8. Ecological Impact Assessment

8.1 Introduction

This section addresses the potential ecological impacts that may arise from the demolition and removal of the existing above ground structures of the Livestock Waste Composting Plant and construction and operation of the proposed OWTF 2 at Sha Ling in the North District, within the Frontier Closed Area. It presents the findings of literature review and supplementary field surveys conducted from February to June 2012. The potential impacts on the ecological sensitive receivers within the Assessment Area were assessed in accordance with the criteria and guidelines stated in Annexes 8 and 16 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM) and suitable mitigation measures were proposed to mitigate the potential adverse impacts to an environmentally acceptable level.

8.2 Environmental Legislation, Standards and Guidelines

A number of international conventions, local legislation and guidelines provide the framework for the protection of species and habitats of ecological importance. Those related to this Project are:

- *Forests and Countryside Ordinance* (Cap. 96), which protects the rare plant species from selling, offering for sale, or possession illegally;
- *Wild Animals Protection Ordinance* (Cap. 170), which protects wild animals listed under the second schedule from being hunted, possession, sale or export, disturbance of their nest or egg without permission by authorised officer;
- *Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586),* which regulates the import, introduction from the sea, export, re-export, and possession of specimens of a scheduled species, including live, dead, parts or derivatives. The Ordinance applies to all activities involving endangered species which include the parties of traders, tourists and individuals;
- *Environmental Impact Assessment Ordinance (EIAO) (Cap. 499),* which specifies designated projects under Schedule 2 of the Ordinance, unless exempted, must follow the statutory environmental impact assessment (EIA) process and require environmental permits for their construction and operation;
- *EIAO Guidance Notes No. 6/2010, 7/2010 and 10/2010.* These guidance notes provide the observations on Ecological Assessment from the EIAO perspective, providing the general guidelines for conducting an ecological baseline survey for ecological assessment, introducing some methodologies in conducting terrestrial and freshwater ecological baseline surveys, and methodologies for marine ecological baseline surveys respectively;
- *Annexes 8 and 16 of the Technical Memorandum on Environmental Impact Assessment Process (EIAO-TM):* Annex 8 recommends the criteria for evaluating ecological impacts. Annex 16 sets out the general approach and methodology for assessment of ecological impacts arising from a project or proposal, to allow a complete and objective identification, prediction and evaluation of the potential ecological impacts;

- *Town Planning Ordinance (Cap. 131)* which gives designation to country parks, conservation area, green belts, sites of special scientific interest, coastal protection area and other specified uses to promote conservation, protection and education of the valuable environment; and

- *Hong Kong Planning Standards and Guidelines Chapter 10 (HKPSG)* provides the guidelines on landscape and conservation to achieve a balance between the need for development and the need to minimise disruption of the landscape and natural resources.

8.3 Assessment Area and Survey Methodology

The ecological baseline information of the Assessment Area was collected through a combination of both literature review and field survey.

8.3.1 Assessment Area

According to Section 3.4.8.2 of the EIA Study Brief No. ESB-226/2011, the Assessment Area for the purpose of terrestrial ecological assessment includes all areas within 500m from the Project site boundary (**Figure 8.1**) and any other areas likely to be impacted by the Project. For aquatic ecology, the assessment area is the same as the water quality impact assessment described in Section 3.4.6.2 of the EIA Study Brief No. ESB-226/2011.

8.3.2 Literature Review

A preliminary desktop study and literature review have been conducted to investigate the existing conditions within the Assessment Area and identify habitats or species having conservation interest. The available information relevant to this Project including approved EIA reports, Government and private sector reports, published literature, academic study reports and unpublished data requested were covered in the literature review. Examples for these are as follows:

- Recent aerial photographs
- Field Guides to flora and fauna groups (individual books)
- Hong Kong Biodiversity Newsletter (AFCD)
- AFCD's Biodiversity Survey data (AFCD, correspondence, February 20, 2012)
- Hong Kong Bird Report and other survey reports by Hong Kong Bird Watching Society (HKBWS)
- HKBWS Breeding Bird Survey (Carey et al., 2001)
- Data collected during field surveys for "Land Use Planning for the Closed Area – Feasibility Study" (Ove Arup, 2010)
- Final Environmental Impact Assessment Report for North East New Territories New Development Areas (NENT NDAs) – Planning and Engineering Study – Investigation (Ove Arup, 2013)

Site specific and updated ecological information were collected through ecological field survey to fill the information gaps identified in literature review.

8.3.3 Reconnaissance Survey

A reconnaissance survey was conducted on 31 January 2012 to verify the information gathered from the preliminary desktop study and to identify representative areas for the ecological field survey.

8.3.4 Ecological Field Survey Methodology

Ecological field surveys were conducted following the guidelines stated in the "Ecological Baseline Survey for Ecological Assessment (EIAO Guidance Note No. 7/2010)" and "Methodologies for Terrestrial and Freshwater Ecological Baseline Surveys (EIAO Guidance Note No. 10/2010)".

The ecological field survey covers the 500 m boundary of the proposed OWTF 2 (**Figure 8.1**) with focus on areas potentially receiving direct impacts and indirect disturbance during the construction and operation phases. Ecological field surveys were conducted between February and June 2012, in both wet and dry seasons. Special attention was paid to the ecologically sensitive wildlife groups and habitats. Details of the field survey programme are described in the following sections and the survey locations and routes are presented in **Figure 8.1**. The field survey schedule is presented in **Table 8.1**.

Table 8.1: Schedule of Ecological Field Surveys

Survey Time	Type of survey	2012 FEB	MAR	APR	MAY	JUN
Day	Habitat and vegetation	✓	✓	✓	✓	✓
	Avifauna	✓	✓	✓	✓	✓
	Mammal	✓	✓	✓	✓	✓
	Herpetofauna	✓	✓	✓	✓	✓
	Butterfly and Dragonfly	✓	✓	✓	✓	✓
	Aquatic fauna		✓			✓
Night	Mammal		✓		✓	✓
	Herpetofauna		✓		✓	✓

8.3.4.1 Habitat Survey

A habitat map of suitable scale showing the types and locations of habitats in the Assessment Area with the overlay plot of the Project boundary was produced and presented in **Figure 8.2**.

Latest aerial photos were studied to identify the general land use / habitat type of the Assessment Area. Historical aerial photos were also referred to for studying the age of the habitat. A preliminary habitat map was generated through translating the visualised condition in the aerial photos, and the detailed habitats were marked up during ground truthing exercise.

Ground truthing was conducted on-site between February and June 2012 to verify and delineate the habitat types. All ecological resources within habitats were recorded and a more focused survey on those identified important habitats were conducted to collect further information.

8.3.4.2 Vegetation Survey

Vegetation surveys were conducted during wet and dry seasons from February to June 2012 within the Assessment Area. Special attention was paid on the species of conservation interest. All the flora species along the survey route were recorded and their relative abundance was qualitatively estimated through visual observation.

8.3.4.3 Fauna Survey

Transect Survey Route

Based on the reconnaissance survey, transect routes for terrestrial ecological surveys for avifauna, mammal, herpetofauna, butterfly and dragonfly are proposed and indicated in **Figure 8.1**, covering representative habitats and accessible areas within the Project Area and Assessment Area.

Avifauna Survey

Bird surveys were conducted during both day and night times using walk transect survey method with the aid of binoculars. All birds seen or heard during the transect survey were identified and counted. Special attention was paid to the plantation habitat that would be directly affected by the Project and the adjacent area where indirect disturbance might arise. Species showing notable breeding behaviour was also recorded in detail to identify any important breeding ground. Ornithological nomenclature and status followed HKBWS' List of HK Birds (HKBWS, 2013).

Mammal Survey

Mammal surveys were conducted during both day and night time by direct observation and active searching of traits such as scats, footprints and feeding signs within the Assessment Area. Any observed sightings, tracks and signs of mammals were identified and recorded. Bat surveys were carried out by direct counting at potential roosting and foraging sites. Night surveys for nocturnal mammals particularly at wooded areas were conducted. Species, abundance and their feeding/ foraging behaviours were identified and recorded. Nomenclature for mammals followed Shek (2006).

Herpetofauna (Amphibians and Reptiles) Survey

Herpetofauna surveys were conducted through active searching and detection of the mating calls during day and night times. Survey area covered both terrestrial and aquatic environment of potential habitat types, including watercourse, fishpond, agricultural area and wooded area. Night surveys were carried out during wet season when this fauna group is most active. Nomenclature for amphibians and reptiles followed Chan et al. (2005) and Karsen et al. (1998).

Butterfly and Dragonfly Survey

Butterfly and dragonfly surveys were carried out using walk transect survey method. All butterflies and dragonflies observed during the transect survey were identified and counted. Special attention was paid to any preferable habitats for these fauna groups, including watercourse, fishpond, and vegetated areas. Hand netting was used for collecting specimens if necessary to confirm the species identification, and the live specimen was released in-situ after identification. Nomenclature to be used in this report for butterflies and dragonflies follows Young and Yiu (2002) and Tam et al. (2011) respectively.

Aquatic Fauna Survey

Watercourse

Aquatic fauna surveys (including fish and invertebrates) were undertaken at the watercourse located about 60m to the northeast of the Project Area. During the reconnaissance site visit, the aforementioned watercourse was observed to be comparatively natural within the Assessment Area. The upper course was connected to a concrete paved outfall of an existing pond with landscape surroundings. The middle course was modified for draining excessive water from the pond and runoff from the surrounding village area. The lower course was connected to the drainage system at Man Kam To Road.

Surveys were conducted at representative locations at upper and lower courses along the watercourse by direct observation with the aids of a pair of binoculars with short focal length, active searching and sample collection using hand nets. All stream fauna species observed and collected were identified in the field, and their abundances were noted.

Pond

Aquatic fauna surveys at accessible pond areas were conducted during day time in both dry and wet seasons by bankside counting with the aid of binoculars. Wherever possible, pot trapping of freshwater fish was undertaken at locations with deep water depth. Pot traps with bait were deployed to the pond area as indicated in **Figure 8.1** for around 20 minutes. Disturbance to the trap was avoided during the deployment. The species and number of trapped fish was recorded. Species were released to the pond upon identification. Nomenclature for freshwater fishes followed Lee et al. (2004).

8.4 Ecological Baseline Information

This section describes the ecological context of the Assessment Area and any site identified of having high ecological value. The findings of literature review and the ecological field survey are also presented.

8.4.1 General Description of the Project Area and Assessment Area

It was observed from the reconnaissance survey that the majority of the proposed Project Area was currently occupied by the Environmental Protection Department (EPD) as Sha Ling Livestock Waste Composting Plant (SLCP). It was a built-up and concrete-paved developed area surrounded by a thin strip of plantings which receives regular maintenance. The remaining southern section of the Project Area outside the existing fenced area of the SLCP was covered by a large area of plantation. The canopy structure was simple and vegetation at the ground canopy is sparse, probably owing to the short history of the plantation.

From historical aerial photographs, it is observed that the Project Area and its vicinity were composed of natural woodland before end of 80s. The area was subsequently modified to bare grounds in early 90s. Currently, sparsely wooded and vegetated areas were observed at the area.

During the reconnaissance survey, wooded areas and inactive fishponds were observed within the Assessment Area. Most of the watercourses observed during reconnaissance survey were artificially modified drainage channels that were partially dry at sections. One watercourse with natural bottom / embankment is noted in the north-eastern vicinity of the Project Area. The upper course has natural bottom

and is connected to a concrete paved outfall of an existing pond with landscaped surroundings. No fisheries activities were observed at the pond during the site visit. The middle course was modified to form a ditch for draining excessive water from the pond and runoff from the surrounding village area, where orchards and active agricultural areas were observed. Towards the lower course near the outfall, which is connected to the drainage system at Man Kam To Road, human disturbance was observed to be less, where dense riparian vegetation and wooded area is present.

Detailed information of the ecological context identified from ground truthing exercise was described in **Sections 8.4.3** and **8.4.4**.

8.4.2 Recognised Sites of Conservation Importance

No Site of Special Scientific Interest (SSSI), Nature Reserve, Special Area and nature conservation related Restricted Area was found within the Assessment Area.

The watercourse in the north-eastern vicinity of the Project Area is connected to the drainage channel at Man Kam To Road and eventually led to Shenzhen River. The complex of wetland at Mai Po Inner Deep Bay located at downstream of Shenzhen River is recognised as ecologically important and protected through designation of Ramsar Site, SSSI and Nature Reserve.

Man Kam To Road Egretry

The egretry is located at Man Kam To Road, approximately 1 km from the Project Area. The egretry has been first discovered in June 2009 during the course of ecological surveys conducted under the NENT NDAs EIA Study (Ove Arup, 2013). It has been mainly used by Chinese Pond Heron (Anon, 2012). It was recorded with maximum of 21 Chinese Pond Heron nests and 6 Little Egret nests in 2012 (Anon, 2012); and it had two colonies comprising 19 Chinese Pond Heron nests and 1 Little Egret nest recorded (AFCD, correspondence, August 16, 2013).

The Man Kam To Road Egretry is located outside the 500 m Assessment Area. Nevertheless, given the forage range of ardeid which can cover more than 1 km of their roosting site, baseline condition and potential impact on this egretry were studied assessed under the EIA study.

8.4.3 Habitat Type and Vegetation within the Assessment Area

There are 13 major habitats identified in the Assessment Area, namely:

- Shrubland;
- Woodland;
- Hillside grassland;
- Grassland;
- Plantation;
- Orchard;
- Active agricultural area;
- Wet abandoned agricultural area;
- Village;
- Open field;
- Developed area;

- Pond; and
- Watercourse.

The distribution of each habitat type is shown in the Habitat Map in **Figure 8.2**. The areas of each habitat type within the Assessment Area and Project Area are listed in **Table 8.2** and **Table 8.3** respectively. Project Area refers to the proposed land required for construction works.

Table 8.2: Habitats Present in the Assessment Area (excluding the Project Area)

Habitat	Assessment Area	
	Area (ha)	%
Shrubland	1.8	1.5
Woodland	3.3	2.8
Hillside grassland	45.6	38.9
Grassland	4.7	4.0
Plantation	21.2	18.1
Orchard	3.2	2.7
Active agricultural area	1.8	1.5
Wet abandoned agricultural area	0.7	0.6
Village	18.5	15.8
Open field	1.3	1.1
Developed area	14.1	12.0
Pond	0.9	0.8
Watercourse	0.2	0.2
Total	**117.3**	**100**

Table 8.3: Habitats Present in the Project Area

Habitat	Project Area	
	Area (ha)	%
Shrubland	0	0
Woodland	0	0
Hillside grassland	0	0
Grassland	0	0
Plantation	1.0	40
Orchard	0	0
Active agricultural area	0	0
Wet abandoned agricultural area	0	0
Village	0	0
Open field	0	0
Developed area	1.5	60
Pond	0	0
Watercourse	0	0
Total	**2.5**	**100**

Representative photographs of each type of habitats are illustrated in **Plates 1 to 13** in **Appendix 8.1**.

8.4.3.1 Shrubland

Shrublands are scattered near villages and on hillsides within the Assessment Area. This type of habitat is a subsequent succession stage of grassland. Floral species commonly observed in this habitat include *Bidens alba*, *Dicranopteris pedata*, *Ficus hispida* and *Ligustrum sinense*.

8.4.3.2 Woodland

Patches of woodland areas were found scattered in the Assessment Area. They are distributed on near villages, and separated by artificial land uses such as roads and landscape plantation. This habitat is dominated by *Ficus hispida* and *Celtis sinensis*. Other plant species such as *Bidens alba* are also common. It can be seen from historical aerial photos that a large patch of woodland area was converted into paved area in 1993 for the construction of Livestock Waste Composting Plant.

8.4.3.3 Hillside grassland

This habitat is a hillside habitat maintained by frequent hill fires. As hill fires are common incidents in the rural New Territories particularly during Ching Ming and Chung Yeung Festivals, this hill fire associated habitat is also very common within the Assessment Area. This habitat is dominated by grass species including *Miscanthus sinensis*, *Panicum maximum*, *Digitaria sanguinalis* and *Imperata cylindrica var. major*. Other floral species commonly found include *Melastoma malabathricum* and *Dianella ensifolia*.

8.4.3.4 Grassland

This habitat is dominated by grass species *Miscanthus floridulus* and *Panicum maximum*. Other plant species such as *Ipomoea cairica*, *Bidens alba* and *Lantana camara* are also common.

8.4.3.5 Plantation

Plantation is a man-made habitat dominated by planted trees for forestation or landscape. Plantation habitats are common but scattered throughout the Assessment Area. Common trees species include *Acacia auriculiformis*, *Casuarina equisetifolia*, *Eucalyptus citriodora*, *Lophostemon confertus* and *Pinus massoniana*.

8.4.3.6 Orchard

Orchard is a man-made habitat for fruit production. Orchard areas are common but scattered throughout the Assessment Area. Fruit trees widely planted within this habitat include *Clausena lansium*, *Dimocarpus longan*, *Musa x paradisiaca* and *Mangifera indica*.

8.4.3.7 Active agricultural area

This is wholly man-made habitat for crop production. No wet agriculture is practised. It is patchily scattered within the Assessment Area near the rural villages. Agricultural crops observed include *Brassica alboglabr*, *Capsicum annuum*, *Lycium chinense*, *Brassica parachinensis* and *Benincasa hispida*.

8.4.3.8 Wet abandoned agricultural area

This habitat is established by the abandonment of cultivation. The areas are generally flat and wet. They are quite homogeneous in terms of floral species distribution with low species diversity. Floral species commonly found in this habitat include *Hedychium coronarium*, *Alocasia odora*, *Colocasia esculenta*, *Bidens alba, Ipomoea cairica, Lantana camara, Panicum maximum* and *Polygonum chinense*.

8.4.3.9 Village

This is wholly man-made habitat characterised by rural housing interspersed with area of vegetation, mainly comprised of ornamental plants and some fruit trees. Exotic ornamental plants are commonly seen in the front gardens including one orchid species *Oncidium spp*. Other floral species commonly encountered include *Bidens alba*, *Lantana camara*, *Emilia sonchifolia*, *Ipomoea cairica* and *Mikania micrantha*.

8.4.3.10 Open field

Open field refers to bare ground, construction site or wasteland. Floral species commonly observed in this habitat include *Bidens alba*, *Ipomoea cairica*, *Panicum maximum*, *Polygonum chinense* and *Amaranthus viridis*.

8.4.3.11 Developed area

Developed areas are wholly artificial habitats. This urbanised land use is of negligible ecological importance.

8.4.3.12 Pond

A few ponds were found scattered within the Assessment Area. Some of them are abandoned irrigation ponds formerly used for cultivation while some are currently in private use for recreational purposes. A floating plant species *Lemna minor* is found in the ponds. Floral species commonly observed in the pond bunds include *Kyllinga monocephala*, *Ludwigia octovalvis* and *Cyperus imbricatus*.

8.4.3.13 Watercourse

Watercourses refer to those semi-natural or modified stream courses found within the Assessment Area. Floral species seen along the stream banks include *Alocasia odora*, *Blechnum orientale*, *Christella parasitica*, *Cyperus distans* and *Hedyotis corymbosa*.

8.4.3.14 Project Area

Habitats within the Project Area are man-made including plantation and developed area. Most plant species recorded are common and typical to these habitats.

8.4.3.15 Floral Species of Conservation Interest

A species of conservation interest, *Aquilaria sinensis*, was recorded in the plantation on the southern periphery of the Project Area. It is scheduled under the Protection of Endangered Species of Animals and

Plants Ordinance (Cap. 586), which aims to control the import/ export of the listed species. It is also listed under State protection (Category II) in Mainland China. However, this species is common in Hong Kong.

Another floral species encountered, *Hylocereus undatus*, which belong to the family *Cactaceae* is also scheduled under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586). It is recorded in the village and on agricultural land. It is a non-native species often planted as ornamental or food plant. The observed individuals are probably intentionally planted by villagers.

A protected floral species *Keteleeria fortunei* is found on both sides of Kong Nga Po Road. It is protected under the Forestry Regulations (Cap. 96. sub. leg.). The individuals observed are restricted to the roadside and are probably intentionally planted as roadside amenity trees.

Within the Project Area, three species of orchid were also recorded. All orchids in Hong Kong are protected under the Forestry Regulations (Cap. 96. sub. leg.) except "plants grown outside Hong Kong or on any land held from the Government under a lease, licence or permit or by virtue of an Ordinance". For the orchid species within the Project Area, two of them, namely *Cattleya spp*. and *Oncidium spp*., belong to genera non-native to Hong Kong. *Cattleya spp*. was found in a planting area within the existing Livestock Waste Composting Plant and *Oncidium spp*. was found growing in the front garden of a village house. These two species were very unlikely wild-grown but imported and planted intentionally as ornamental plants. Hence, these two species are not protected under the Forestry Regulations (Cap. 96. sub. leg.) However, they are scheduled under the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).

The remaining orchid species *Geodorum densiflorum* is a native orchid found on hillside grassland beside a footpath. It is likely a wild orchid and hence a species of conservation interest protected under both the Forestry Regulations (Cap. 96. sub. leg.) and Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586). It is considered locally uncommon and vulnerable in Hong Kong.

A total of 294 plant species were recorded within the Assessment Area. The plant list is presented in **Appendix 8.2.**

8.4.4 Fauna within the Assessment Area

8.4.4.1 Avifauna

Owing to the nature of the habitat covered in the Assessment Area, the avifauna recorded in the survey comprises mainly terrestrial bird species. Unlike the lowland area in northeast New Territories, the inland habitat in northeast New Territories, where the Assessment Area is situated, lacks a continuous wetland system to support any diverse wetland ecosystem. Therefore, the avifauna in the Assessment Area contains only a limited number of wetland-dependent birds.

Literature Review

Unlike the wetland habitat in northwest New Territories, the avifauna in the terrestrial habitat in northeast New Territories is seldom surveyed thoroughly. Relevant studies that present the local avifauna information in the Assessment Area are the Breeding Bird Survey in 1993-1996 conducted by the HKBWS (Carey et al., 2001) and the survey findings for "Land Use Planning for the Closed Area – Feasibility Study" (Ove Arup, 2010).

In the Breeding Bird Survey, it recorded all the breeding and potentially breeding bird species in Hong Kong and the results were presented in 1-square-kilometer (or 5-km^2 for some raptor species)-grid format. For the grids covering the Assessment Area of the Project, the Breeding Bird Survey has recorded 23 species. A raptor species Black Baza *Aviceda leuphotes*, which is an uncommon passage migrant and scarce summer visitor, has been recorded for one of the grids covering the Assessment Area (Carey et al., 2001, pp. 59). However, it was noted in the same book (pp. 171) that there was only one confirmed breeding record in 1989, while the breeding survey results for Black Baza probably included observations of many birds that were actually migrants. The other 22 breeding species recorded for the grids covering the Assessment Area of this Project are mostly common and widespread in Hong Kong. Among them, Greater Coucal and White-throated Kingfisher are species of conservation interest. The survey results are extracted in **Table 8.4**.

In the data collected during field survey for "Land Use Planning for the Closed Area – Feasibility Study" (Appendix G of the Final Report; Ove Arup, 2010), the finding of Kong Nga Po appeared to be the most relevant to the Assessment Area of this Project, while those areas south of Sandy Ridge cemetery and Man Kam To obtained at Muk Wu area were outside the Assessment Area. Although a complete list of avifauna is not available in the report, it was reported that a total of four avifauna species of 'conservation significance' were recorded at Kong Nga Po in low abundance (Ove Arup, 2010); all the four species are rather common and widespread in Hong Kong. The records available are extracted in **Table 8.4**.

The Final EIA Report for NENT NDA project was reviewed and found that only the northeast corner part of the NENT NDA EIA study area has overlapped with the Assessment Area. Since about 95% of the NENT NDA EIA study area is irrelevant to the Assessment Area of this Project, fauna records without specific location presented in the NENT NDA EIA were not extracted or incorporated. Nevertheless, it was noted that Grey Nightjar of conservation concern was recorded calling over upland grassland at Cheung Po Tau in surveys conducted under the NENT NDA EIA study (Ove Arup, 2013). This avifauna species is considered to be of Local Concern by Fellowes et al. (2002), and is a locally distributed summer visitor and passage migrant (Allcock et al., 2012). Only one breeding record of this species in Hong Kong is listed by Carey et al. (2001), but this species is now considered by the NENT NDA EIA study team to breed in upland grassland/shrubland areas in a number of locations in the New Territories.

Survey Findings

Project Area

Within the Project Area, 10 avifauna species were recorded at plantation and developed areas, as listed in **Table A8-1** in **Appendix 8.3**. Most of the avifauna species recorded is common, widely distributed in Hong Kong and not of conservation interest. Large Hawk Cuckoo *Hierococcyx sparverioides* and Indian Cuckoo *Cuculus micropterus* recorded within the Project Area are commonly found at the northeast part of Hong Kong during summer.

Lesser Coucal *Centropus bengalensis*, a species of conservation interest, was heard calling from plantation area within the Project Area (location indicated in **Figure 8.2**). This species is a Class II state major protected animal in Mainland China and listed as vulnerable in China Red Data Book. It is a widespread and fairly common resident in areas of grassland or grassland/shrubland (Allcock et al., 2012).

Assessment Area

A total of 45 avifauna species were recorded within the Assessment Area (excluding the Project Area), as listed in **Table A8-2 in Appendix 8.3**. Most of them are common in Hong Kong, being residents, visitors and/or passage migrant. Among them, six avifauna species of conservation interest were recorded (locations indicated in **Figure 8.2**). No rare species was recorded.

Two individuals of Little Grebe *Tachybaptus ruficollis* (shown in **Plate 14** in **Appendix 8.1**) and an individual of White-throated Kingfisher *Halcyon smyrnensis* were recorded at a pond northeast to the Project Area (i.e. the pond where P4 located in **Figure 8.1**). Both Little Grebe and White-throated Kingfisher are considered to be of Local Concern by Fellowes et al. (2002), and present all year in ponds/wetland areas (Allcock et al., 2012).

Two individuals of Chinese Pond Heron *Ardeola bacchus* were recorded flying near the aforementioned pond. This species is considered to be of Potential Regional Concern (Fellowes et al., 2002). Populations of migrant, winter and breeding are present in widespread wetlands and damp areas (Allcock et al., 2012).

Greater Coucal *Centropus sinensis* was recorded in various habitats throughout the course of field survey. It is a Class II state major protected animal in Mainland China and listed as vulnerable in China Red Data Book. In Hong Kong, it is a widespread and common resident in lowland shrubland areas (Allcock et al., 2012).

The calls of Collared Scops Owl *Otus lettia* were heard from plantation and shrubland areas respectively. Collared Scops Owl is a widespread and common resident in lowland areas of closed-canopy shrubland and woodland (Allcock et al., 2012). It is listed as Class II state major protected animal in Mainland China.

Black Kite *Milvus migrans* was recorded flying over the Assessment Area twice. This species is considered to be of Regional Concern (Fellowes et al., 2002) and listed in Class II State Major Protected Animal in Mainland China. It is widespread in Hong Kong, present all year with a population group of winter visitor (Allcock et al., 2012).

Two bird nests by Eurasian Magpie *Pica pica* were noted within village habitat on the trees adjacent to the path leading to San Uk Ling Holding Centre during the field survey in March (shown in **Plate 15** in **Appendix 8.1**). The nests appeared to be incomplete but abandoned. In the course of field survey, no individual of Common Magpie was observed in the vicinity of those nests. Breeding or nesting activities of avifauna within the Assessment Area were not observed.

Carcasses of birds including Grey-backed Thrush *Turdus hortulorum*, Long-tailed Shrike *Lanius schach*, Chinese Bulbul *Pycnonotus sinensis* and Red-whiskered Bulbul *Pycnonotus jocosus* were noted on a mist net located at the northeast of the Project Area, which are included as a part of the avifauna records in this assessment. During the course of survey, no specific feeding activity of birds at that active agricultural area was noted.

The field survey results are summarised in **Table 8.4**.

Table 8.4: Avifauna recorded within Assessment Area (including Project Area)

Common Name	Scientific Name	Level of Concern / Protection Status[1]	Hong Kong Status[2]	HKBWS Breeding Bird Survey 1993-1996[3]	Closed Area Study[4]	Field Survey
Chinese Francolin	*Francolinus pintadeanus*	--	locally-distributed resident	✓ (widespread in Northeast NT and Lantau)	✓	✓
Little Grebe	*Tachybaptus ruficollis*	LC	present all year on ponds and pools			✓
Chinese Pond Heron	*Ardeola bacchus*	PRC (RC)	winter, migrant and breeding population in widespread wetlands and damp areas			✓
Black Baza	*Aviceda leuphotes*	Cap. 586	passage migrant and scarce summer visitor	✓ (widespread in NT)		
Black Kite	*Milvus migrans*	Cap. 586, CPS (2), (RC)	present all year and widespread		✓	✓
White-breasted Waterhen	*Amaurornis phoenicurus*	--	common resident	✓ (abundant at Northwest NT and widespread in NT)	✓	✓
Common Moorhen	*Gallinula chloropus*	--	winter visitor, breeding species and migrant			✓
Spotted Dove	*Spilopelia chinesnsis*	--	very common resident	✓ (abundant and widespread in HK)		✓
Greater Coucal	*Centropus sinensis*	CRDB (V), CPS (2)	widespread and common resident	✓ (widespread in HK)		✓
Lesser Coucal	*Centropus bengalensis*	CRDB (V), CPS (2)	widespread and fairly common resident			✓
Asian Koel	*Eudynamys scolopacues*	--	recorded in all months, widespread			✓
Plaintive Cuckoo	*Cacomantis merulinus*	--	recorded in all months, mainly in spring and summer			✓
Large Hawk Cuckoo	*Hierococcyx sparverioides*	--	summer visitor and passage migrant			✓
Indian Cuckoo	*Cuculus micropterus*	--	summer visitor and passage migrant			✓
Collared Scops Owl	*Otus lettia*	Cap.586, CPS (2)	widespread and common resident			✓
Asian Barred Owlet	*Glaucidium cuculoides*	--	widespread though locally-distributed resident			✓

Common Name	Scientific Name	Level of Concern / Protection Status[1]	Hong Kong Status[2]	HKBWS Breeding Bird Survey 1993-1996[3]	Closed Area Study[4]	Field Survey
House Swift	*Apus nipalensis*	--	spring migrant and resident	✓ (abundant and widespread in HK)		✓
White-throated Kingfisher	*Halcyon smyrnensis*	LC	present all year	✓ (widespread in HK)	✓	✓
Common Kingfisher	*Alcedo atthis*	--	present all year	✓ (mainly at Northwest NT area)		✓
Long-tailed Shrike	*Lanius schach*	--	common resident			✓
Black Drongo	*Dicrurus macrocercus*	--	common passage migrant, locally common breeder and winter visitor			✓
Hair-crested Drongo	*Dicrurus hottentottus*	--	locally-common resident			✓
Eurasian Magpie	*Pica pica*	--	common resident	✓ (abundant and widespread in HK)		✓
Large-billed Crow	*Corvus macrorhynchos*	--	common resident			✓
Cinereous Tit	*Parus cinereus*	--	common resident	✓ (abundant and widespread at hilly areas in HK)		✓
Red-whiskered Bulbul	*Pycnonotus jocosus*	--	abundant resident	✓ (abundant and widespread in HK)		✓
Chinese Bulbul	*Pyconotus sinensis*	--	abundant and widespread resident, with migrants and winter visitor	✓ (abundant and widespread in HK)		✓
Sooty-headed Bulbul	*Pycnonotus aurigaster*	--	common resident	✓ (abundant on Lamma, widespread in HK)		✓
Barn Swallow	*Hirundo rustica*	--	abundant passage migrant especially in spring, common breeding species and uncommon winter visitor	✓ (abundant and widespread in HK)		✓
Dusky Warbler	*Phylloscopus fuscatus*	--	very common winter visitor and migrant			✓

Common Name	Scientific Name	Level of Concern / Protection Status[1]	Hong Kong Status[2]	HKBWS Breeding Bird Survey 1993-1996[3]	Closed Area Study[4]	Field Survey
Yellow-browed Warbler	*Phyllocsopus inornatus*	--	very common and widespread winter visitor and migrant			✓
Yellow-bellied Prinia	*Prinia flaviventris*	--	very common resident	✓ (abundant and widespread in HK)		✓
Plain Prinia	*Prinia inornata*	--	locally common resident			✓
Common Tailorbird	*Orthotormus sutorius*	--	widespread and common resident	✓ (abundant and widespread in HK)		✓
Masked Laughingtrush	*Garrulax perspicillatus*	--	very common resident	✓ (abundant and widespread in HK)		✓
Japanese White-eye	*Zosterops japonicus*	--	abundant and widespread resident	✓ (abundant and widespread in HK)		✓
Crested Myna	*Acridotheres cristatellus*	--	very common resident	✓ (abundant and widespread in HK)		✓
Black-collared Starling	*Gracupica nigricollis*	--	common resident	✓ (widespread in lowland areas in NT)		✓
Grey-backed Thrush	*Turdus hortulorum*	--	very common winter visitor and migrant			✓
Oriental Magpie Robin	*Copsychus saularis*	--	abundant resident	✓ (abundant and widespread in HK)		✓
Daurian Redstart	*Phoenicurus auroreus*	--	common winter visitor			✓
Stejneger's Stonechat	*Saxicola stejnegeri*	--	common passage migrant and winter vistor			✓
Eurasian Tree Sparrow	*Passer montanus*	--	very common resident	✓ (abundant and widespread in HK)		✓
Scaly-breasted Munia	*Lonchura punctulata*	--	common resident			✓
Grey Wagtail	*Motacilla cinerea*	--	common winter visitor and passage migrant			✓

Common Name	Scientific Name	Level of Concern / Protection Status[1]	Hong Kong Status[2]	HKBWS Breeding Bird Survey 1993-1996[3]	Closed Area Study[4]	Field Survey
White Wagtail	*Motacilla alba*	--	present all year, most common in winter and spring	✓ (mainly in wetland areas in Northwest NT)		✓
Olive-backed Pipit	*Anthus hodgsoni*	--	common winter visitor and passage migrant			✓

Notes: (1) All wild birds are protected under the Wild Animals Protection Ordinance (Cap.170).
Abbreviations for Level of Concern/ Protection Status:
Cap.586 – Listed in Protection of Endangered Species of Animals and Plants Ordinance;
CPS – Listed in "National Key Protected Species" in mainland China; 1 = Grade 1; 2 = Grade 2;
CRDB – Chinese Red Data Book: E = Endangered, V = Vulnerable, R = Rare, I = Intermediate (Zheng & Weng 1998);
Level of Concern – LC = Local Concern, RC = Regional Concern, PRC = Potential Regional Concern, PGC = Potential Global Concern, GC = Global Concern, Letter in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence. (Fellowes et al. 2002)
(2) Hong Kong Status follows Allcock et al. (2012).
(3) Carey et al., 2001.
(4) Ove Arup, 2010.

Man Kam To Road Egretry

In 2009, an egretry was first identified in a patch of bamboo to the east Man Kam To Road with maximum of 15 Chinese Pond Heron nests recorded (Ove Arup, 2013). Number of nests at Man Kam To Road Egretry has increased slightly subsequently, which was recorded with maximum of 21 Chinese Pond Heron nests and 6 Little Egret nests in 2012 (Anon, 2012). It was reported that vegetation at the Man Kam To colony was cleared during June and July 2012 including the removal of some bamboos which formed the main part of the egretry, and the pruning of some mature trees growing within the area. The total number of nests at the Man Kam To Road colony decreased from 23 nests in June 2012 to 5 nests in July 2012, which was possibly due to the clearance of nesting substrate. The egretry was re-occupied in April 2013 (Ove Arup, 2013) and had two colonies comprising 19 Chinese Pond Heron nests and 1 Little Egret nest recorded (AFCD, correspondence, August 16, 2013).

Flight-line surveys have been conducted at the Man Kam To Road Egretry in June to July 2009 and May to July 2011, under the NENT NDAs EIA Study (Ove Arup, 2013). It was found that most birds (67.4%) flew towards the southwest, either following the Ng Tung River (46.4% of birds) or directly over the developed land to the southwest (21.0% of birds). On the other hand, a moderate proportion of birds (13.5%) flew east along the Ng Tung River. Very few birds (only 4.4%) flew towards the northeast where the Assessment Area of this Project locates.

8.4.4.2 Mammal

Literature Review

The distribution records of the terrestrial mammals of Hong Kong provided in Shek (2006), Shek and Chan (2006) and Shek et al. (2007) have been reviewed. No locally-specific record is involved within the

Assessment Area. With reference to Shek and Chan (2005), no water tunnel, abandoned mines or cave habitat is present within the Assessment Area for roosting of cave dwelling bats species.

Signs of Red Muntjac and unidentified *Rattus* sp. were noted within the Project Area in 2011 (AFCD, correspondence, March 5, 2013). This information is extracted in **Table 8.5**. Red Muntjac is considered as a species of conservation interest (Fellowes et al 2002).

In the "Land Use Planning for the Closed Area – Feasibility Study" (Ove Arup, 2010), foraging insectivorous bats were surveyed by recording all calls detected using a Batbox Duet bat detector. The calls were then analysed by use of the BatScan program. However, most of the bat individuals detected could not be identified to species level. The findings of these bat surveys at San Uk Ling and Kong Nga Po appeared to be the most relevant to the Assessment Area of this Project. In San Uk Ling, foraging bat surveys covered shrubland and fishpond habitats and found four species of bats with moderate abundance. On the other hand, a moderate abundance of three species of foraging bats was recorded in Kong Nga Po. It was observed from the overall finding of this survey that higher species diversity and abundance of foraging insectivorous bats were recorded in Chow Tin, Ta Kwu Ling and Tsung Yuen Ha than other parts of the Closed Area.

Survey Findings

A checklist of mammals recorded is presented in **Table A8-3** in **Appendix 8.3**. In the course of field survey, a total of 5 individuals of common bat species Short-nosed Fruit Bat *Cynopterus sphinx* were recorded flying at the developed area (location indicated in **Figure 8.2**). This species is described as "Indeterminate" in the China Red Data Book but very common in Hong Kong urban area.

Carcasses of Short-nosed Fruit Bat and unidentified Pipistrelle were noted on a mist net in the active agricultural area (location indicated in **Figure 8.2,** photo record in **Plate 16** in **Appendix 8.1**). Other terrestrial mammal species were not recorded present within the Project Area or the Assessment Area.

Owing to the secretive behaviour of the non-flying mammal species, direct sighting records are rarely obtained. Detection of mammal species has been made by searching of their scat and footprint. However, in the course of field survey, no scat or footprint or trace (for example, Porcupine's quill) of non-flying mammals was observed. In a revisit of the Assessment Area on 19 March 2013, a carcass of House Mouse *Mus musculus* was noted on Kong Nga Po Road near the south-western edge of the Assessment Area. The results of field survey and visit are summarised in **Table 8.5**.

Table 8.5: Mammals recorded within the Assessment Area (including Project Area)

Common Name	Scientific Name	Level of Concern / Protection Status[1]	Status in Kong Kong[2]	AFCD's site visit[3]	Field Survey
Bats					
Short-nosed Fruit Bat	*Cynopterus sphinx*	Cap. 170, CRDB (I)	Very common		✓
Unidentified Pipistrelle	--	Cap. 170[4]	--		✓
Non-flying Mammals					
Red Muntjac	*Muntiacus muntjak*	Cap.170; PRC	Very common	✓	
House Mouse	*Mus musculus*	--	Human commensal species throughout urban areas		✓

Common Name	Scientific Name	Level of Concern / Protection Status[1]	Status in Kong Kong[2]	AFCD's site visit[3]	Field Survey
Unidentified rat	*Rattus* sp.	--	--	✓	

Notes: (1) Abbreviations for Level of Concern/ Protection Status:
Cap.170 – Listed in Wild Animals Protection Ordinance;
CRDB – China Red Data Book of Endangered Animals: Mammalia (Wang, 1998); Letters in parentheses: E = Endangered, V = Vulnerable, R = Rare, I = Indeterminate
Level of Concern – LC = Local Concern, RC = Regional Concern, PRC = Potential Regional Concern, PGC = Potential Global Concern, GC = Global Concern, Letter in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence. (Fellowes et al. 2002)
(2) Status in Hong Kong follows Shek et al. (2007).
(3) AFCD, correspondence, March 5, 2013.
(4) All bats found in Hong Kong are protected under the Wild Animals Protection Ordinance (Cap.170).

8.4.4.3 Herpetofauna

In the New Territories, the agricultural land is inhabited by a variety of amphibian species. Lowland species such as Asiatic Painted Frog *Kaloula pulchra pulchra*, Paddy Frog *Fejervarya limnocharis* and Spotted Narrow-mouthed Frog *Kalophrynus interlineatus* are widely distributed.

Literature Review

The distribution of the 24 species of amphibians found in Hong Kong, mentioned in "A Field Guide to The Amphibians of Hong Kong" (Chan et al., 2005), has been reviewed. One species, Asiatic Painted Frog was recorded within the Assessment Area. This species is common in Hong Kong and not of conservation interest. With reference to the "Hong Kong Biodiversity" Newsletters (Chan et al., 2005; Chan et al., 2006; and Chan et al., 2009), no endemic or rare herpetofauna species was recorded within the Assessment Area.

The record of herpetofauna from AFCD's Biodiversity Survey data (AFCD, correspondence, February 20, 2012) at the Assessment Area was presented in **Table 8.6**.

In the data collected during field survey for "Land Use Planning for the Closed Area – Feasibility Study" (Appendix G of the Final Report; Ove Arup, 2010), the herpetofauna species observed at San Uk Ling and Kong Nga Po appeared to be the most relevant to the Assessment Area of this Project. The records are extracted in **Table 8.6**. An amphibian species of conservation interest, Chinese Bullfrog *Hoplobatrachus chinensis*, was recorded in the San Uk Ling area and in a polluted pond at Kong Nga Po.

Survey Findings

No herpetofauna species was recorded within the Project Area. A total of 10 herpetofauna species were recorded within the Assessment Area (as listed in **Table A8-4 in Appendix 8.3**). All species recorded are common in Hong Kong. No rare species or species of conservation interest was recorded.

In the active agricultural area, common amphibians Paddy Frog *Fejervarya limnocharis*, Asiatic Painted Frog *Kaloula pulchra pulchra*, Brown Tree Frog *Polypedates megacephalus* and Gunther's Frog *Rana guentheri* were recorded. Another two common amphibian species Spotted Narrow-mouth Frog

Kalophrynus interlineatus and Asian Common Toad *Bufo melanostictus* were recorded in the developed area.

Reptiles recorded include Changeable Lizard *Calotes versicolor* and Chinese Skink *Eumeces chinensis chinensis* in grassland area, Long-tailed Skink *Mabuya longicaudata* in plantation and grassland areas, and White-spotted Slug Snake *Pareas margaritophorus* in developed area. All of them are common and widespread in Hong Kong.

The field survey results are summarised in **Table 8.6**.

Table 8.6: Herpetofauna recorded within the Assessment Area

Common Name	Scientific Name	Level of Concern / Protection Status[1]	Distribution in Kong Kong	AFCD Survey[4]	AFCD's Unpublished Data[5]	Closed Area Study[6]	Field Survey
Amphibians							
Asian Common Toad	*Bufo melanostictus*	--	abundant[3]			✓	✓
Paddy Frog	*Fejervarya limnocharis*	--	very common[3]			✓	✓
Chinese Bullfrog	*Hoplobatrachus chinensis*	PRC	fairly common and widespread throughout the New Territories and Lantau Island[3]			✓	
Spotted Narrow-mouthed Frog	*Kalophrynus interlineatus*	--	common[3]			✓	✓
Asiatic Painted Frog	*Kaloula pulchra pulchra*	--	common[3]	✓	✓	✓	✓
Ornate Pigmy Frog	*Microhyla ornata*	--	common[3]			✓	
Marbled Pigmy Frog	*Microhyla pulchra*	--	common[3]			✓	
Brown Tree Frog	*Polypedates megacephalus*	--	very common[3]			✓	✓
Gunther's Frog	*Rana guentheri*	--	very common[3]			✓	✓
Reptiles							
Changeable Lizard	*Calotes versicolor*	--	common[2]				✓
Chinese Skink	*Eumeces chinensis chinensis*	--	common[4]				✓
Long-tailed Skink	*Mabuya longicaudata*	--	common[4]				✓
White-spotted Slug Snake	*Pareas margaritophorus*	--	fairly common[2]				✓

Notes: (1) Abbreviations for Level of Concern/ Protection Status:
Cap.586 – Listed in Protection of Endangered Species of Animals and Plants Ordinance;
CPS – Listed in "National Key Protected Species" in mainland China; 1 = Grade 1; 2 = Grade 2;

CRDB – Chinese Red Data Book: E = Endangered, V = Vulnerable, R = Rare, I = Intermediate (Zheng & Weng 1998); Level of Concern – LC = Local Concern, RC = Regional Concern, PRC = Potential Regional Concern, PGC = Potential Global Concern, GC = Global Concern, Letter in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence. (Fellowes et al. 2002)

(2) Karsen et al., 1998

(3) Chan et al., 2005

(4) Hong Kong Biodiversity No. 17 (Chan et al., 2009)

(5) Unpublished data collected in the territory-wide long-term monitoring survey undertaken by AFCD from 2002 to Feb 2012 (AFCD, correspondence, February 20, 2012).

(6) Ove Arup (2010).

8.4.4.4 Butterflies

Literature Review

In general, woodland habitat with higher diversity of plant species is more favourable to butterfly community while homogenous grassland or plantation is not optimal for butterfly. There is only limited woodland within the Project and Assessment Areas. Therefore, those areas are generally not optimal for butterfly community. In addition, no over-wintering hotspot has been identified in the Northeast New Territories (Wong et al., 2004).

In the data collected during field survey for "Land Use Planning for the Closed Area – Feasibility Study" (Appendix G of the Final Report; Ove Arup, 2010), the butterfly species recorded at the west of Kong Nga Po appeared to be the most relevant to the Assessment Area of this Project. The records available are extracted in **Table 8.7**. A butterfly species of conservation interest Danaid Egg-fly *Hypolimnas misippus* was recorded.

Survey Findings

Checklists of butterflies recorded within the Project Area and the Assessment Area are presented in **Tables A8-5 and A8-6** in **Appendix 8.3** respectively. A total of 16 butterfly species were recorded within the Project Area. All of them are either common or very common in Hong Kong. No rare butterfly or species of conservation interest was present within the Project Area.

Within the Assessment Area, a total of 28 butterfly species were recorded distributing in all identified habitats. They are all common or very common species in Hong Kong. No rare species or species of conservation interest was recorded.

The field survey results are summarised in **Table 8.7**.

Table 8.7: Butterflies recorded within the Assessment Area

Common Name	Scientific Name	Level of Concern(1)	Local Restricted-ness(2)	Closed Area Study(3)	Field Survey
Plum Judy	*Abisara echerius echerius*	--	VC		✓
Common Hedge Blue	*Acytolepis puspa gisca*	--	C	✓	
Angled Castor	*Ariadne ariadne alterna*	--	C		✓

Common Name	Scientific Name	Level of Concern[1]	Local Restricted-ness[2]	Closed Area Study[3]	Field Survey
Forest Hopper	*Astictopterus jama chinensis*	--	C	✓	
Colour Sergeant	*Athyma nefte seitzi*	--	C		✓
Staff Sergeant	*Athyma selenophora leucophryne*	--	C		✓
Formosan Swift	*Borbo cinnara*	--	C		✓
Lemon Emigrant	*Catopsilia pomona pomona*	--	C		✓
Mottled Emigrant	*Catopsilia pyranthe pyranthe*	--	VC	✓	
Tawny Rajah	*Charaxes bernardus bernardus*	--	C	✓	
Common Mime	*Chilasa clytia clytia*	--	C	✓	
Rustic	*Cupha erymanthis erymanthis*	--	VC	✓	✓
Red-base Jezebel	*Delias pasithoe pasithoe*	--	VC		✓
Common Palmfly	*Elymnias hypermnestra hainana*	--	C		✓
Banana Skipper	*Erionota torus*	--	UC		✓
Common Indian Crow	*Euploea core amymone*	--	C		✓
Blue-spotted Crow	*Euploea midamus midamus*	--	VC		✓
Common Grass Yellow	*Eurema hecabe hecabe*	--	VC	✓	✓
Large Faun	*Faunis eumeus eumeus*	--	C		✓
Tailed Jay	*Graphium agamemnon agamemnon*	--	C		✓
Great Orange Tip	*Hebomoia glaucippe glaucippe*	--	C	✓	✓
Purple Sapphire	*Heliophorus epicles phoenicoparyphus*	--	C		✓
Red Ring Skirt	*Hestina assimilis assimilis*	--	C	✓	✓
Great Egg-fly	*Hypolimnas bolina kezia*	--	C	✓	✓
Danaid Egg-fly	*Hypolimnas misippus*	LC	UC	✓	
Yellow Orange Tip	*Ixias pyrene pyrene*	--	UC	✓	
Peacock Pansy	*Junonia almana almana*	--	C	✓	✓
Banded Tree Brown	*Lethe confusa confusa*	--	C	✓	
Dark-brand Bush Brown	*Mycalesis mineus mineus*	--	VC	✓	✓
Common Sailer	*Neptis hylas hylas*	--	VC	✓	✓
Chinese Peacock	*Papilio bianor bianor*	--	C	✓	
Red Helen	*Papilio helenus helenus*	--	VC	✓	✓
Great Mormon	*Papilio memnon agenor*	--	VC	✓	✓
Paris Peacock	*Papilio paris paris*	--	VC	✓	✓
Common Mormon	*Papilio polytes polytes*	--	VC	✓	✓

Common Name	Scientific Name	Level of Concern[1]	Local Restricted-ness[2]	Closed Area Study[3]	Field Survey
Spangle	*Papilio protenor protenor*	--	VC	✓	✓
Glassy Tiger	*Parantica aglea melanoides*	--	C		✓
Common Straight Swift	*Parnara guttata*	--	C	✓	✓
Unidentified Swift	*Parnara* sp.	--	--	✓	
Indian Cabbage White	*Pieris canidia canidia*	--	VC	✓	✓
Common Nawab	*Polyura athamas athamas*	--	UC	✓	
Common Five-ring	*Ypthima baldus baldus*	--	VC	✓	✓
Pale Grass Blue	*Zizeeria maha serica*	--	VC	✓	✓
Lesser Grass Blue	*Zizina otis otis*	--	C	✓	

Notes: (1) Abbreviations for Level of Concern: LC = Local Concern, RC = Regional Concern, PRC = Potential Regional Concern, PGC = Potential Global Concern, GC = Global Concern, Letter in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence. (Fellowes et al. 2002)

(2) Local Restrictedness follows AFCD (2011). VR: Very Rare; R: Rare; UC: Uncommon; C: Common; VC: Very Common

(3) Ove Arup (2010).

8.4.4.5 Dragonflies

Literature Review

The distribution of dragonfly diversity in Hong Kong studied by Tam et al. (2008) has been reviewed. For the grids covering the Assessment Area of the Project, 1 to 20 dragonfly species were found. In addition, the Project and Assessment Areas are not any part of the representative sites of Hong Kong's dragonflies (Tam et al., 2008).

In the data collected during field survey for "Land Use Planning for the Closed Area – Feasibility Study" (Appendix G of the Final Report; Ove Arup, 2010), the dragonfly species recorded at San Uk Ling appeared to be the most relevant to the Assessment Area of this Project. The records are extracted in **Table 8.8**. No rare dragonfly species or species of conservation interest was recorded.

Survey Findings

Checklists of dragonflies recorded within the Project Area and the Assessment Area are presented in **Tables A8-7** and **A8-8** in **Appendix 8.3** respectively. In the Project Area, only one very common dragonfly species *Pantala flavescens* was recorded.

A total of 7 dragonfly species were recorded at various habitats within the Assessment Area. Many of them were present in grassland, pond and watercourse areas. No rare dragonfly species or species of conservation interest was recorded.

During the course of surveys, no pairing or significant egg-laying activity was recorded within the Assessment Area although the watercourse and ponds were potential breeding grounds for dragonflies. The field survey results are summarised in **Table 8.8**.

Table 8.8: Dragonflies recorded within the Assessment Area

Common Name	Scientific Name	Level of Concern[1]	Commonness[2]	Closed Area Study[3]	Field Survey
Orange-tailed Sprite	*Ceriagrion auranticum*	--	Abundant	✓	
Yellow Featherlegs	*Copera marginipes*	--	Abundant	✓	✓
Crimson Darter	*Crocothemis servilia servilia*	--	Abundant		✓
Regal Pond Cruiser	*Epophthalmia elegans*	--	Common	✓	
Amber-winged Glider	*Hydrobasileus croceus*	--	Common	✓	
Common Flangetail	*Ictinogomphus pertinax*	--	Abundant	✓	
Pied Percher	*Neurothemis tullia*	--	Common	✓	
Marsh Skimmer	*Orthetrum luzonicum*	--	Abundant	✓	✓
Common Red Skimmer	*Orthetrum pruinosum*	--	Abundant	✓	
Green Skimmer	*Orthetrum sabina*	--`	Common	✓	
Wandering Glider	*Pantala flavescens*	--	Abundant		✓
Black Threadtail	*Prodasineura autumnalis*	--	Abundant	✓	✓
Orange-faced Sprite	*Pseudagrion rubriceps*	--	Common	✓	
Pied Skimmer	*Pseudothemis zonata*	--	Common	✓	✓
Variegated Flutterer	*Rhyothemis variegata arria*	--	Common	✓	✓
Saddlebag Glider	*Tramea Virginia*	--	Common	✓	
Crimson Dropwing	*Trithemis aurora*	--	Abundant	✓	
Indigo Dropwing	*Trithemis festiva*	--	Abundant	✓	

Notes: (1) Abbreviations for Level of Concern: LC = Local Concern, RC = Regional Concern, PRC = Potential Regional Concern, PGC = Potential Global Concern, GC = Global Concern, Letter in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence. (Fellowes et al. 2002)

(2) Commonness follows Tam et al. (2011)).

(3) Ove Arup (2010).

8.4.4.6 Aquatic Fauna

Literature Review

The distribution records of freshwater fish in Hong Kong provided in Lee et al. (2004) have been reviewed. No locally-specific record is involved within the Assessment Area. With reference to information on website (AFCD, 2013), no watercourse within the Assessment Area was identified as Ecologically Important Stream. Rare aquatic fauna species is not anticipated accordingly.

The record of freshwater fish species from Biodiversity Survey conducted by AFCD at the Assessment Area was presented in **Table 8.9**.

In the data collected during field survey for "Land Use Planning for the Closed Area – Feasibility Study" (Appendix G of the Final Report; Ove Arup, 2010), the fish species observed in San Uk Ling appeared to be the most relevant to the Assessment Area of this Project. The records are extracted in **Table 8.9**. No rare fish species or species of conservation interest was recorded.

Survey Findings

Within the Assessment Area, a total of 8 freshwater fish species were recorded in the watercourse and the pond northeast to the Project Area, as presented in **Table A8-9** in **Appendix 8.3**. They are species with high adaptability. Six of them are common wild fish, while Spotted Snakehead *Channa maculata* and Common Carp *Cyprinus carpio* are cultivated species and uncommon in wild.

Common Carp is a species of conservation interest, listed as Vulnerable in the IUCN Red List of Threatened Species (Freyhof & Kottelat, 2008). Location of its record within the Assessment Area is indicated in **Figure 8.2**.

The field survey results are summarised in **Table 8.9**.

Table 8.9: Freshwater fish recorded within the Assessment Area

Common Name	Scientific Name	Level of Concern / Protection Status[1]	Commonness in Hong Kong[2]	AFCD's Unpublished Data[3]	Closed Area Study[4]	Field Survey
Edible Goldfish	*Carassius auratus*	--	not common in streams but occurs in many reservoirs and cultivated in fish ponds		✓	
Spotted Snakehead	*Channa maculata*	--	uncommon in wild, cultivated			✓
Snakehead Murrel	*Channa striata*	--	uncommon in wild, introduced species		✓	
Common Crap	*Cyprinus carpio*	IUCN (VU)	not common in streams, occurs in reservoirs and cultivated in fish ponds		✓	✓
Mosquito Fish	*Gambusia affinis*	--	Common	✓	✓	✓
Fork Tongue Goby	*Glossogobius giuris*	--	common			✓
Nichols' minnow	*Nicholsicypris normalis*	--	common			✓
Nile Tilapia	*Oreochromis niloticus*	--	common	✓	✓	✓
Mozambique Tilapia	*Oreochromis mossambicus*	--	common	✓		
Chinese Barb	*Puntius semifasciolatus*	--	common	✓	✓	✓
--	*Rhinogobius duospilus*	--	common			✓
Redbelly Tilapia	*Tilapia zillii*	--	common		✓	

Notes: (1) Abbreviations for Protection and Conservation Status:
IUCN – IUCN Red List of Threatened Species (Version 2012.1); VU = Vulnerable;
(2) Lee et al. (2004);
(3) Unpublished data collected in the territory-wide long-term monitoring survey undertaken by AFCD from 2002 to Feb 2012 (AFCD, correspondence, February 20, 2012). (4) Ove Arup (2010).

8.5 Evaluation of the Habitats and Species

Habitats identified within the Assessment Area were evaluated in accordance with the guidelines stated in Table (2) in Annex 8 of the EIAO-TM. Overall ecological values for each habitat type were ranked. Rankings starting with the highest ecological value range from:

- High
- Moderate-high
- Moderate
- Moderate-low
- Low
- Very Low

8.5.1 Evaluation of the Habitats within the Assessment Areas

Ecological evaluation of each habitat within the Assessment Areas (including Project Area) is presented in **Table 8.10 to Table 8.22**.

Table 8.10: Ecological Evaluation of Shrubland

Criteria	Shrubland
Naturalness	Modified habitats associated with hill fires
Size	approx. 1.8 ha in total
Diversity	Moderate-low in avifauna species diversity; Four species of foraging insectivorous bats reported; Low in flora and other fauna species diversity
Rarity	Habitat not rare; All species recorded are common; No rare species recorded; Two avifauna species of conservation interest including Greater Coucal and Collared Scops Owl were recorded; while both species are common resident.
Re-creatability	Re-creatable through re-planting and natural regeneration
Fragmentation	Scattered within the Assessment Area
Ecological linkage	Ecologically connected to adjacent hillside grassland and plantation
Potential value	The habitat value could be enhanced through natural succession
Nursery/ breeding ground	Potential breeding habitats for birds and insects, but no significant record
Age	10 to 20 years
Abundance/ Richness of wildlife	Moderate-low in bird abundance; Moderate abundance of foraging insectivorous bats reported; Low in other terrestrial fauna
Ecological value	Moderate-low

Table 8.11: Ecological Evaluation of Woodland

Criteria	Woodland
Naturalness	Secondary habitat derives from modified habitat
Size	approx. 3.3 ha in total
Diversity	Moderate-low in avifauna and butterfly species diversity; Low in flora and other fauna species diversity
Rarity	Common habitat; All species recorded are common; No rare species recorded; One avifauna species of conservation interest Greater Coucal, which is a common resident, was heard calling
Re-creatability	Re-creatable through re-planting but requires longer duration
Fragmentation	Fragmented due to previous infrastructure developments
Ecological linkage	Ecologically connected to adjacent plantations and hillside grasslands
Potential value	The habitat value could be enhanced with increase in maturity but not much, as being split into patches
Nursery/ breeding ground	Potential breeding records for mammals, birds, herpetofauna and insects, but no significant record
Age	More than 20 years
Abundance/ Richness of wildlife	Moderate-low in bird and butterfly abundance; low in other terrestrial wildlife
Ecological value	Moderate-low

Table 8.12: Ecological Evaluation of Hillside grassland

Criteria	Hillside grassland
Naturalness	Modified habitat disturbed by hill fires
Size	Large, approx. 45.6 ha in total
Diversity	Moderate-low in avifauna and butterfly species diversity; Low in flora and other fauna species diversity
Rarity	Common habitat; One orchid species of conservation interest *Geodorum densiflorum* was recorded, while it is uncommon and vulnerable in Hong Kong; Another floral species of conservation concern *Keteleeria fortunei* was also recorded outside the Project Area, while wild population is rare but ex-situ conservation by active propagation has been successful; All fauna species recorded are common; No rare species recorded; One avifauna species of conservation interest Greater Coucal, which is a common resident, was heard calling; Another avifauna species of conservation concern Grey Nightjar was recorded calling at Cheung Po Tau under NENT NDA EIA study
Re-creatability	Maintained by hill fires
Fragmentation	Mostly contiguous on hillside areas
Ecological linkage	Generally connected to adjacent plantations and woodlands
Potential value	Potential value can be enhanced through habitat enhancement but most of the hillside falls within permitted burial ground which limits the potential

Criteria	Hillside grassland
Nursery/ breeding ground	Not significant nursery / breeding ground, but Grey Nightjar may breed at Cheung Po Tau
Age	N/A
Abundance/ Richness of wildlife	Low abundance
Ecological value	Moderate-low

Table 8.13: Ecological Evaluation of Grassland

Criteria	Grassland
Naturalness	Originated from or wasteland or dry agricultural lands after abandonment
Size	approx. 4.7 ha in total
Diversity	Moderate-low in avifauna and herpetofauna species diversity; Low in flora and other fauna species diversity
Rarity	Common habitat; No rare species recorded; One avifauna species of conservation interest Greater Coucal, which is a common resident, was recorded
Re-creatability	Readily re-creatable
Fragmentation	Scattered within the Assessment Area
Ecological linkage	Low ecological linkage with other habitats
Potential value	The habitat value could be enhanced through natural succession
Nursery/ breeding ground	Not significant nursery / breeding ground
Age	N/A
Abundance/ Richness of wildlife	Moderate-low in bird abundance; low in other terrestrial wildlife
Ecological value	Moderate-low

Table 8.14: Ecological Evaluation of Plantation

Criteria	Plantation
Naturalness	Wholly man-made habitat
Size	approx. 21.2 ha in total (approx. 1.0 ha within the Project Area)
Diversity	Moderate-low in flora, avifauna and butterfly species diversity; Low in other fauna species diversity
Rarity	Common habitat; All species recorded are common; No rare species recorded; A total of three individuals of floral species of conservation interest *Aquilaria sinensis* were recorded (including one individual within the Project Area); Another floral species of conservation concern *Keteleeria fortunei* was also recorded outside the Project Area, while wild population is rare but ex-situ conservation by active propagation has been successful; One avifauna species of conservation interest Lesser Coucal was heard calling and sign of one mammal species of conservation interest Red Muntjac was noted within the Project Area, while both species are common; One avifauna species of conservation interest Collared Scops Owl, which is a common resident, was heard calling within the Assessment Area
Re-creatability	Readily re-creatable
Fragmentation	These habitats are patchily created / modified around hillside and urban land use
Ecological linkage	Ecologically linked with adjacent plantation areas, woodland and shrubland
Potential value	Low potential value around the existing site (Project Area) as the habitat is being maintained for landscaping; Low potential value at lowland areas in the vicinity of villages as the habitat is being maintained for crop production or urban landscaping; Moderate potential value by succession in the other areas in the vicinity of woodland and shrubland
Nursery/ breeding ground	Not significant nursery / breeding ground
Age	10 to 20 years
Abundance/ Richness of wildlife	Moderate-low in bird abundance; low in other terrestrial wildlife
Ecological value	Moderate-low

Table 8.15: Ecological Evaluation of Orchard

Criteria	Orchard
Naturalness	Wholly man-made habitat
Size	approx. 3.2 ha in total
Diversity	Low in both fauna and flora species diversity
Rarity	Not rare
Re-creatability	Readily re-creatable
Fragmentation	These habitats are patchily created / modified
Ecological linkage	Low ecological linkage with other habitats
Potential value	Low potential value as the habitat is being maintained for fruit production
Nursery/ breeding ground	Potential foraging ground for birds and fruit bats, but similar grounds are readily available in the northern part of NT
Age	N/A
Abundance/ Richness of wildlife	Low
Ecological value	Low

Table 8.16: Ecological Evaluation of Active agricultural area

Criteria	Active agricultural area
Naturalness	Wholly man-made habitat
Size	approx. 1.8 ha in total
Diversity	Low in both fauna and flora species diversity
Rarity	Habitat not rare; No rare species recorded; One floral species of conservation interest *Hylocereus undatus* was recorded but it is commonly cultivated; Carcasses of bat species of conservation interest Short-nosed Fruit Bat was noted
Re-creatability	Readily re-creatable
Fragmentation	These habitats are patchily created / modified
Ecological linkage	Low ecological linkage with other habitats
Potential value	Low potential value as the habitat is being maintained for crop production
Nursery/ breeding ground	Breeding habitat for various common amphibian species; Potential foraging habitat for common avifauna species; but similar grounds are readily available in the northern part of NT
Age	N/A
Abundance/ Richness of wildlife	Low
Ecological value	Low

Table 8.17: Ecological Evaluation of Wet abandoned agricultural area

Criteria	Wet abandoned agricultural area
Naturalness	Man-made habitat after abandonment
Size	approx. 0.7 ha in total
Diversity	Low in both fauna and flora species diversity
Rarity	Habitat not rare; No rare species recorded; One avifauna species of conservation interest Greater Coucal was recorded
Re-creatability	Readily re-creatable
Fragmentation	These habitats are patchily formed
Ecological linkage	Ecologically linked to adjacent vegetated habitat and streams
Potential value	Potential value can be improved if human disturbance cease for long period
Nursery/ breeding ground	Not significant nursery / breeding ground
Age	N/A
Abundance/ Richness of wildlife	Low
Ecological value	Moderate-low

Table 8.18: Ecological Evaluation of Village

Criteria	Village
Naturalness	Wholly man-made habitat
Size	approx. 18.5 ha in total
Diversity	Moderate-low in flora and avifauna species diversity; Low in other fauna species diversity
Rarity	Three floral species of conservation interest including *Cattleya spp.*, *Hylocereus undatus* and *Oncidium spp.*were recorded, but all of them are commonly cultivated species. One floral species of conservation concern *Keteleeria fortunei* was recorded outside the Project Area, while wild population is rare but ex-situ conservation by active propagation has been successful.
Re-creatability	Readily re-creatable
Fragmentation	Scattered throughout the Assessment Area
Ecological linkage	Ecologically linked with adjacent woodland, shrubland and plantations
Potential value	Low potential value due to human disturbance
Nursery/ breeding ground	Not significant nursery / breeding ground
Age	N/A
Abundance/ Richness of wildlife	Moderate abundance of common avifauna species associated with human activities; Moderate-low in butterfly abundance; Low in other fauna species
Ecological value	Low

Table 8.19: Ecological Evaluation of Open field

Criteria	Open field
Naturalness	Wholly man-made habitat
Size	approx. 1.3 ha in total
Diversity	Low in both fauna and flora species diversity
Rarity	Not rare
Re-creatability	Readily re-creatable
Fragmentation	These habitats are patchily created/modified
Ecological linkage	Low ecological linkage with other habitats
Potential value	Low potential value due to human disturbance
Nursery/ breeding ground	Not nursery / breeding ground
Age	N/A
Abundance/ Richness of wildlife	Moderate-low abundance of common butterfly species; Very low in other fauna species
Ecological value	Very Low

Table 8.20: Ecological Evaluation of Developed area

Criteria	Developed area within Project Area	Other Developed area
Naturalness	Wholly man-made habitat	Wholly man-made habitat
Size	approx. 1.5 ha	approx. 14.1 ha in total
Diversity	Low in both fauna and flora species diversity	Moderate-low in avifauna species diversity; Low in flora and other fauna species diversity
Rarity	Common habitat	Common habitat; One bat species of conservation interest Short-nosed Fruit Bat was recorded, which is commonly found in urban areas.
Re-creatability	Readily re-creatable	Readily re-creatable
Fragmentation	N/A	N/A
Ecological linkage	N/A	N/A
Potential value	Very low potential value due to heavy dist urbance by human activities	Very low potential value due to heavy disturbance by human activities
Nursery/ breeding ground	Not nursery / breeding ground	Not nursery / breeding ground
Age	Around 15 years	N/A
Abundance/ Richness of wildlife	Very Low	Moderate-low abundance of common avifauna species associated with human activities; Low in other fauna species
Ecological value	Very Low	Low

Table 8.21: Ecological Evaluation of Pond

Criteria	Pond
Naturalness	Man-made habitat
Size	approx. 0.9 ha in total
Diversity	Moderate-low in avifauna species diversity; Low in flora and other fauna species diversity
Rarity	Habitat not rare; No rare species recorded; Three avifauna species of conservation interest Little Grebe, Chinese Pond Heron and White-throated Kingfisher were recorded; Four species of foraging insectivorous bats were reported; One amphibian species of conservation interest Chinese Bullfrog was reported; One fish species of conservation interest Common Carp was recorded.
Re-creatability	Readily re-creatable
Fragmentation	These isolated habitats are not contiguous
Ecological linkage	Ecologically linked with watercourse and plantation
Potential value	Low potential value due to their isolated location and small size
Nursery/ breeding ground	Potential nursery ground for fish and dragonfly species, but no significant record
Age	Around 10 years
Abundance/ Richness of wildlife	Moderate abundance of foraging insectivorous bats reported; Low in other terrestrial fauna; Moderate-low abundance of aquatic fauna
Ecological value	Moderate-low

Table 8.22: Ecological Evaluation of Watercourse

Criteria	Watercourse
Naturalness	Semi-natural, modified for agricultural drainage
Size	Approx. 1.4 km in total length (about 0.2 ha in total)
Diversity	Moderate-low in both fauna and flora species diversity
Rarity	Habitat not rare; No rare species recorded; One avifauna species of conservation interest Greater Coucal was recorded; One fish species of conservation interest Common Carp was recorded.
Re-creatability	Re-creatable through restoration and natural regeneration
Fragmentation	Generally not fragmented
Ecological linkage	Ecologically linked with pond and bankside plantations
Potential value	Potential value can be improved if human disturbance cease for long period
Nursery/ breeding ground	Potential breeding and nursery ground for fish, amphibian and dragonfly species, but no significant record
Age	N/A
Abundance/ Richness of wildlife	Moderate-low
Ecological value	Moderate-low

8.5.2 Evaluation of Species of Conservation Interest Recorded within the Assessment Area

The species of conservation interest recorded were listed and tabulated in accordance with the criteria stated in Table (3) in Annex 8 in EIAO-TM. The evaluation of flora and fauna species is presented in **Table 8.23** and **Table 8.24** espectively.

Table 8.23: Ecological Evaluation of Floral Species

Species	Location	Protection Status / Conservation Status	Distribution	Rarity
Aquilaria sinensis	Plantation on the southern periphery of the Project Area	Listed under Protection of Endangered Species of Animals and Plants Ordinance (Cap.586) in Hong Kong; listed as near threatened in mainland China [(1)]; Category II protected species in Mainland China	Widely distributed in Hong Kong [(1)]	The species is common in Hong Kong [(2)]
Cattleya spp.	In planter within Project Area	Listed under Protection of Endangered Species of Animals and Plants Ordinance (Cap.586) in Hong Kong	Species of this genus are native to America [(5)]; many cultivars introduced to Hong Kong for ornamental purposes [(3)]	Species of this genus commonly cultivated in Hong Kong
Geodorum densiflorum	On hillside grassland along a footpath at the north-western periphery of the Assessment Area	Listed under Forestry Regulations (Cap. 96 sub. leg.) and Protection of Endangered Species of Animals and Plants Ordinance (Cap.586) in Hong Kong	Wong Nai Chung, Aberdeen, Sai Kung [(4)]; known from more than ten scattered locations in Hong Kong [(5)]	Total population size is estimated to be fewer than 1,000 plants in Hong Kong [(5)]; This species is considered uncommon [(6)] and vulnerable [(5)] in Hong Kong
Hylocereus undatus	In front of village house and in active agricultural area within the Assessment Area	Listed under Protection of Endangered Species of Animals and Plants Ordinance (Cap.586) in Hong Kong	Commonly cultivated [(7)]	The species is commonly cultivated in Hong Kong [(7)]
Keteleeria fortunei	On both sides along Kong Nga Po Road near Police Search Training School	Listed under Forestry Regulations (Cap. 96 sub. leg.)	Natural populations in Cape D'Aguilar and Stanley [(7)]	This species has been propagated in the natural environment with promising results [(8)]
Oncidium spp.	In front garden of village houses	Listed under Protection of Endangered Species of Animals and Plants Ordinance (Cap.586) in Hong Kong	Species of this genus native to tropical America and cultivated in Hong Kong [(3)]	Species of this genus commonly cultivated in Hong Kong

Reference source:

(1) Rare and Precious Plants of Hong Kong (AFCD 2003)

(2) Hong Kong Vascular Plants: Distribution and Status (Corlett *et al*. 2000)

(3)The Genera of Orchidaceae in Hong Kong (Hu 1977)

(4) Flora of Hong Kong Volume 4 (Hong Kong Herbarium and South China Botanical Garden 2011)

(5) The Wild Orchids of Hong Kong (Baretto *et al*. 2011)

(6) Hong Kong Orchids (Baretto and Young 1980)

(7) Flora of Hong Kong Volume 1 (Hong Kong Herbarium and South China Botanical Garden 2007)

(8) Hong Kong Biodiversity Issue No. 20 (Pang et al., 2011)

Table 8.24: Ecological Evaluation of Fauna Species

Scientific Name	Common Name	Location	Protection Status / Conservation Status[1]	Distribution[2]	Rarity[2]
Avifauna					
Ardeola bacchus	Chinese Pond Heron	A pond within the Assessment Area (northeast to the Project Area)	• Cap. 170 • Level of Concern: PRC(RC)	Widespread	Common resident, winter visitor and migrant
Aviceda leuphotes	Black Baza	Assessment Area (presented in grid format)	• Cap. 170 • Cap. 586	Widespread in the New Territories	Passage migrant and scarce summer visitor
Caprimulgus jotaka	Grey Nightjar	Hillside grassland at Cheung Po Tau (southern fringe of the Assessment Area	• Cap. 170 • Level of Concern: (LC)	Locally distributed to areas of closed-canopy shrubland	Summer visitor and passage migrant
Centropus bengalensis	Lesser Coucal	Plantation area within the Project Area	• Cap. 170 • CRDB: V • CPS: 2	Widespread	Fairly common resident
Centropus sinensis	Greater Coucal	Various habitats within the Assessment Area	• Cap. 170 • CRDB: V • CPS: 2	Widespread	Common resident
Halcyon smyrnensis	White-throated Kingfisher	A pond within the Assessment Area (northeast to the Project Area)	• Cap. 170 • Level of Concern: (LC)	Widely distributed in coastal areas throughout Hong Kong	Present all year
Milvus migrans	Black Kite	Flying over the Assessment Area	• Cap. 170 • Cap. 586 • Level of Concern: (RC) • CPS: 2	Widespread	Present all year; common resident and winter visitor
Otus lettia	Collared Scops Owl	Plantation and shrubland areas within the Assessment Area	• Cap. 170 • Cap. 586 • CPS: 2	Widespread	Common resident

Scientific Name	Common Name	Location	Protection Status / Conservation Status[1]	Distribution[2]	Rarity[2]
Tachybaptus ruficollis	Little Grebe	A pond within the Assessment Area (northeast to the Project Area)	• Cap. 170 • Level of Concern: LC	Widespread in ponds and pools	Present all year
Mammal					
Cynopterus sphinx	Short-nosed Fruit Bat	Developed area within the Assessment Area	• Cap. 170 • CRDB: I	Widely distributed in urban and forested areas throughout Hong Kong	Very common
Muntiacus muntjak	Red Muntjac	Its sign noted within the Project Area	• Cap. 170 • PRC	Widely distributed	Very common
Amphibian					
Hoplobatrachus chinensis	Chinese Bullfrog	San Uk Ling, Kong Nga Po	• PRC	Widespread throughout the New Territories and Lantau Island	Fairly common
Butterfly					
Hypolimnas misippus	Danaid Egg-fly	West of Kong Nga Po	• LC	Ngau Ngak Shan, Lung Kwu Tan, Wetland Park, Mount Parker, Cloudy Hill, Lin Ma Hang	Uncommon
Aquatic Fauna					
Cyprinus carpio	Common Carp	Pond and watercourse within the Assessment Area	• IUCN: VU	Not common in streams but occurs in many reservoirs and cultivated in fishponds	Native to China and Southeast Asia; Not rare, introduced throughout Hong Kong

Note:

(1) Abbreviations for Protection and Conservation Status:

Cap. 170 – Listed in Wild Animals Protection Ordinance;

Cap. 586 – Listed in Protection of Endangered Species of Animals and Plants Ordinance;

Level of Concern – LC = Local Concern, RC = Regional Concern, PRC = Potential Regional Concern, PGC = Potential Global Concern, GC = Global Concern. Letters in parentheses indicate that the assessment is on the basis of restrictedness in breeding and/or roosting sites rather than in general occurrence. (Fellowes et al. 2002);

IUCN – IUCN Red List of Threatened Species (Version 2012.1); EN = Endangered, VU = Vulnerable, NT = Near Threatened;

CRDB – China Red Data Book of Endangered Animals (Zheng & Wang 1998); E = Endangered, V = Vulnerable, R = Rare, I = Indeterminate;

CPS – Listed in "National Key Protected Species" in mainland China; 1 = Grade 1; 2 = Grade 2.

(2) References for Distribution and Rarity:

Avifauna: Allcock et al. (2012);
Mammal: Bats – Shek and Chan (2006); Non-flying mammals – Shek et al. (2007).
Amphibian: Chan et al. (2005).
Butterfly: AFCD Biodiversity Database.
Aquatic Fauna: Lee et al. (2004).

8.6 Identification and Evaluation of Potential Ecological Impacts

This section identifies and evaluates the potential ecological impacts on habitats and species, caused by the proposed works during the construction and operation phase. The potential impacts described below have been assessed and evaluated in accordance with the criteria stipulated in the EIAO-TM and following the detailed technical requirements given in Appendix F of the EIA Study Brief No. ESB-226/2011. Levels of ecological impacts were ranked as follows:

- Severe
- Severe-moderate
- Moderate
- Moderate-minor
- Minor
- Negligible

8.6.1 Construction Phase

8.6.1.1 Habitat Loss

The 2.5 ha Project Area includes the 1.5 ha Livestock Waste Composting Plant and another 1.0 ha peripheral area. The site for Livestock Waste Composting Plant is exclusively Developed Area whilst the peripheral area comprises plantation.

The Livestock Waste Composting Plant is a flat platform. Very low ecological value is associated with the concrete land. The existing building structures will be cleared while the area will remain as developed area. Therefore, temporary loss of the developed area due to demolition and construction works would not constitute any significant ecological impact on habitat loss.

For the peripheral plantation area, although an area of 1.0 ha was originally proposed as part of the Project Area, the layout of the facilities on the OWTF 2 Project site were optimised to reduce the number of trees proposed to be felled from 153 trees initially to 14 trees in the latest amendment during the investigation stage, as mentioned in **Section 2.5.6**. Therefore, most of the plantation area covered within the Project Area will be retained while only 14 trees constituting a total area of approximately 0.025 ha will be lost. With reference to **Section 10.6.2**, the 14 trees proposed to be felled include 2 individuals of *Acacia auriculiformis,* 3 individuals of *Acacia confusa* and 9 individuals of *Musa paradisiaca*, which are all exotic tree species of low ecological value. The individual of *Aquilaria sinensis* found within the plantation habitat will be preserved and protected on-site. With reference to **Section 10.7.3**, new tree plantings will be concentrated in the proposed amenity areas along the boundaries of the site and along the exterior of OWTF buildings which should be able to fully compensate for the loss of 14 trees proposed to be felled in terms of both quantity and quality.

The plantation area is considered as of moderate-low ecological value owing to the short history of the habitat, moderate-low to low abundance and diversity of fauna and flora species. Fauna species of conservation interest recorded at the plantation area included Lesser Coucal (call) and Red Muntjac (signs), which are common in the local context. Similar plantation habitat adjoining the project area is readily available to support the moderate-low to low abundance of fauna recorded, so the potential impact of loss the plantation area is anticipated to be low. With the limited ecological value of the affected habitats and that plantation with the project area are largely retained, the ecological significance due to habitat loss is considered to be minor.

The loss of different type of habitats within the Project Area is presented in following **Table 8.25**.

Table 8.25: Summary of Habitat Loss for the Proposed Project

Habitat	Loss Area (ha)
Developed Area	1.5
Plantation	14 trees constituting approx. 0.025 ha
Total	1.5

The ecological significance due to the loss of the two habitat types is summarised in **Table 8.26**.

Table 8.26: Evaluation of Ecological Impact of Habitat Loss

Criteria	Developed Area	Plantation
Habitat Quality	The ecological value for the developed area is very low.	The ecological value of the plantation is moderate-low.
Species	No flora or fauna species of conservation interest was recorded	One species of flora species of conservation interest (*Aquilaria sinensis*) and two fauna species of conservation interest (Lesser Coucal and Red Muntjac) were recorded
Size / Abundance	1.5 ha	14 trees constituting approx. 0.025 ha
Duration	During construction and operation phase	During construction and operation phase
Reversibility	Reversible	Irreversible for 14 trees; full compensation in terms of both quantity and quality is proposed in Section 10.7.3
Magnitude	Minor	Minor
Overall Impact Severity	Minor	Minor

8.6.1.2 Impact on Flora Species of Conservation Interest

Six floral species of conservation interest, including *Aquilaria sinensis, Cattleya spp*., *Geodorum densiflorum*, *Hylocereus undatus*, *Keteleeria fortunei* and *Oncidium spp*. were recorded in the Assessment Area. Only one of them, which is the orchid species *Cattleya spp*., is located within the proposed Project Area. As this species is found within part of the planting area which is proposed to be retained, no direct impact on this species is expected. Also, as this commonly planted orchid is readily replaceable, the significance of ecological impact on this non-native orchid is considered as negligible and no specific mitigation measure for it is considered necessary.

Another floral species of conservation interest found within the proposed Project site boundary is *Aquilaria sinensis*. This species is listed under the Forestry Regulations (Cap. 96 sub. leg.) and Protection of Endangered Species of Animals and Plants Ordinance (Cap.586). Only one of the three observed individuals of this species is located within the Project Area where vegetation is proposed to be preserved. Therefore, all three individuals will be preserved on-site. Owing to high commonness of the species and all observed individuals will be preserved on-site, the ecological significance of impact on this plant species is considered as negligible and no specific mitigation measure for the species is considered necessary.

For the other four floral species of conservation interest, their locations are not affected by the Project, so the significance of ecological impact is considered negligible. The ecological impact on the floral species of conservation interest is evaluated in **Table 8.27**.

Table 8.27: Evaluation of Ecological Impact on Floral Species of Conservation Interest

Criteria	Impact on Floral Species of Conservation Interest
Species	Six floral species of conservation interest including *Aquilaria sinensis, Cattleya spp., Geodorum densiflorum*, *Hylocereus undatus, Keteleeria fortunei* and *Oncidium spp.*
Size / Abundance	Relatively low abundance for all six species
Duration	Construction phase
Reversibility	No expected direct impact on any of the six floral species of conservation interest
Magnitude	No expected direct impact on any of the six floral species of conservation interest
Overall Impact Severity	Negligible

8.6.1.3 Impact on Fauna Species of Conservation Interest

A few fauna species of conservation interest were recorded within the 500m Assessment Area but only a call of one avifauna species Lesser Coucal and sign of one mammal species Red Muntjac were recorded within the plantation to be preserved in the Project site boundary. For Red Muntjac which is very common in Hong Kong, the habitat near Chow Tin Tsuen (to the northeast of Project site) is considered to be more optimal for this mammal given the larger cover of abandoned agricultural land, secondary woodland and shrubland. The location is far (approximately 1 km) from the Project site so that no significant impact on this species of conservation interest is expected. On the other hand, the avifauna species Lesser Coucal is listed in China Red Data Book as “vulnerable” but this species is rather common in Hong Kong, particularly in north-eastern New Territories. It prefers shrubland to grassland habitats (Allcock et al., 2012), while plantation habitat is not its optimal habitat. Therefore, the loss of developed area and a minor portion of plantation would not constitute significant impact on the species.

Similar to Lesser Coucal, Greater Coucal is also listed as “vulnerable” in the China Red Data Book but is relatively common in Hong Kong. This species was commonly recorded in the village-side shrubland to grassland, and the potential impact on the species is considered negligible.

Three wetland dependent bird species were recorded within the Assessment Area including Little Grebe, Chinese Pond Heron and White-throated Kingfisher. All these species were found associated with the village-side pond area to the north-eastern downhill side of the Project Area. Given that the pond area will not be affected and the riparian habitat will remain intact, potential ecological impact on these wetland dependent bird species will be insignificant.

Widespread species Collared Scops Owl and Black Kite were recorded in the Assessment Area during the course of field survey. Collared Scops Owl inhabits in lowland areas of closed-canopy shrubland and woodland (Allcock et al., 2012), while Black Kite inhabits in a wide variety of coastal and inland habitats (Carey et al., 2001). These habitats within the Assessment Area will not be lost or significantly affected by the Project, and they are readily available in the Frontier Closed Area. Furthermore, both species are highly widespread in Hong Kong while no significant breeding or over-wintering behaviour for these species was noted near the Project site; therefore the potential impact on these two species are negligible.

Black Baza recorded in the Breeding Bird Survey at one of the grids covering the Assessment Area of the Project was probably a migrant to the area. This species visited shrubland and open woodland (Allcock et al, 2012). Given its wide distribution recorded in Hong Kong, while the project would not affect any shrubland or woodland, potential indirect impact on this species is anticipated to be negligible.

Call of Grey Nightjar was recorded at upland grassland under NENT NDA EIA study. This species is a summer visitor and passage migrant (Allcock et al., 2012) and considered to breed in upland grassland/shrubland areas in the New Territories (Ove Arup, 2013). It is localised on open hillsides, even occurring in recently burnt areas, but not associated with grassland of higher ecological value (Ove Arup, 2013). Given that any area of upland/hillside grassland will not be affected by the project, potential indirect impact on this species will be negligible.

A mammal species of conservation interest Short-nosed Fruit Bat was recorded in developed area near the Project Area. This fruit bat species is highly common in Hong Kong and usually associated with palm trees in urban areas. The proposed Project will not affect this type of habitat and the potential impact on the bat species is therefore considered negligible. However, unidentified foraging insectivorous bats were reported at Kong Nga Po and in shrubland and fishpond habitats at San Uk Ling under the survey for “Land Use Planning for the Closed Area – Feasibility Study” (Ove Arup, 2010. These unidentified bats might include bat species of conservation interest. As the proposed Project will not affect the shrubland and pond habitats, potential impact on these unidentified bat species is therefore considered negligible.

An amphibian species of conservation interest Chinese Bullfrog was recorded at San Uk Ling and a polluted pond at Kong Nga Po in low abundance under the “Land Use Planning for the Closed Area – Feasibility Study” (Ove Arup, 2010) where these pond areas will not be directly affected by the proposed Project. This species is native to Hong Kong but the origin of the wild population found near local village is doubtful given that it is sold in local food markets. Nonetheless, due to its wide distribution in Hong Kong, the potential offsite disturbance to this species due to the Project is predicted to be minor.

One butterfly species of conservation interest Danaid Egg-fly was recorded once in low abundance west of Kong Nga Po under the “Land Use Planning for the Closed Area – Feasibility Study” (Ove Arup, 2010). This species is uncommon and distributed in Cloudy Hill and Lin Ma Hang, in areas to the northeast and southeast of the Project Area. Given its distribution range, potential disturbance arisen from this Project would not constitute significant impact on its population in Hong Kong.

One freshwater fish species of conservation interest Common Carp, which is listed as Vulnerable in the IUCN Red List of Threatened Species, was recorded in the pond area and watercourse within the Assessment Area. Common Carp can be readily found in many reservoirs and have been cultivated in fishponds. Any potential offsite disturbance impact on this species is regarded to be negligible, given its wide distribution range, and no significant residual water quality impact on its offsite environment.

Potential disturbance impact from construction activities may arise on the above fauna species of conservation interest in case of uncontrolled site runoff and air/noise emission and neglect of good site practice. However, precautionary and mitigation measures for various environmental aspects, such as dust control, selection of quieter plant, use of movable noise barrier, good site practices for waste handling and minimisation of water quality impact, have been stated in previous sections. Given the relatively low abundance of fauna species of conservation interest and the high availability of their optimal habitats in other parts of the New Territories, potential disturbance impact on the individuals would not constitute significant impact on their population in Hong Kong and therefore the potential disturbance impact on these species is considered as minor.

The ecological impact on the fauna species of conservation interest is evaluated in **Table 8.28**.

Table 8.28: Evaluation of Ecological Impact on Fauna Species of Conservation Interest

Criteria	Impact on Fauna Species of Conservation Interest
Species	Nine avifauna species, one mammal species, one amphibian species, one butterfly species and one fish species of conservation interest
Abundance	Low for all, except Greater Coucal
Duration	Both construction and operation phases
Reversibility	Reversible for off-site impact, irreversible for loss of the Project Area
Magnitude	Minor
Overall Impact Severity	Minor, due to low abundance of the fauna species to be directly affected and most of the potentially affected species are common species in Hong Kong

Impact on Man Kam To Road Egretry

With reference to recent correspondence (AFCD, correspondence, August 16, 2013), in 2013 breeding season there were up to 20 nests of breeding ardeid including 1 Little Egret nest and 19 Chinese Pond Heron nests from two colonies at Man Kam To Road Egretry, approximately 1 km to the southwest of the Project site. Although the egretry is not located within the Assessment Area, breeding ardeid could cover a wide foraging range. Therefore, the potential impact on the egretry is assessed for precautionary purposes. Barrier hindering the breeding herons from travelling between their breeding and foraging sites would require them habituating the barrier by adjusting their flight altitude, distance or direction, which would demand higher energy consumption and may indirectly affect the breeding successful rate.

The major foraging habitats for Chinese Pond Heron are inland pond and marsh. A flight line study for locally breeding Chinese Pond Heron revealed that 72% landed around fish ponds (Young, 1998). It is noted that fish ponds or similar wetland habitat are uncommon in the Assessment Area. It was also observed in the field that fairly low number of Chinese Pond Heron was found in the Assessment Area, probably due to lack of suitable wetland habitat for ardeid.

From the flight-line survey conducted at the Man Kam To Road Egretry for NENT NDAs EIA (Ove Arup, 2013), it can be revealed that the Project site and the surrounding environment (i.e. the Assessment Area) are not optimal foraging sites for the breeding Chinese Pond Herons and Little Egrets at Man Kam To Road Egretry as only 4.4% of them flew towards the northeast where the Assessment Area of this Project located. Wetland is available in proximity to the egretry, noticeably Ng Tung River, Long Valley and fish ponds in Ho Sheung Heung, which are considered to be the major foraging habitats for the egretry. All

these wetlands are located in the western to southern side of the egretry; therefore the most frequent flight movement is considered being the western and southern side of the egretry. This was confirmed by the flight-line survey conducted for NENT NDAs EIA which showed that the majority (67.4%) of ardeid at the egretry flew towards the southwest. Since the Project site is located to the north-eastern side of the egretry, the construction and operation of the OWTF 2 will unlikely constitute disturbance impact on the flight-line or foraging opportunity for the breeding ardeids. **Table 8.29** summarises the potential ecological impact on the Man Kam To Road Egretry.

Table 8.29: Evaluation of Ecological Impact on Man Kam To Road Egretry

Criteria	Potential Impact on Man Kam To Road Egretry
Species	Ardeid (Little Egrets and Chinese Pond Herons)
Abundance	Breeding population for 1 Little Egret nest and 19 Chinese Pond Heron nests in 2013 – small population in the local context
Duration	Both construction and operation phases
Reversibility	Potential off-site disturbance impact will be reversible
Magnitude	Magnitude of any off-site disturbance impact will be negligible; Egretry is relatively small in the local context.
Overall Impact Severity	Negligible

8.6.1.4 Habitat fragmentation

Habitat fragmentation is considered as significant if a high-valued ecological habitat is divided into disconnected patches, affecting the ecological linkages. For this project, the major habitat loss is developed area with no ecological value, therefore the loss of developed area would not constitute any fragmentation effect. Moreover, the vegetated habitat near the Project site has already been intersected by various artificial structures such as village houses and carriageway. Therefore, the fragmentation effect due to the loss of 1.0 ha plantation is also negligible. The potential ecological impact of habitat fragmentation is evaluated in **Table 8.30**.

Table 8.30: Evaluation of Habitat Fragmentation

Criteria	Habitat Fragmentation
Species	All flora and fauna species
Abundance	Relatively low
Duration	Both construction and operation phases
Reversibility	Irreversible
Magnitude	Negligible
Overall Impact Severity	Negligible

8.6.1.5 Off-site Disturbances

During construction of the Project, dust and noise generated may affect the adjoining habitat. Also, site runoff, sewage effluent or accidental spillage of any chemical could pollute the adjacent stream and pond if they are uncontrolled. Since the construction noise, air emission, site runoff, sewage effluent disposal and handling of chemicals will be closely monitored under respective regulations and ordinances on air, noise

and water, any potential environmental disturbance to the offsite habitat will be controlled within acceptable level (see **Sections 3.8, 5.8** and **6.8.1** respectively). Furthermore, given that the adjacent habitats are relatively low in ecological value with low abundance of fauna species of conservation interest, the offsite disturbance impact is considered as minor in construction phase. The potential ecological impact of offsite disturbance is evaluated in **Table 8.31**.

Table 8.31: Evaluation of Offsite Disturbance

Criteria	Off-site Disturbance
Species	All flora and fauna species
Abundance	Relatively low
Duration	Construction phase
Reversibility	Reversible
Magnitude	Minor, owing to low abundance of fauna, and the environmental impact of air, noise and water will be controlled
Overall Impact Severity	Minor

8.6.1.6 Reduction of Ecological Carrying Capacity

Ecological carrying capacity refers to the ecological resource that a habitat or an area can sustain. The general area where the Project is located is a mixture of various artificially modified habitats, considered as of generally low ecological value. The flora and fauna resource is generally of low ecological importance in the area, so the carrying capacity is also not significant in the context of the ecosystem at the northeast New Territories. Moreover, as the habitat to be lost temporarily is mainly developed area and plantation, in which the abundance of flora and fauna species is relatively low, the reduction of ecological carrying capacity is considered as minor. The potential impact of reduction of ecological carrying capacity is evaluated in **Table 8.32**.

Table 8.32: Evaluation of Reduction of Ecological Carrying Capacity

Criteria	Reduction of Ecological Carrying Capacity
Species	All flora and fauna species
Abundance	Relatively low
Duration	Both construction and operation phases
Reversibility	Irreversible
Magnitude	Minor
Overall Impact Severity	Minor, owing to carrying capacity for the habitat to be lost is not significant

8.6.2 Operation Phase

The operation of the OWTF2 involves reception/pre-treatment, digestion, biogas delivery, composting, treatment of exhaust gas and odour that will be carried out in an enclosed building preventing unacceptable emission of air, odour or noise. Therefore, the potential indirect impact of air quality or noise on off-site habitat in operation phase is considered negligible. Potential areas of concern on water quality impacts during operation phase include sewage effluents and wastewater generation, contaminated stormwater runoff and accidental spillages. Since the sewage effluents and wastewater generated will be

properly handled, discharged and closely monitored under respective regulations and ordinances on water, any potential disturbance to the offsite pond or watercourse habitat will be controlled within acceptable level (see **Section 6.8.2**). Furthermore, given that the adjacent habitats are relatively low in ecological value, the offsite disturbance impact is considered as minor in operation phase. The potential ecological impact of offsite disturbance is evaluated in **Table 8.33.**

Table 8.33: Evaluation of Offsite Disturbance during operation phase

Criteria	Operation Phase Impact
Species	All flora and fauna species
Abundance	Relatively low
Duration	operation phase
Reversibility	Reversible
Magnitude	Minor, owing to low abundance of fauna, and the environmental impact of sewage effluent and wastewater will be controlled No unacceptable emission or air and noise
Overall Impact Severity	Minor

8.7 Mitigation Measures

According to Annex 16 in EIAO-TM and EIA Study Brief No. ESB-226/2011, mitigation measure shall be proposed with an aim to protect, maintain or rehabilitate the natural environment if it is considered necessary. However, as it is evaluated above, direct impact on plantation within the Project Area has largely been avoided by the optimisation of the layout of the facilities on the OWTF 2 Project site as mentioned in **Section 2.5.6**. Also, no unacceptable ecological impact will be resulted due to construction and operation of the Project, while the individual of *Aquilaria sinensis* of conservation interest identified within the Project Area will be preserved on-site. Therefore, specific ecological mitigation measure is generally considered not necessary.

Nevertheless, for precautionary purposes and to further ensure that no wild flora species of conservation interest will be affected, prior to commencement of any construction works, it is recommended to conduct a detailed vegetation survey as baseline monitoring to update the exact locations, number and condition of individuals of *Aquilaria sinensis* and any other floral species of conservation interest within the Project Area. Since only 0.025ha of plantation will be affected, where no floral species of conservation interest has been recorded, identification of individuals of floral species of conservation interest likely to be affected by the Project in the detailed vegetation survey is not expected. However, should such individuals be identified, mitigation measures, such as transplantation, shall be proposed and agreed with relevant authorities including EPD and AFCD prior to commencement of construction works.

During construction phase, erection and maintenance of a temporary protective fence along the plantation area where trees and vegetation, including those of conservation concern identified under the detailed vegetation survey, would be retained within the Project Area is recommended for precautionary purposes to avoid any potential impact from construction activities such as vehicle movement and materials storage. While the protective fence should be properly maintained, monitoring of individuals of *Aquilaria sinensis* and any other floral species of conservation interest identified in the detailed vegetation survey during construction phase on a monthly basis is proposed to make sure that they are not affected by the

construction works of the Project. Any irregularities and effectiveness of the precautionary measure would be monitored as part of the general site inspection and audit exercise during the construction phase.

The mitigation measures for landscape impact proposed in **Section 10.7.3,** including compensatory planting, would respectively serve as landscaping compensation for the minor number of trees to be felled. In addition, the environmental control/ mitigation measures for air quality, noise and water quality proposed in **Sections 3, 5 and 6** respectively would control the potential environmental impact to an acceptable level.

8.8 Cumulative Impact

Five projects, which are planned in the vicinity of this Project, are identified as interfacing projects. Under the NENT NDAs project, the proposed Fanling North Freshwater Service Reservoir will be constructed at the southern fringe of the Assessment Area of this Project, thus also identified as a potential interfacing project. Potential cumulative effect is accessed by making reference to the implementation programme, scope and impact assessment result of the interfacing projects and this Project. Associated with the OWTF2 Project include construction of a rising main to transfer sewage flows to the existing Sha Ling pumping station and minor modification of the access road to accommodate the swept path of refuse collection vehicles accessing the site. Impacts will be confined to trenching works and the minor road modification at some road bends. It is not considered that these minor works will have a significant impact on existing roadside ecological features and will be addressed in assessments associated with other projects (i.e. Hung Lung Hang).

For Hung Lung Hang Residential Development, Man Kam To Development Corridor and the Cement Plant, since there remains no programme or scope for the implementation of these plans, they are not considered in the cumulative impact assessment at this stage. The other two projects are described below and the potential cumulative impact is assessed accordingly.

Kong Nga Po CDA

The planned Kong Nga Po CDA is located to the east of the Project site and around 150 m away at its closest point. The CDA is intended for comprehensive development of the area for residential use with the provision of open space and other supporting facilities. Detail on the construction programme is currently not available. Nevertheless, planned land availability in 2020 is anticipated, associated works such as road improvements along Kong Nga Po Road and site formation may be carried out prior to 2020. These associated works may interface with the operation phase of this Project.

Result of ecological impact assessment of the CDA was not available at this stage. During the operation phase of this Project, temporary losses of developed area and plantation habitats will be re-created. Offsite disturbance impact of this Project is considered as minor, with proper control of sewage effluent and wastewater and without unacceptable emission of air or noise. Therefore, no cumulative impact on habitat or ecological resource is anticipated at this stage.

Development of Columbarium, Crematorium and related facilities at Sandy Ridge Cemetery

This proposed development is located at around 200 m to the northwest of the Project site. The works will mainly comprise site formation works of about 10 ha of land at Sandy Ridge Cemetery, associated infrastructural works (landscaping, geotechnical, drainage and sewerage works, waterworks, roadworks and other utilities services) and a pedestrian walkway between Lo Wu MTR Station and the columbarium

facilities. According to the Project Profile (No. PP-482/2013) for "Site Formation and Associated Infrastructural Works for Development of Columbarium, Crematorium and Related Facilities at Sandy Ridge Cemetery", detailed design will be carried out from mid 2013 to 2016, while site formation works and infrastructural works will be completed in 2019 and 2022 respectively. Therefore, site formation works may commence in 2017 and interface with the operation phase of this Project.

Findings from the ecological impact assessment of this proposed development are not currently available. During the operation phase of this Project, temporary losses of developed area and plantation habitats will be re-created. Offsite disturbance impact of this Project is considered as minor, with proper control of sewage effluent and wastewater and without unacceptable emission of air or noise. Therefore, no cumulative impact on habitat or ecological resource is anticipated at this stage.

NENT NDAs

The proposed Fanling North Freshwater Service Reservoir under the NENT NDAs project will be located at around 450 m to the south of this Project. From the NENT NDAs EIA report, construction works period of infrastructure including service reservoir will be from 2018 to 2021, while the OWTF2 Project will be in operation. Considering the minor offsite disturbance impact during the operation of OWTF2 and the distance between the Project site and the proposed service reservoir, no cumulative ecological impact is anticipated. The boundary of the proposed Fanling North NDA will be at more than 1 km from this Project site, thus cumulative ecological impact is not expected.

8.9 Evaluation of Residual Impacts

Given that no significant impact is identified for construction and operation phases, no residual impact is identified.

8.10 Environmental Monitoring and Audit

The ecological impact assessment has evaluated the ecological impacts of the proposed Project and has concluded that no unacceptable ecological impact will result. No specific ecological mitigation measure is required while precautionary measures for the plantation area are proposed. The proposed precautionary measures to avoid any impacts arising from the Project should be checked as part of the environmental monitoring and audit programme during the construction phase. Precautionary measures recommended to be implemented during the construction phase are summarised below:

- Detailed vegetation survey as baseline monitoring to update the exact locations, number and condition of individuals of *Aquilaria sinensis* and any other floral species of conservation interest within the Project Area prior to commencement of any construction works;

- Proposal of mitigation measures, such as transplantation, if individuals of floral species of conservation interest likely to be affected by the Project and any monitoring requirements will be identified in the detailed vegetation survey as necessary; and
- Erection and maintenance of temporary protective fence along the plantation area where trees and vegetation would be retained within the Project Area and monitor the effectiveness of such precautionary measure.

The implementation, monitoring and audit of the above precautionary measures should be conducted as presented in the standalone Environmental Monitoring and Audit (EM&A) Manual. In addition, the mitigation measures for air, noise, water and landscape aspects proposed in respective sections which are indirectly beneficial to the local ecology shall be checked as part of the environmental monitoring and audit procedures during construction period as presented in the standalone EM&A Manual.

8.11 Conclusion

The Project Area comprises a developed area and plantation habitat near some local village areas. In general, the area is not ecologically significant owing to the relatively low ecological value of the habitats. The ecological impact of loss of developed area and a very small area of plantation habitat within the Project Area is therefore considered as minor. Indirect impact on off-site habitat is also not considered to be significant due to lack of important ecological resources. No ecological impact will result from the operation of the Project as all potential air quality, noise and water quality impacts will be controlled to environmentally acceptable levels. No specific ecological mitigation measure is considered necessary. As a precautionary measure, temporary protective fence would be installed and maintained by the project proponent during the construction period to delineate the works limit and to preserve the plantation area to be retained within the Project Area.

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