

Appendix D: Revised Pages of EcoIA Report

3 METHODOLOGY

3.1 Location and Area

3.1.1 The Study Area for this ecological impact assessment covered the Application Site and all area within 500m from the Application Site boundary, any associated works. The boundary of the 500m Study Area is illustrated in **Figure 1**.

3.2 General

3.2.1 The ecological surveys followed the requirements of Annexes 8 and 16 of the Technical Memorandum as well as Environmental Impact Assessment Ordinance Guidance Note No. 7/2010 “Ecological Baseline Survey for Ecological Assessment”, No. 10/2010 “Methodologies for Terrestrial and Freshwater Ecological Baseline Survey”.

3.3 Literature Review

3.3.1 A desktop literature review on the existing ecological and fisheries baseline condition was undertaken upon commencement of the study. Findings of relevant studies or surveys, including but not limited to relevant Environmental Impact Assessment reports, newsletters related to local ecology and conservation (such as HK Biodiversity by Agriculture, Fisheries, and Conservation Department (AFCD) and Connections by Kadoorie Farm and Botanic Garden (KFBG)), scientific papers, as well as the Biodiversity Database and other publications on the conservation status and distribution of local flora and fauna etc.

3.4 Ecological Field Surveys

3.4.1 Ecological field surveys were conducted monthly over a 12-month period from January to December 2021, covering both the wet and dry seasons. Survey transects are shown in **Figures 2 and 3**.

3.4.2 A programme of the Study showing the survey frequency is presented below in **Table 1** below:

Table 1. Survey Programme

Ecological Field Surveys	2021											
	Dry Season			Wet Season						Dry Season		
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Habitat and Vegetation Surveys	✓			✓								
Mammal Surveys	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Avifauna Surveys	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Herpetofauna Surveys	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Butterfly and Odonate Surveys	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Firefly Surveys	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Freshwater Community Surveys	✓			✓			✓			✓		

Habitats and Vegetation Surveys

3.4.3 A habitat map was prepared to reflect current site conditions of the Study Area. The habitat map was first prepared by desktop review of recent aerial photographs and the government base map, followed by on-site verification during ground-truthing surveys (see Figure 2). Habitat value was assessed based on the condition, vegetation type and faunal use, particularly species of conservation concern. A photographic record of each habitat type within the Study Area is provided in Appendix 3.

3.4.4 Vegetation surveys were conducted once in both the wet and dry seasons. Transects were set across representative patches of each habitat type present in the Study Area. Relative abundance and

Firefly Survey

3.4.13 Firefly surveys were conducted at least once a month during the 12-month survey period. In certain months, more than one survey was carried out to increase the effort in search of particular species. Survey dates were determined with reference to known peak period of individual species.

3.4.14 Surveys for fireflies were conducted via transects, with species detected by direct observation. Surveys commenced immediately after sunset and lasted for approximately 2 hours. Surveys were carried out under suitable weather conditions (i.e. without rain or strong wind). All fireflies observed, including adults and larvae, were identified to species level and quantified.

3.4.15 Nomenclature follows Yiu (2022). The abundance and conservation status (including status from China Red Data Book, the latest IUCN red list and other relevant references (e.g. Fellowes *et al.* (2002)) for each species are provided.

Freshwater Community Survey

3.4.16 Freshwater community surveys were conducted twice per season. Aquatic fauna, including freshwater macro-invertebrates and fishes, were identified and studied by direct observation and active searching by nets, cages and standard field sampling techniques as appropriate.

3.4.17 Nomenclature follows AFCD HK Biodiversity Database. The commonness and conservation status (including status from Red List of China's Vertebrates, the latest IUCN red list and other scientific research study e.g. Fellowes *et al.* (2002)) for each species are presented.

3.5 Ecological Impact Assessment

3.5.1 The ecological baseline profile of the Study Area is presented in the following sections of this Report.

3.5.2 The condition of existing habitats and potential ecological impacts resulting from the proposed development are assessed and evaluated following the criteria and evaluation methodologies of Annexes 8 and 16 of EIAO-TM, with recommendations to avoid or minimise impacts on any recognised sites of conservation importance and other ecologically sensitive receivers, and to protect, maintain or rehabilitate the natural environment.

Direct Impacts to Species of Conservation Importance

- 6.3.4 An evaluation of the potential direct loss of flora and fauna species of conservation importance recorded within the Application Site in the absence of mitigation measures is provided below in **Table 18**.
- 6.3.5 Given that most of these species were recorded within the Application Site in low abundance and frequency, and do not prefer the type of habitats offered within the Site, it is considered that their occurrence in the Application Site is only of a transient nature. Furthermore, these species are highly mobile and are unlikely to sustain direct loss.

Table 18. Evaluation of direct impacts on species of conservation importance without mitigation

Criteria	Floral Species	Faunal Species
Habitat Quality	Low to moderate for village / developed area	Low for pond; Low to moderate for village / developed area
Species	One floral species	23 fauna species of conservation importance were recorded (although most of the fauna species are considered to occur transiently only).
Size / Abundance	Small size of approximately 0.021 ha. Abundance of wildlife is generally low.	Small size of approximately 0.779 ha. Abundance of wildlife is low to moderate.
Duration	Permanent	
Reversibility	Irreversible	
Magnitude	Low magnitude for the low abundance and frequency of these species recorded	
Significance of Impact	Low	Low

Indirect Disturbance Impacts in Construction Phase

- 6.3.6 Potential indirect impacts to other habitats and species of conservation importance during the construction phase may include artificial light, construction noise, vibration, dust, and other forms of human disturbances arising from construction activities.
- 6.3.7 Based on the current design, the proposed development is of small scale. All facilities will be single-storey. No extensive site formation and foundation works are required as the redevelopment works will be largely confined to the existing building footprints. The overall construction period is anticipated to be 9 months, with minimal plant, equipment and construction vehicles needed due to the small scale of works required and the limited capacity of the Tai Po Kau access road. There will be no more than 5 vehicles during construction peak hour.
- 6.3.8 Considering the small scale of construction works, potential impacts with regards to air quality, dust, noise, and human disturbance arising from construction activities will be minimal as mainly modification of the existing building structures and only minor excavation works will be required. Furthermore, the Application Site is surrounded by dense, mature secondary woodland in all directions. Impacts such as noise and human activities during construction would be screened off by the woodland edges and would not be able to travel deep into the interior woodland habitats.
- 6.3.9 In regards to the water quality impacts, construction works may potentially generate wastewater. Wastewater generated from general land-based construction works (e.g. general cleaning and polishing, dust suppression, utility installation, etc.) and construction site runoff (e.g. runoff and erosion of exposed bare soil and earth, earth working area and stockpiles, etc.) could potentially pose indirect impacts on the water quality of the adjoining watercourse as these often contain sediment and pollutants such as lubricants. Other activities that are likely to cause water pollution include drainage or sewage effluent from the workforce, and accidental spillage of chemicals (e.g. oil, fuel, solvents, lubricant, etc.).
- 6.3.10 If these flows into the watercourse outside the Application Site, aquatic fauna within these habitats will be affected. Dust and exposed earth from construction operations may also enter the waterbodies via run-off, particularly during periods of heavy rain, or be wind-blown. Sediment from the runoff will

Indirect Disturbance Impacts in Operation Phase

- 6.4.3 As the Nature Academy will be for educational purpose and will not involve any emission activities, air quality impact is not anticipated. Increased traffic, noise, and human activities may occur during the operation phase as a result from the general operation of the Nature Academy and the education programmes and visitors' activities, including general tours and camping activities.
- 6.4.4 For traffic, all visitors are expected to walk up from the entrance of the Tai Po Kau Nature Reserve, and thus will not generate additional vehicular traffic. Only a minor increase in traffic related to the daily operation of the Academy is expected.
- 6.4.5 The maximum number of visitors to the Academy is set as 400 per day. According to the Country and Marine Parks Authority Progress Reports in recent years (i.e., 2021 to 2022), the ceiling of 400 visitors per day is comparable or even well below the actual visitor number in some existing Country Park Visitor Centres or Education Centres, such as Lions Nature Education Centre, Tai Mo Shan Country Park Visitor Centre and Volcano Discovery Centre. This indicates that the proposed maximum number is set at a reasonable level that is compatible with the existing environment.
- 6.4.6 What should be of note is that while the daily maximum number of visitors is set at 400, it does not necessarily mean that the total number of visitors to the Tai Po Kau Nature Reserve will increase by as much as 400 per day, as these visitors are likely to include people already planning to visit Tai Po Kau. Moreover, the number of visitors to the Academy will be strictly controlled through an advance booking mechanism. The maximum number of visitors as well as the number of educational activities taking place within the Academy can be controlled and adjusted according to the peak seasons and peak hours to minimise any disturbance to wildlife. As such, the potential increase of visitors to the Tai Po Kau Nature Reserve due to the operation of the Academy is not considered significant against the background of the current levels of visitors at the Tai Po Kau Nature Reserve.
- 6.4.7 It should also be highlighted that currently there is unrestricted pedestrian access to Tai Po Kau Nature reserve, and that the main access road is the main entrance for pedestrian visitors and the vehicular access (requiring a specific permit) to the Tai Po Kau Special Area and the village of Lau Chi Hang. The unrestricted pedestrian access (which often include large, vocal groups of people, including at night during the peak firefly season in summer), vehicle use along the road, and other human activities at the management centre and village suggest that there is already a relatively high level of disturbance in the general area. Given that the activities of the visitors to the Academy will be regulated and supervised, the additional disturbance from even 400 visitors per day is considered acceptable.
- 6.4.8 Low level noise may be generated from outdoor activities including educational tours and camping. However, these activities are considered very similar to the current recreational activities such as hiking, picnic and wildlife watching, which are predominantly operated in low noise level. Hence, only a minor increase in noise level is expected, and this is not considered to be significant.
- 6.4.9 It is anticipated that there will be no trapping or collecting of wild animals and plants for educational activities. If any trapping/ trapping devices will be used for conducting activities, prior permission under relevant legislations from AFCD will be sought.
- 6.4.10 No catering services will be provided on site, therefore, no fire would be generated. Fire is also strictly forbidden during all other operations and activities of the Academy, including camping.
- 6.4.11 All of the operations and activities shall be designed, led and monitored by professional outdoor environmental education practitioners, who shall ensure that all these are conducted in an appropriate fashion which will not result in undesirable ecological and environmental outcome.

7 MITIGATION MEASURES

7.1 General Approach

7.1.1 The general approach for mitigating impacts on important habitats and species as stated in Annex 16 of the EIAO-TM is, in order of priority: avoidance, minimisation and compensation.

7.2 Habitat Loss

7.2.1 Under the current layout, the Application Site will be largely preserved and left untouched. Loss of habitats is avoided as construction works will be restricted to the existing building footprints. No loss of pond would occur under the current layout. The residual impact is considered very minor and acceptable.

7.3 Loss of Floral Species of Conservation Importance

7.3.1 Individuals of a protected fern *Neottopteris nidus* were found within the Application Site. The Master Layout Plan has been adjusted to avoid any direct impact to this species.

7.4 Loss of Faunal Species of Conservation Importance

7.4.1 Given that the fauna species of conservation importance within the Application Site were only recorded with low abundance and frequency, and that most of these species do not prefer the type of habitats within the Site, it is considered that their occurrence in the Application Site is only of a transient nature. Furthermore, these species are highly mobile and are unlikely to sustain direct loss. As a result, no specific mitigation measures are proposed.

7.5 Mitigation for Bird Collision

7.5.1 To prevent bird collision, the building design has made reference to international best practices of bird strike prevention. Fritted glass will be used to provide visual markers on glass surface for birds. Further, glasses or windows will be set back with awnings or overhangs to minimise reflection of nearby vegetation or habitat. The residual impact is considered to be acceptable.

7.6 Mitigation for Indirect Disturbance Impacts during Construction Phase

7.6.1 The disturbance impacts to the surrounding habitats (including those in the Tai Po Kau Nature Reserve) and associated wildlife arising from the construction activities could be minimised by adopting the mitigation measures in the sections below.

7.6.2 To minimise disturbance to Tai Po Kau Nature Reserve and the associated wildlife, the use of heavy machinery and construction vehicles will be scheduled outside of the wet season during which breeding of most terrestrial fauna takes place. Major construction activities shall be carried out in the dry season (from November to March) only. Although uncommon migrants and overwintering birds are known to occur in the Reserve during the dry season, their abundance/density would be lower than that of the resident breeding species, and it is considered that birds and other fauna would be more susceptible to disturbance during breeding period.

7.6.3 There will be no more than 5 vehicles during construction peak hour. To minimise disturbance to the wildlife, the maximum length of vehicle used would be 5.7m, where normally the size for construction vehicles is longer than 9m. The volume of construction traffic is considered acceptable and would not generate significant additional impacts to the Tai Po Kau Nature Reserve.

- 7.6.4 Construction dust should be suppressed to avoid and minimise the dust covering leaves of plants that would affect their photosynthesis, and thus their health and growth:
- Regular watering, to reduce dust emissions from exposed site surfaces and unpaved roads.
 - Proper storage of construction materials.
 - Tarpaulin covering of all dusty vehicle loads transported to, from and between site locations.
- 7.6.5 Noise impact during construction phase should be avoided and minimised to reduce the disturbance to the habitats (including those in the Tai Po Kau Nature Reserve) adjacent to the works areas:
- Machines, equipment and plants that may be in intermittent use should be shut down between work periods or should be throttled down to a minimum.
 - Machines and plants known to emit strong directional noise should, wherever possible, be orientated so that the noise is directed away from the nearby habitats.
 - Material stockpiles and other structures should be effectively utilised, wherever practicable, in screening noise from on-site construction activities.
- 7.6.6 In order to avoid impacts of run-off causing pollution or sedimentation in the habitats adjacent to the Application Site (including those in the Tai Po Kau Nature Reserve), it will be necessary to implement standard construction site practices in these sites that limit run-off into adjacent water bodies. Generally, indirect water impact to any aquatic fauna during the construction phase should be minimised by implementing water control measures (ETWB TCW No. 5/2005) and the Practice Notes for Professional Persons on “Construction Site Drainage” (ProPECC PN1/94) in controlling water pollution at construction site to avoid direct or indirect impacts any watercourses and good site practices. In particular, the following good site practices/water control measures should be adopted to minimise any pollution entering the watercourse nearby:
- General refuse and construction wastes should be collected and disposed of in a timely and appropriate manner.
 - The Application Site should be properly fenced off with hoarding or with sandbag stockpiled along the site boundary. Sediment traps should be installed within the Site to collect and control any construction run-off.
 - All works and storage area should be restricted to the Application Site boundary and in accordance with the Master Layout Plan.
 - Covering of any exposed soil or other loose materials with tarpaulins to prevent erosion.
 - Exposed soil to be covered as quickly as possible following formation works, then seeded and covered with a biodegradable geotextile blanket for erosion control purposes.
 - A temporary sewage treatment system or portable chemical toilets should be designed and installed to collect wastewater and prevent it from entering nearby habitats.
 - The proposed works site inside or in the proximity of nearby habitats should be temporarily isolated, such as by placing of sandbags or silt curtains with a lead edge at the bottom and properly supported props, to prevent adverse impacts on these areas.