i>	RC, (1)																										
Common Greenshank	<i>Tringa nebularia</i>	RC, (1)			0.5												0.3	0.8	0.2									
Green Sandpiper	<i>Tringa ochropus</i>	(1)			1	0.4	0.5	0.5	0.4				0.3							0.2		0.2	0.4			0.2		
Wood Sandpiper	<i>Tringa glareola</i>	LC, (1)						0.5	1.2											0.8	0.3					0.6		
Common Sandpiper	<i>Actitis hypoleucos</i>	(1)	1		0.5	1		0.5	0.6	1	0.3			0.2								0.4	0.2					0.9
Eurasian Woodcock^	<i>Scolopax rusticola</i>	(1)																										
Pintail/Swinhoe's Snipe*	<i>Gallinago stenura/G. megala</i>	LC*, (1)			0.5											0.3												
Common Snipe	<i>Gallinago gallinago</i>	(1)						0.3	0.2																			
Red-necked Stint	<i>Calidris ruficollis</i>	LC, (1)	3																									
Temminck's Stint	<i>Calidris temminckii</i>	LC, (1)			0.5			2.5	0.4	1.3																		
Long-toed Stint	<i>Calidris subminuta</i>	LC, (1)																		0.3								
Whiskered Tern	<i>Chlidonias hybrida</i>	(1)																					1.3					
Domestic Pigeon	<i>Columba livia</i>	-												v														
Oriental Turtle Dove	<i>Streptopelia orientalis</i>	-													0.2													
Red Turtle Dove^	<i>Streptopelia tranquebarica</i>	-																										
Spotted Dove	<i>Spilopelia chinensis</i>	-																v		v	v		v			v		0.6
Greater Coucal	<i>Centropus sinensis</i>																											
Eurasian Eagle Owl *	<i>Bubo bubo</i>	RC																										
Savanna Nightjar^	<i>Caprimulgus affinis</i>	-																										
Pacific Swift	<i>Apus pacificus</i>	(LC)								0.3																		
House Swift	<i>Apus nipalensis</i>	-	10					0.2												v	v							
Pied Kingfisher	<i>Ceryle rudis</i>	(LC), (1)				0.2	0.3	0.5	0.2			0.3									0.2				0.5			
Common Kingfisher	<i>Alcedo atthis</i>	(1)				0.4	0.5	0.3		0.3	0.5	1	0.3	1	0.8	0.5	0.8	1	0.4		0.8					0.6		0.4
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	(LC)															0.3								0.3			
Barn Swallow	<i>Hirundo rustica</i>	-	25					1.5												v	v		v		v	v	3	
Red-rumped Swallow	<i>Hirundo daurica</i>	-																										
Eastern Yellow Wagtail	<i>Motacilla tschutschensis</i>	(1)			14.5	10.2	15	23.5	8.2	11.8	1.8			0.2	0.8	1.5	2	1.2	0.6		4	1						
Grey Wagtail	<i>Motacilla cinerea</i>	(1)				0.2		0.3	0.2						0.3													
White Wagtail	<i>Motacilla alba</i>	(1)	3			1.8												v	v	v	v	v				v	1.8	3.2
Richard's Pipit	<i>Anthus richardi</i>	(1)			1.5	0.8	0.5	1	1	1.8	0.5					0.3		v		v	v	v						
Olive-backed Pipit	<i>Anthus hodgsoni</i>	-			0.5													v										
Red-throated Pipit	<i>Anthus cervinus</i>	LC		2	2.5	1.2	0.5	0.5	0.2													0.4						0.7
Buff-bellied Pipit	<i>Anthus rubescens</i>	LC		1	1.5																							
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	-																										
Chinese Bulbul	<i>Pycnonotus sinensis</i>	-																		v		v			v			
Long-tailed Shrike	<i>Lanius schach</i>	-																	v	v					v	v		
Oriental Magpie Robin	<i>Copsychus saularis</i>	-																		v								
Daurian Redstart	<i>Phoenicurus auroreus</i>	-																										
Stejneger's Stonechat	<i>Saxicola stejnegeri</i>	-		3	0.5	1	1	0.8	0.2	0.3						1		v	v		v							
Masked Laughingthrush	<i>Garrulax perspicillatus</i>	-																							v			

Common name	Scientific name	Conservation status	Sep-10	Oct-10	Nov-10	Dec-10	Jan-11	Feb-11	Mar-11	Apr-11	May-11	Jun-11	Jul-11	Aug-11	Sep-11	Oct-11	Nov-11	Dec-11	Jan-12	Feb-12	Mar-12	Apr-12	May-12	Jun-12	Jul-12	Aug-12	Sep-12	Oct-12	
Lanceolated Warbler	<i>Locustella lanceolata</i>	(1)														0.3													
Pallas's Grasshopper Warbler	<i>Locustella certhiola</i>	LC, (1)														0.3													
Black-browed Reed Warbler	<i>Acrocephalus bistrigiceps</i>	(1)														0.3													
Zitting Cisticola	<i>Cisticola juncidis</i>	LC							0.2	1.5	2.5	2.5	1	0.4		0.3	0.8	1.8	0.2	0.3	0.6					0.2			
Yellow-bellied Prinia	<i>Prinia flaviventris</i>	-																	v		v		v		v	v	0.8	0.4	
Plain Prinia	<i>Prinia inornata</i>	-																			v		v		v	v			
Dusky Warbler	<i>Phylloscopus fuscatus</i>	-														0.5		v											
Yellow-browed warbler	<i>Phylloscopus inornatus</i>	-																										1.4	
Chinese Penduline-Tit	<i>Remiz consobrinus</i>	RC, (1)																			1.2	0.2							
Little Bunting	<i>Emberiza pusilla</i>	-			0.5																								
Black-faced Bunting	<i>Emberiza spodocephala</i>	-								0.5																			
Chinese Grosbeak	<i>Eophona migratoria</i>	LC														0.3													
Scaly-breasted Munia	<i>Lonchura punctulata</i>	-	20				2.5		15	7.5													v		v	v	1.5		
Eurasian Tree Sparrow	<i>Passer montanus</i>	-																			v		v		v				
Red-billed Starling	<i>Spodiopsar sericeus</i>	GC													0.3		0.8	1.6	6.6	39	17.4								
White-cheeked Starling	<i>Spodiopsar cineraceus</i>	PRC												6.6															
Black-collared Starling	<i>Gracupica nigricollis</i>	-																v	v	v	v					v			
White-shouldered Starling	<i>Sturnia sinensis</i>	(LC)									0.3		0.5	2.4															
Common Myna	<i>Acridotheres tristis</i>	(1)																		v									
Crested Myna	<i>Acridotheres cristatellus</i>	—	3															v					v			v		^	
Black-naped Oriole	<i>Oriolus chinensis</i>	LC													1														
Black Drongo	<i>Dicrurus macrocercus</i>	-																							v	v			
Eurasian Magpie	<i>Pica pica</i>	-																			v					v	0.3		
Large-billed Crow	<i>Corvus macrorhynchos</i>	-				0.4			0.2																				
Collared Crow	<i>Corvus torquatus</i>	LC, NT				0.2	0.3			0.5		0.3		0.8	0.8	0.8	0.5							0.8					
No. of species recorded	102																												

Note: Conservation Status follows that of Fellowes et. al. (2002)
(1) Indicates the bird species is wetland dependent.
* Pintail Snipe and Swinhoe's Snipe cannot be distinguished in field, conservation status refers to Swinhoe's Snipe.
^ Indicates the species is recorded outside regular surveys.
v Indicates species recorded during surveys.

Table B5. Summary of Bird Species Recorded at the WRA and their Respective Monthly Mean between November 2012 and October 2013

Common name	Scientific name	Conservation status	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13
Little Grebe	<i>Tachybaptus ruficollis</i>	LC, (1)	1.0	1.0	1.2	0.4	0.6	0.4	1.5	0.5		0.6	0.5	1.2
Great Cormorant	<i>Phalacrocorax carbo</i>	PRC, (1)	0.8	3.2	0.8	1	0	0						0.2
Grey Heron	<i>Ardea cinerea</i>	PRC, (1)	0.8	1.4	0.8	1.4	0	0					^	1
Purple Heron	<i>Ardea purpurea</i>	RC, (1)												
Great Egret	<i>Ardea alba</i>	PRC, (1)	1.4	0.6	1	0.8	0.2	0.6		0.8	0.6			0.6
Intermediate Egret	<i>Egretta intermedia</i>	RC, (1)	0.2											
Little Egret	<i>Egretta garzetta</i>	PRC, (1)	0.8	2	2.2	1.4	0.6	1.2	0.6	1.8	0.4	3.4	0.5	2.2
Eastern Cattle Egret	<i>Bubulcus coromandus</i>	(LC), (1)												
Chinese Pond Heron	<i>Ardeola bacchus</i>	PRC, (1)	1.6	2.2	2.4	0.4					0.8	2	0.5	1.4
Yellow Bittern	<i>Ixobrychus sinensis</i>	(LC), (1)						^	1.0	2.5	0.2	1.4	1.3	0.8
Black-crowned Night Heron	<i>Nycticorax nycticorax</i>	LC, (1)	^			0.2				0.3				^
Eurasian Spoonbill^	<i>Platalea leucorodia</i>	LC, (1)												
Black-faced Spoonbill	<i>Platalea minor</i>	PGC, EN, (1)												
Mandarin Duck	<i>Aix galericulata</i>	(1)												
Eurasian Wigeon	<i>Anas penelope</i>	RC, (1)												
Eurasian Teal	<i>Anas crecca</i>	RC, (1)												
Northern Pintail	<i>Anas acuta</i>	RC, (1)												
Northern Shoveler	<i>Anas clypeata</i>	RC, (1)			^									
Tufted Duck	<i>Aythya fuligula</i>	LC, (1)			^									
Garganey^	<i>Anas querquedula</i>	(1)												
Western Osprey	<i>Pandion haliaetus</i>	RC, (1)												
Black Kite	<i>Milvus migrans</i>	(RC) 0.8		0.2			0.6		0.2	0.3		1.2	0.8	0.2
Eastern Buzzard	<i>Buteo japonicus</i>	-												
Common Kestrel	<i>Falco tinnunculus</i>	-												
Eurasian Hobby^	<i>Falco subbuteo</i>	(LC), (1)												
Peregrine Falcon	<i>Falco peregrinus</i>	-		^										
Imperial Eagle	<i>Aquila heliaca</i>	-			^									
Japanese Quail	<i>Coturnix japonica</i>	LC, (1)												^
White-breasted Waterhen	<i>Amaurornis phoenicurus</i>	(1)	0.2		0.2		0.4	0.2	^	1.8	0.2	0.2	^	0.8
Common Moorhen	<i>Gallinula chloropus</i>	(1)												
Pheasant-tailed Jacana	<i>Hydrophasianus chirurgus</i>	LC, (1)												
Greater Painted-snipe	<i>Rostratula benghalensis</i>	LC, (1)	0.2											
Black-winged Stilt	<i>Himantopus himantopus</i>	RC, (1)									0.2	0.6	^	0.2
Pied Avocet	<i>Recurvirostra avosetta</i>	RC, (1)		0.2										
Oriental Pratincole	<i>Glareola maldivarum</i>	LC, (1)												
Little Ringed Plover	<i>Charadrius dubius</i>	LC, (1)			0.4	1	0.2							^
Kentish Plover^	<i>Charadrius alexandrinus</i>	RC, (1)									0.8			
Spotted Redshank^	<i>Tringa erythropus</i>	RC, (1)												^
Common Redshank^	<i>Tringa totanus</i>	RC, (1)												
Marsh Sandpiper^	<i>Tringa stagnatilis</i>	RC, (1)												
Common Greenshank	<i>Tringa nebularia</i>	RC, (1)	^	^	^		^							
Green Sandpiper	<i>Tringa ochropus</i>	(1)						0.2						1
Wood Sandpiper	<i>Tringa glareola</i>	LC, (1)		^		^	^							^
Common Sandpiper	<i>Actitis hypoleucos</i>	(1)	0.2					0.2	0.2		^	0.6	^	0.8
Eurasian Woodcock^	<i>Scolopax rusticola</i>	(1)												

Common name	Scientific name	Conservation status	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13
Pintail/Swinhoe's Snipe*	<i>Gallinago stenura/G. megala</i>	LC*,(1)												
Common Snipe	<i>Gallinago gallinago</i>	(1)		^				^						
Red-necked Stint	<i>Calidris ruficollis</i>	LC, (1)												
Temminck's Stint	<i>Calidris temminckii</i>	LC, (1)												
Long-toed Stint	<i>Calidris subminuta</i>	LC, (1)												
Whiskered Tern	<i>Chlidonias hybrida</i>	(1)												
Domestic Pigeon	<i>Columba livia</i>	-												
Oriental Turtle Dove	<i>Streptopelia orientalis</i>	-												
Red Turtle Dove^	<i>Streptopelia tranquebarica</i>	-												
Spotted Dove	<i>Spilopelia chinensis</i>	-	0.4	1.2	0.4		0.2	0.2	0.4	0.5	0.8	2.8	2.0	2.6
Greater Coucal	<i>Centropus sinensis</i>								0.2	0.3	0.2	0.2		0.2
Eurasian Eagle Owl *	<i>Bubo bubo</i>	RC											ü	
Savanna Nightjar^	<i>Caprimulgus affinis</i>	-				^				^				
Pacific Swift	<i>Apus pacificus</i>	(LC)												
House Swift	<i>Apus nipalensis</i>	-		0.4	^									
Pied Kingfisher	<i>Ceryle rudis</i>	(LC), (1)						^				^		
Common Kingfisher	<i>Alcedo atthis</i>	(1)	0.2	0.2	0.5	0.4	0.2	0.2	0.6	0.3	0.4	0.4	0.8	1.0
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	(LC)												
Barn Swallow	<i>Hirundo rustica</i>	-	0.2	1		0.2	9.2	23	11.2		1.4	1.8	1.0	
Red-rumped Swallow	<i>Hirundo daurica</i>	-	1.2	1.2										
Eastern Yellow Wagtail	<i>Motacilla tschutschensis</i>	(1)	0.2	0.2	1.4	2.8	2.2	2.2	0.2					0.4
Grey Wagtail	<i>Motacilla cinerea</i>	(1)	0.6											
White Wagtail	<i>Motacilla alba</i>	(1)	2.6	1.0	1.0	3.0	4.8	2.0	1.0		1.2	0.4	3.5	2.8
Richard's Pipit	<i>Anthus richardi</i>	(1)	0.2	0.4	1.2	0.4	0.4							
Olive-backed Pipit	<i>Anthus hodgsoni</i>	-				0.6	1.2	1.4						
Red-throated Pipit	<i>Anthus cervinus</i>	LC												
Buff-bellied Pipit	<i>Anthus rubescens</i>	LC												
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	-						0.2		0.3		0.2		
Chinese Bulbul	<i>Pycnonotus sinensis</i>	-		0.2	2	0.2	0.2	3.2	2	3.8		2.4	3.5	0.2
Long-tailed Shrike	<i>Lanius schach</i>	-	0.2		0.4			0.2		^	0.4	0.2	0.3	0.2
Oriental Magpie Robin	<i>Copsychus saularis</i>	-		0.2					0.2	0.5		0.2	0.3	^
Daurian Redstart	<i>Phoenicurus aureus</i>	-			0.2									
Stejneger's Stonechat	<i>Saxicola stejnegeri</i>	-	0.4	0.4	0.8			0.6						^
Masked Laughingthrush	<i>Garrulax perspicillatus</i>	-					0.6	1.2					1.0	
Lanceolated Warbler	<i>Locustella lanceolata</i>	(1)												
Pallas's Grasshopper Warbler	<i>Locustella certhiola</i>	LC, (1)												
Black-browed Reed Warbler	<i>Acrocephalus bistrigiceps</i>	(1)	0.2											
Zitting Cisticola	<i>Cisticola juncidis</i>	LC		0.2			^							
Yellow-bellied Prinia	<i>Prinia flaviventris</i>	-		0.8	0.6	0.8	1.4	4.6	4.4	5.0	2.4	1.8	3.0	2.4
Plain Prinia	<i>Prinia inornata</i>	-	1.2	0.4	^	1.4	0.2	0.2	0.2	0.5	0.8	0.4	0.3	
Dusky Warbler	<i>Phylloscopus fuscatus</i>	-												^
Yellow-browed warbler	<i>Phylloscopus inornatus</i>	-	0.8	0.6										
Chinese Penduline-Tit	<i>Remiz consobrinus</i>	RC, (1)												
Little Bunting	<i>Emberiza pusilla</i>	-												
Black-faced Bunting	<i>Emberiza spodocephala</i>	-												
Chinese Grosbeak	<i>Eophona migratoria</i>	LC												
Scaly-breasted Munia	<i>Lonchura punctulata</i>	-				1.0	2.2	1.0			2.0	0.4	0.3	

Common name	Scientific name	Conservation status	Nov-12	Dec-12	Jan-13	Feb-13	Mar-13	Apr-13	May-13	Jun-13	Jul-13	Aug-13	Sep-13	Oct-13
Eurasian Tree Sparrow	<i>Passer montanus</i>	-												0.8
Red-billed Starling	<i>Spodiopsar sericeus</i>	GC												
White-cheeked Starling	<i>Spodiopsar cineraceus</i>	PRC												
Black-collared Starling	<i>Gracupica nigricollis</i>	-			0.8	0.4	0.2	0.2	0.2				0.8	
White-shouldered Starling	<i>Sturnia sinensis</i>	(LC)									0.2			
Common Myna	<i>Acridotheres tristis</i>	(1)												
Crested Myna	<i>Acridotheres cristatellus</i>	-	0.6						0.2	0.3	0.8	0.2		
Black-naped Oriole	<i>Oriolus chinensis</i>	LC												
Black Drongo	<i>Dicrurus macrocercus</i>	-											0.3	0.4
Eurasian Magpie	<i>Pica pica</i>	-								0.3				
Large-billed Crow	<i>Corvus macrorhynchos</i>	-								1.0				
Collared Crow	<i>Corvus torquatus</i>	LC, NT						^						0.2
No. of species recorded	102													

Note: Conservation Status follows that of Fellowes et. al. (2002)
(1) Indicates the bird species is wetland dependent.
* Pintail Snipe and Swinhoe's Snipe cannot be distinguished in field, conservation status refers to Swinhoe's Snipe.
^ Indicates the species is recorded outside regular surveys.
v Indicates species recorded during surveys.

Appendix C. Summary of Herpetofauna Monitoring, Mammals and Insects Surveys

Table C1. Summary of herpetofauna monitoring within the Survey Area (excluding the WRA)

Common Name	Scientific Name	Conservation Status ⁽²⁾	Mean ⁽¹⁾					
Amphibians			May	Jun	Jul	Aug	Sep	Oct
Gunther's Frog	<i>Rana guentheri</i>	-	1.0	5.0	-	-	-	-
		No. of Species Recorded	1	1	0	0	0	0
Reptiles			May	Jun	Jul	Aug	Sep	Oct
No herpetofuna was recorded during the survey period	-	-	-	-	-	-	-	-
		No. of Species Recorded	0	0	0	0	0	0

- (1) Conservation status follows that of Fellowes et al. (2002), Chan et al. (2005) and Karsen et al. (1998).
 (2) indicates number of surveys recorded within the reporting period.
 (3) refers to the mean number of individuals recorded in the reporting period (excluding the WRA)
 ✓ indicates the species is recorded outside regular surveys

Table C2. Summary of herpetofauna monitoring in the WRA

Common Name	Scientific Name	Conservation Status ⁽²⁾	Mean ⁽¹⁾					
Amphibians			May	Jun	Jul	Aug	Sep	Oct
Asian Common Toad	<i>Bufo melanostictus</i>	-	-	-	1.0	-	-	-
		No. of Species Recorded	0	0	1	0	0	0
Reptiles			May	Jun	Jul	Aug	Sep	Oct
Checkered Keelback	<i>Xenochrophis piscator</i>	-	1.0	-	-	-	-	-
Softshell Turtle	<i>Trionychidae</i> sp.	-	-	-	-	-	-	✓

Proposed Comprehensive Development at Wo Shang Wai Yuen Long

Biannual EM&A Report on Ecology for May – Oct 2013 (Rev A)



Common Name	Scientific Name	Conservation Status ⁽²⁾	Mean ⁽¹⁾					
Chinese Skink	<i>Eumeces chinensis</i>	-	-	-	-	-	-	1.0
		No. of Species Recorded	1	0	0	0	0	2

(1) Conservation status follows that of Fellowes et al. (2002), Chan et al. (2005) and Karsen et al. (1998).

(2) indicates number of surveys recorded within the reporting period.

(3) refers to the mean number of individuals recorded in the reporting period (excluding the WRA)

✓ indicates the species is recorded outside regular surveys

Table C3. Summary of mammal monitoring in the Survey Area (excluding the WRA)

Common Name	Scientific Name	Conservation Status ⁽²⁾	Mean ⁽¹⁾					
No mammal was recorded during the survey period	-	-	-	-	-	-	-	-
		No. of Species Recorded	0	0	0	0	0	0

(1) Conservation status follows that of Fellowes et al. (2002) and Shek (2006).

(2) Refers to the maximum number of individuals recorded in each month in the survey area (excluding WRA)

Table C4. Summary of mammal monitoring in the WRA

Common Name	Scientific Name	Conservation Status ⁽²⁾	Mean ⁽¹⁾					
Small Asian Mongoose	<i>Herpestes javanicus</i>	-	-	1	-	-	-	-
Pipistrelle	<i>Pipistrellus sp.</i>	-	-	✓	✓	✓	-	
		No. of Species Recorded	0	2	1	1	0	0

(1) Conservation status follows that of Fellowes et al. (2002) and Shek (2006).

(2) Refers to the maximum number of individuals recorded in each month in the survey area (excluding WRA)

✓ indicates the species is recorded outside regular surveys

Table C5. Summary of dragonfly and butterfly monitoring in the Survey Area (excluding the WRA)

Common Name	Scientific Name	Conservation Status ⁽²⁾	Mean ⁽¹⁾					
Odonate			May	Jun	Jul	Aug	Sep	Oct
Asian Amberwing	<i>Brachythemis contaminata</i>	-	1.3	0.0	0.0	0.0	0.0	0.0
Blue Dasher	<i>Brachydiplax chalybea flavovittata</i>	-	0.0	0.0	0.0	0.0	1.0	0.0
Common Bluetail	<i>Ischnura senegalensis</i>	-	27.3	38.0	0.0	5.0	0.0	0.0
Common Flangetail	<i>Ictinogomphus pertinax</i>	-	1.7	1.0	2.5	4.0	2.0	0.0
Crimson Dropwing	<i>Trithemis aurora</i>	-	0.0	0.0	0.5	0.0	0.0	0.0
Green Skimmer	<i>Orthetrum sabina sabina</i>	-	0.3	6.5	3.5	1.5	1.0	1.0
Indigo Dropwing	<i>Trithemis festiva</i>	-	0.0	0.0	0.0	0.0	0.0	1.0
Saddlebag Glider	<i>Tramea virginia</i>	-	1.0	2.0	3.0	5.5	4.0	1.0
Variegated Flutterer	<i>Rhyothemis variegata arria</i>	-	1.0	26.5	8.0	19.5	18.0	1.0
Wandering Glider	<i>Pantala flavescens</i>	-	0.0	2.0	1.5	3.5	13.0	1.0
Yellow Featherlegs	<i>Copera marginipes</i>	-	0.0	0.5	0.0	0.0	0.0	0.0
		No. of Species Recorded	6	7	6	6	6	5
Butterfly			May	Jun	Jul	Aug	Sep	Oct
Long-tailed Blue	<i>Lampides boeticus</i>	-	0.3	0.0	0.0	0.0	0.0	0.0
Common Grass Yellow	<i>Eurema hecabe</i>	-	1.3	2.0	1.0	0.0	0.0	0.0
Common Mormon	<i>Papilio polytes</i>	-	0.0	0.0	1.0	0.0	0.0	0.0
Indian Cabbage White	<i>Pieris canidia</i>	-	1.0	0.5	0.5	0.0	1.0	0.0
Lemon Emigrant	<i>Catopsilia pomona</i>	-	0.0	0.5	0.0	0.0	0.0	0.0
Mottled Emigrant	<i>Catopsilia pyranthe</i>	-	0.3	0.5	2.0	0.5	0.0	1.0
Pale Grass Blue	<i>Pseudozizeeria maha serica</i>	-	1.0	0.5	0.0	0.0	0.0	0.0
		No. of Species Recorded	5	5	4	1	1	1

(1) Conservation status follows that of Fellowes et al. (2002), Lo & Hui (2004), Wilson (2004) and Young & Yiu (2002).

(2) refers to the mean number of individuals recorded in each month in the survey area (excluding the WRA)

Table C6. Summary of dragonfly and butterfly monitoring in the WRA

Common Name	Scientific Name	Conservation Status ⁽²⁾	Mean ⁽¹⁾					
Odonate			May	Jun	Jul	Aug	Sep	Oct
Asian Amberwing	<i>Brachythemis contaminata</i>	-	1.7	0.0	3.0	0.0	1.0	1.0
Asian Emberwing	<i>Brachythemis contaminata</i>	-	0.0	0.0	0.0	0.0	0.0	0.0
Asian Pintail	<i>Acisoma panorpoides panorpoides</i>	-	0.3	0.0	0.0	0.0	0.0	0.0
Blue Dasher	<i>Brachydiplax chalybea flavovittata</i>	-	0.3	0.5	1.0	0.0	0.0	1.0
Blue Percher	<i>Diplacodes trivialis</i>	-	0.3	0.0	0.0	0.0	0.0	0.0
Common Bluetail	<i>Ischnura senegalensis</i>	-	201.3	122.5	16.5	3.0	0.0	0.0
Common Flangetail	<i>Ictinogomphus pertinax</i>	-	2.0	9.0	7.5	14.5	12.0	0.0
Crimson Darter	<i>Crocothemis servilia servilia</i>	-	0.0	0.0	0.0	0.0	1.0	1.0
Evening Skimmer	<i>Tholymis tillarga</i>	-	0.3	0.0	0.0	0.0	0.0	0.0
Green Skimmer	<i>Orthetrum sabina sabina</i>	-	1.7	8.5	13.5	20.0	22.0	5.0
Indigo Dropwing	<i>Trithemis festiva</i>	-	0.0	0.0	0.0	0.0	1.0	1.0
Lesser Emperor	<i>Anax parthenope julius</i>	-	0.3	0.0	1.0	1.0	0.0	0.0
Organge-tailed Sprite	<i>Ceriagrion auranticum ryukyuanum</i>	-	0.3	0.0	0.0	0.0	0.0	0.0
Pied Percher	<i>Neurothemis tullia tullia</i>	-	0.3	0.5	1.5	0.5	1.0	2.0
Pied Skimmer	<i>Pseudothemis zonata</i>	-	0.0	1.0	0.0	0.0	0.0	0.0
Saddlebag Glider	<i>Tramea virginia</i>	-	1.7	1.5	6.0	15.0	16.0	3.0
Variegated Flutterer	<i>Rhyothemis variegata arria</i>	-	32.0	73.0	29.0	28.5	12.0	9.0
Wandering Glider	<i>Pantala flavescens</i>	-	0.7	1.0	0.5	7.0	4.0	1.0
		No. of Species Recorded	14	9	10	8	9	9
Butterfly			May	Jun	Jul	Aug	Sep	Oct
Blue-spotted Crow	<i>Euploea midamus</i>	-	0.0	0.5	0.0	0.0	0.0	0.0
Chocolate Pansy	<i>Junonia iphita</i>	-	0.0	0.5	0.0	0.0	0.0	0.0
Common Bluebottle	<i>Graphium sarpedon sarpedon</i>	-	0.0	0.0	0.0	0.0	0.0	3.0

Proposed Comprehensive Development at Wo Shang Wai Yuen Long

Biannual EM&A Report on Ecology for May – Oct 2013 (Rev A)



Common Name	Scientific Name	Conservation Status ⁽²⁾	Mean ⁽¹⁾					
Common Grass Yellow	<i>Eurema hecabe</i>	-	1.3	6.0	2.5	0.5	0.0	1.0
Common Sailer	<i>Neptis hylas hylas</i>	-	0.0	0.0	0.5	0.0	1.0	0.0
Dark Brand Bush Brown	<i>Mycalesis mineus mineus</i>	-	0.0	0.0	0.0	0.0	0.0	1.0
Indian Cabbage White	<i>Pieris canidia</i>	-	1.0	0.5	0.0	0.0	1.0	1.0
Lemon Emigrant	<i>Catopsilia pomona</i>	-	0.0	0.5	0.0	0.0	0.0	0.0
Mottled Emigrant	<i>Catopsilia pyranthe pyranthe</i>	-	0.0	3.5	0.5	1.0	0.0	1.0
Pale Grass Blue	<i>Pseudozizeeria maha serica</i>	-	0.7	0.0	0.0	0.0	0.0	0.0
Paris Peacock	<i>Papilio paris</i>	-	0.3	0.0	0.0	0.0	0.0	0.0
Peacock Pansy	<i>Junonia almana almana</i>	-	0.0	0.0	0.0	0.5	0.0	0.0
Plain Tiger	<i>Danaus chrysippus</i>	-	0.0	0.5	0.0	0.0	0.0	0.0
Red Ring Skirt	<i>Hestina assimilis assimilis</i>	-	0.0	0.5	0.0	0.5	0.0	0.0
Red-base Jezebel	<i>Delias pasithoe</i>	-	0.0	0.5	0.0	0.0	0.0	0.0
Tailed Jay	<i>Graphium agamemnon agamemnon</i>	-	0.0	0.0	0.0	0.0	0.0	1.0
		No. of Species Recorded	4	9	3	4	2	6

(1) Conservation status follows that of Fellowes et al. (2002), Lo & Hui (2004), Wilson (2004) and Young & Yiu (2002).

(2) refers to the mean number of individuals recorded in each month in the survey area (excluding the WRA)

Appendix D. Summary of Water and Soil Quality Monitoring

Table D1. Water quality at WRA

May 2013

Cell No.	Temp. (°C)	pH	Salinity (ppt)	Turbidity (mg/L)	DO (mg/L)
1	29.1	8.00	0.85	11.2	6.2
2	29.0	8.11	1.04	9.7	5.5
3	29.0	7.99	0.87	6.2	4.9
4	28.7	8.21	0.89	18.7	5.5

June 2013

Cell No.	Temp. (°C)	pH	Salinity (ppt)	Turbidity (mg/L)	DO (mg/L)
1	31.0	8.02	0.85	10.2	7.2
2	31.1	8.13	0.90	7.4	7.1
3	30.6	8.05	0.89	8.2	7.5
4	33.0	8.17	0.96	27.7	6.6

July 2013

	Temp. (°C)	pH	Salinity (ppt)	Turbidity (mg/L)	DO (mg/L)
1	29.4	8.01	0.60	26.5	5.8
2	30.4	8.11	0.47	12.2	6.2
3	30.1	8.05	0.47	10.4	5.9
4	30.6	8.18	0.64	11.9	6.5

August 2013

Cell No.	Temp. (°C)	pH	Salinity (ppt)	Turbidity (mg/L)	DO (mg/L)
1	33.6	7.62	0.35	13.2	4.8
2	33.2	7.63	0.40	8.9	4.7
3	32.2	7.80	0.41	13.8	6.7
4	32.1	7.74	0.46	5.6	7.0

September 2013

Cell No.	Temp. (°C)	pH	Salinity (ppt)	Turbidity (mg/L)	DO (mg/L)
1	27.9	7.68	0.42	10.7	6.1
2	28.1	7.63	0.42	9.2	6.5
3	28.2	7.65	0.42	11.3	7.2
4	28.3	7.62	0.47	8.9	7.3

October 2013

Cell No.	Temp. (°C)	pH	Salinity (ppt)	Turbidity (mg/L)	DO (mg/L)
1	25.7	7.81	0.34	25.1	5.7
2	25.6	7.88	0.40	13.7	5.6
3	25.6	7.89	0.40	15.6	6.8
4	25.7	7.93	0.41	5.9	6.9

Notes: Values **Bold** indicate Action Level exceedance.
Values **Underlined and Bold** indicate Limit Level exceedance.

Table D2. Soil quality at WRA on 31 May 2013

Cell No.	pH	Total Solids (%)	Volatile Solids (%)	Oxidation Reduction Potential (mV)	Total Nitrogen (mg/Kg)	Total Phosphorus (mg/Kg)	Total Reactive Phosphorus (mg/Kg)	Total Organic Carbon (mg/Kg)
1	7.1	65.8	4.6	182	1070	45	<0.1	1.20
2	5.7	68.9	6.2	174	890	247	<0.1	1.61
3	6.4	75.0	3.2	190	560	336	<0.1	1.24
4	6.4	52.4	5.9	47.6	1330	402	<0.1	1.98