6 Ecological Impact – Terrestrial

6.1 Introduction

6.1.1.1 This section outlines the potential terrestrial ecological impacts arising from the construction and operation phase of the proposed helipad. The extent of ecological impact is evaluated and mitigation measures are proposed, where necessary, to minimise the potential ecological impacts to acceptable levels.

6.1.1.2 According to the EIA Study Brief No. ESB-284/2015, a desktop study and site inspection should be carried out to confirm whether there are adverse ecological impacts resulting from the Project. Ecological impact assessment is required if adverse impacts are anticipated.

6.2 Criteria and Guidelines

6.2.1.1 The local ordinances, regulations and guidelines applicable to the ecological impact assessment including the following:-

- Environmental Impact Assessment Ordinance - Technical Memorandum (TM-EIAO), Annexes 8 and 16;
- Wild Animals Protection Ordinance (Cap. 170);
- Country Parks Ordinance (Cap. 208) and its subsidiary legislation;
- The Protection of Endangered Species of Animals and Plants Ordinance */(Cap. 586) and its subsidiary legislation;
- Town Planning Ordinance (Cap. 131);
- Hong Kong Planning Standards and Guidelines (HKPSG) Chapter 10 “Conservation”;
- EIAO Guidance Note No. 6/2010 – Some Observation on Ecological Assessment from the Environmental Impact Assessment Ordinance Perspective;
- EIAO Guidance Note No. 7/2010 – Ecological Baseline Survey for Ecological Assessment;
- EIAO Guidance Note No. 10/2010 – Methodologies for Terrestrial and Freshwater Ecological Baseline Surveys; and
- Wild Animals Under State Protection details Class I and Class protected animals species under Mainland China Legislation.

6.2.1.2 In addition, the following international conventions and guidelines are also relevant to the ecological impact assessment:

- International Union for Conservation of Nature (IUCN) Red List of Threatened Species provides a comprehensive evaluation of the

taxonomic, conservation status and status of plant and animal species globally; and

- CITES (the Convention on International Trade in Endangered Species of Wild Fauna and Flora).

6.3 Description of the Environment

6.3.1 General

6.3.1.1 The Proposed Helipad will be located on the roof of the Proposed New Block, which will be situated at the existing locations of the Clinical Pathology Building (CPB), Houseman Quarters (HQ) and University Pathology Building (UPB) within Queen Mary Hospital Complex (QMH). The Site is located on Pok Fu Lam Road, immediately west of High West. Lung Fu Shan Country Park and Pok Fu Lam Country Park are situated more than 100m to the north-east and east of the Proposed Helipad, respectively.

6.3.1.2 The terrestrial environment within the 500m boundary of the Proposed Helipad covers part of the Lung Fu Shan Country Park, Pok Fu Lam Country Park and Pok Fu Lam Reservoir Catchment Area SSSI (which essentially overlaps with the Pok Fu Lam Country Park), amongst other development such as the Chinese Christian Cemetery, Queen Mary Hospital Complex and the University of Hong Kong campus. In addition, residential development as well as the campus grounds of the University of Hong Kong surround the Proposed Helipad to the west and south-west. Immediately west of the Queen Mary Hospital Complex is Pok Fu Lam Road, a major trunk road with high traffic flows connecting the western and southern part of Hong Kong Island.

6.3.2 Study Area

6.3.2.1 There is no specification of study area for assessing the ecological impact in the EIA Study Brief. For the purpose of the desktop study, a study area encompassing the 500m boundary from the proposed Helipad has been used. The study area is shown in Figure 6.1.

6.3.2.2 A review of existing literature as well as site inspection has been carried out within the aforementioned study area. Within the 500m study area, there is a focus on the areas potentially affected by the construction and operation phase of the Proposed Helipad.

6.3.2.3 For the construction phase, the majority of construction works would take place at the roof of the New Block (which would be built under a separate project). Ground-based operations would be limited to material delivery and removal via trucks on designated haul roads within the site. During the operation phase of the Proposed Helipad, the Government Flying Services (GFS) had advised that they would adopt either a north-to-west flight sector or a south flight sector (Figure 6.1 refers). GFS would not adopt a flight sector from the east (i.e. across High West) as the steep

terrain of Pok Fu Lam Country Park may pose a safety risk during landing and take-off.

Existing Environment in the Study Area

6.3.2.4 Within the 500m study area, the majority of the area situated west of the Project is urbanised area, mainly characterised by residential development and the Chinese Christian Cemetery. Within this developed area are some woodland and shrubland habitat, mainly found at the northern and southern perimeter of the Chinese Christian Cemetery as well as the slopes near the University of Hong Kong Campus. The eastern portion of the study area is largely represented by the Lung Fu Shan and Pok Fu Lam Country Parks which are characterised by woodland, shrubland habitats and some streams/ watercourses interspersed within.

6.4 Assessment Methodology

6.4.1.1 In order to establish the ecological baseline for the Project Area, desktop study was conducted which included a review on relevant literature and previous EIA reports in the vicinity of the Proposed Helipad. Site inspection was subsequently conducted to confirm findings from the relevant literature as well as fill information gaps. Construction works for the Proposed Helipad will be confined to the roof level with ground-based operation limited to material delivery and removal via trucks on designated hauls roads on-site. Also, the operational area of the helicopter during the operational phase of the Proposed Helipad would be at roof level or above. Given the above, targets of potential ecological impact are only limited to the avifauna and bats.

6.4.2 Desktop study

6.4.2.1 The ecological conditions of the study area were reviewed based on existing literature. The number of EIA studies within the area is limited. However, partial areas covered by the ecological survey conducted in the EIA reports “Drainage Improvement in Northern Hong Kong Island – Hong Kong West Drainage Tunnel” (EIA Ref No.: EIA 115/2005)” and “Harbour Area Treatment Scheme (HATS) Stage 2A” (EIA Ref No.: EIA 148/2008) overlap with the study area defined in this EIA report. In addition, relevant publications by government departments, non-government organisations as well as journals were reviewed.

6.4.3 Site Inspection / Field Survey

6.4.3.1 Three field surveys were conducted in September 2015, December 2015 and June 2016 for the avifauna and bats.

6.4.3.2 In the field surveys in September and December 2015, transect counts and point counts were conducted to identify the distribution and abundance of avifauna species. The route for the transect count covered the majority of the accessible area of the QMH Complex as well as the junction of Bisney Road and Pok Fu Lam Road. For point counts, three count locations (P1-P3) were chosen. During the

transect and point count surveys, birds within the study area were recorded. Where possible, their activities and flying heights were noted or estimated as appropriate.

6.4.3.3 Point counts and transect counts were conducted at three periods: morning (0630 – 0900), afternoon (1600 – 1800) and evening (1800 – 2000). Counts were commenced in early morning when the birds were more active. The morning and afternoon surveys were scheduled to capture the feeding behaviour of avifauna. Evening survey was carried out to verify the presence of bats or other nocturnal bird species. For each session, a transect count was conducted, and the remaining time was spent at the three point count locations.

6.4.3.4 Observations were made using an 8X binoculars and photographic records were taken where possible. Ornithological nomenclature followed Carey *et al* (2001). The transect route and the locations of the point counts are presented in Figure 6.1.

6.4.3.5 An additional survey was conducted in June 2016 to confirm the presence of house swift nests. The survey area covered 50m from the location where house swifts were identified in the previous site survey. Areas under eaves and beams of man-made structures were surveyed as these are typical locations where swifts build their nests (del Hoyo *et al*, 1999).

6.5 Evaluation of Surrounding Environment

6.5.1 Habitat Distribution

6.5.1.1 Based on observations from the site surveys, the distribution of habitats within the study area remains similar to those identified in previous studies (Black & Veatch, 2005) and relevant publications (AFCD, 2015, Kwong *et al*, 2014). Secondary woodland and shrubland habitats are predominant within the two country parks (i.e. the eastern portion of the study area), with some rock outcrop located around the peak of High West.

6.5.1.2 As there has not been large scale developments within the study area, the portion of urbanised area remains largely unchanged. It is estimated that the portion of secondary woodland/ shrubland and urbanised area (including the area of the cemetery) accounts for 60% and 40% of the study area, respectively.

6.5.1.3 Study areas that fall within the Lung Fu Shan Country Park and Pok Fu Lam Country Park are dominated by woodland/ shrubland habitats. It hosts both native (e.g. Hong Kong Gordonia (*Polyspora axillaris*) and Chekiang Machilus (*Machilus chekiangensis*) and introduced species such as Slash Pine (*Pinus elliottii*) (AFCD, 2015). Parts of the woodland comprising of non-native species generally have a lower ecological value (Kwong *et al*, 2014).

6.5.1.4 Some streams were identified within the study area. The stream situated at the northern portion of the study area, near the residential developments along Pok Fu Lam Road, is generally natural in the upstream area but has been subject to

channelisation in the downstream section. The other stream located close to the QMH Complex is generally natural but as it is situated close to maintenance works, there are signs of human disturbance such as dumping of municipal waste. A number of streams were also identified within the Country Park area, along the hiking trails and hillside. In general, these streams were generally natural. No vegetation was present in the streams and the water was clear at the time of observation.

6.5.1.5 In addition, some streams have also been identified in the western portion of the study area, namely within and near the Chinese Christian Cemetery. Those watercourse located within the cemetery and along the concrete slope near Bisney Road are man-made whilst those situated along the wooded areas to the north and south of the cemetery are subject to less human disturbance and comparatively more natural.

6.5.1.6 The distribution of habitats is shown in Figure 6.2.

6.5.2 Fauna

6.5.2.1 During the field surveys, the dominant species sighted was Black Kites (*Milvus migrans*). When sighted, most of the Black Kites were soaring around Mount Davis, above the Chinese Christian Cemetery. It was noted that their soaring behaviour lasted on average 1-3 minutes. Other locations where Black Kites were sighted included the area near the tip of the western portion of the Chinese Christian Cemetery and the ridge of High West. They were usually seen flying individually or in pairs, at heights of approximately 150 – 300mPD. Based on the above, it can be confirmed that Black Kites are mainly active within the proposed north-to-west flight sector.

6.5.2.2 Black Kites were also sighted within the QMH Complex, within close vicinity of the Proposed Helipad. However, this only contributes a very small proportion of the total number of Black Kites sighted. The Proposed Helipad will be located at the roof of the New Block, which will be built at the existing location of the Clinical Pathology Building (CPB), Houseman Quarters (HQ) and University Pathology Building (UPB). Over the 2 field surveys, there were 4 sightings of Black Kites flying above the QMH Complex. Three of these sightings occurred in the morning period (0630 – 0900), and the remaining one occurred in the afternoon period (1600 – 1800). A pair of them were flying near the ridge of High West, located approximately 250m from the location of the Proposed Helipad. In two of the recorded sightings, individual Black Kites were seen flying in either the east-west or west-east direction. In the remaining sighting, the Black Kite was seen flying in the south-western direction towards the campus grounds of University of Hong Kong.

6.5.2.3 From the two field surveys, Black Kites were more abundant during the morning session (0630 – 0900) as compared to the afternoon session (1600 – 1800).

6.5.2.4 Other than Black Kites, House Swifts (*Apus nipalensis*) were observed to be soaring at the area located approximately 400m west of the Proposed Helipad.

These birds were sighted once during the earlier survey in September 2015, appearing in flocks of 5 to 7, but were not recorded in the subsequent surveys.

6.5.2.5 Other than avifauna species, no bats were observed during the field surveys. The two dominant avifauna species identified are shown in Table 6.1 below, which are both common resident birds widely distributed in Hong Kong. Figure 6.2 presents the locations where avifauna species was recorded and also the extent to which their soaring behaviour covers.

Table 6.1 Fauna Species Identified During Field Survey

Common Name	Scientific Name	Commonness
Black Kite	*Milvus migrans*	Common
House Swift	*Apus nipalensis*	Common

6.5.2.6 The Black Kite is a very widespread and common species in Hong Kong and is present year-round. It is classified as a species of conservation interest, and Table 6.2 tabulates the evaluation of the species based on EIAO-TM.

6.5.2.7 This species is conspicuous in the urban area and also found in a wide variety of coastal and inland habitat ranging from small island, reservoirs to grassy hillsides at all altitudes. There is no record of their roosting sites within the study area. However, there are known roosting sites at Stonecutters Island and Magazine Gap (Carey *et al*, 2001). Hence, it is unlikely that the Black Kites would spend extended periods of time within the vicinity of the proposed helipad.

Table 6.2 Ecological Evaluation of Black Kite (*Milvus migrans*)

Protection Status / Conservation Status	Protected under Cap 586 in Hong Kong
	Classified as Class II under the PRC Protection Status
	Listed in CITES Appendix II
	Wild Animal Protection Ordinance (Cap. 170)
Distribution	Widespread in Hong Kong
Rarity	Common in Hong Kong

6.5.2.8 The House Swift is known to forage above urban areas, hillsides and mountain tops that are close to urban areas. According to Carey et al (2001), Pok Fu Lam is one of the localities where nesting has been recorded but swifts nests were not identified upon the additional survey. Table 6.3 presents the evaluation of the species based on EIAO-TM.

Table 6.3 Ecological Evaluation of House Swift (*Apus nipalensis*)

Protection Status / Conservation Status	Wild Animal Protection Ordinance (Cap. 170)
Distribution	Widely distributed in Hong Kong and a locally common resident.
Rarity	Common in Hong Kong

6.6 Construction Stage

6.6.1 Impact Prediction and Assessment

Direct Impact

6.6.1.1 As the Proposed Helipad will not encroach upon existing non-built up area, there will be no loss of the surrounding natural habitats (i.e. woodland and shrubland) within the study area. None of the area outside the Project boundary will be directly impacted by the Project during construction phase. Hence, there will be no direct impact upon the identified habitats and avifauna during construction phase.

Indirect Impact

6.6.1.2 Potential indirect impact arising from the Project upon surrounding habitats and the associated wildlife are noise from construction plants, fugitive dust and surface run-off generated by construction works.

6.6.1.3 Noise generating works would be from the construction of the helipad, safety walkway, access ramp, noise barrier and noise reducer. The proposed helipad is likely to be constructed by in-situ concrete while the safety walkway and access would be formed by prefabricated steel members and assembled on-site. The nature of these works are mainly concrete pouring and installation works. As such, the use of Powered Mechanical Equipment (PME) would be limited. For avifauna, these species are highly mobile and their use of the environment within the study area is transient. The anticipated period for structural works for the proposed development would take approximately 4 months. Given the short duration of construction works, potential impact, if any, shall be negligible.

6.6.1.4 Fugitive dust could be generated during the construction phase from vehicle movement on designated haul roads or loading and unloading works. However, the works area would be regularly sprayed with water during construction works to maintain surfaces wet. With the proper implementation of dust control measures, fugitive dust would not have any impact on the surrounding habitat.

6.7 Operation Stage

6.7.1 Impact Prediction and Assessment

Direct Impact

6.7.1.1 Potential direct impact during operation phase would be bird strike. In terms of Black Kites, they do not appear in flocks and their use of the study area is likely of a transient nature. Although Black Kites have been sighted within the proposed flight sectors, GFS has advised that they would avoid birds obstructing their flight path to avoid bird strike. As Black Kites do not appear in flocks, the helicopter should be able to manoeuvre its flight path to avoid bird strike if avifauna were present within the flight sector during approach or lift-off.

6.7.1.2 With reference to past records of the operation of existing helipads, it is estimated that the usage of the Proposed Helipad would be less than 300 times annually. Also, the duration from the helicopter's approach to lift-off would only last for approximately 5 minutes. Given the high mobility of avifauna, the precautionary measures undertaken by GFS and short durations for which the helicopter stays within the study area, potential direct impact arising from the operation phase would not be significant.

Indirect Impact

6.7.1.3 Potential indirect impact arising from the Project would be upon avifauna, in particular noise disturbance during the operation of the Proposed Helipad. Based on information provided by the GFS, the duration at which the helicopter stays within the study area would be short while the frequency of helicopter landings is less than once per day.

6.7.1.4 The study area has not been documented at a roosting or breeding site for Black Kites (*Milvus migrans*) (Carey *et al*, 2010). Black Kites were often sighted as individuals or in pairs, and did not linger within the study area for extended periods. Hence, the nature of this species' use of the study area is likely of a transient nature. In addition, Black Kites are highly mobile and are able to utilise the surrounding environment beyond the study area. Given the nature of the Black Kite's use of the study area and the short duration at which the helicopter stays within the study for each flight, potential noise disturbance arising from helicopter noise upon avifauna would be limited. Similarly for house swifts, these species are highly mobile and able to utilise the surrounding environment beyond the study area. Hence, potential impact upon house swifts, if any, would be limited.

6.7.1.5 GFS has advised that they would not adopt a flight sector from the east. This means that no flights would approach the Proposed Helipad from the east, via Pok Fu Lam Country Park and High West. As shown in Figure 6.1, the proposed flight sectors mainly overlap with the urbanised area and a section of the woodland habitat within the Lung Fu Shan Country Park. Woodland is considered as ecologically important habitat under the TM-EIAO. However, helicopter would only

be flying over the woodland habitat and so no impact is anticipated upon this habitat during operation phase.

6.7.1.6 There have not been sightings of any bats during the field survey. However, the Greater Short-nosed Fruit Bat (*Cynopterus sphinx*) is known to roost in Chinese Fan Palm (*Licistona chinensis*) and can be found within the Lung Fu Shan Country Park area (Kwong *et al*, 2014; Black & Veatch, 2005). These species are known to have an upper elevation limit of approximately 400m. However, there are no Chinese Fan Palms located within close vicinity of the location of the Proposed Helipad. Hence, it is unlikely that the proposed flight sectors intercept with the movement corridor of the Greater Short-nosed Fruit Bat. Hence, ecological impact upon bats is not anticipated.

6.8 Recommended Mitigation Measures

6.8.1.1 Aforementioned, the ecological impact for the Proposed Helipad has been assessed. As the Proposed Helipad is not likely to result in adverse ecological impact, specific ecological mitigation measures are not necessary.

6.8.1.2 However, it is recommended that during construction phase, good site practice should be carried out to minimise potential indirect ecological impact from the construction works. Examples of good sites practices are listed below:

Waste Management

- Construction waste stored on-site at designated areas and disposed of properly.
- Chemical waste generated from on-site machinery should also be stored in designated containers to be disposed of at Chemical Waste Treatment Centre.
- General refuse including food and paper waste generated from the workforce shall be disposed of at on-site refuse collection points in order to minimise nuisance to sensitive surroundings.

Wastewater

- While carrying out construction works, the Contractor shall be responsible for ensuring that any wastewater produced on-site shall be directed into storm drains or via sand/ silt removal facilities such as sand traps, silt traps and sediment retention basin.
- Sand and silt removal facilities should also be regularly maintained and the deposited silt and grid should be removed by the Contractor at the onset of, and after each rainstorm to ensure that the facilities are functioning properly. This is to prevent the runoff of untreated wastewater into the surrounding environment.

Fugitive Dust

- To mitigate potential fugitive dust impact, the Contractor shall be responsible for implementing relevant dust control measures as recommended in the Air Pollution Control (Construction Dust) Regulation.
- All vehicles leaving the site shall be washed to remove any dusty material from its body and wheels.
- All dusty materials or surfaces shall be sprayed with water prior to loading, unloading or transfer operation to maintain the dusty materials wet.

6.9 Residual Impact

6.9.1.1 As no significant ecological impact is identified for the Project, no residual impact is identified.

6.10 Conclusion

6.10.1.1 The potential ecological impact during both construction and operation phases of the Proposed Helipad has been evaluated in accordance with the EIA Study Brief and EIAO-TM. Both desktop study and site inspections were conducted. The surrounding habitats is mainly dominated by woodland/ shrubland and urbanised area. Aforementioned, construction works and also the operational area of the helicopter will be confined to the roof level of the New Block, which would not encroach into the area of the Lung Fu Shan Country Park and Pok Fu Lam Country Park. Although the proposed flight sector overlaps some woodland habitat within the Lung Fu Shan Country Park, the helicopter would only be flying over this area and hence, ecological impact on surrounding habitat is not anticipated.

6.10.1.2 Black Kites (*Milvus migrans*) were sighted within the proposed flight sectors in the study area. However, the Proposed Helipad is not located within the vicinity of the roosting sites of the Black Kites or the Greater Short-nosed Fruit Bat. Given the short duration from approach to lift-off, and the anticipated usage of the Proposed Helipad (i.e. less than 300 times annually), the potential ecological impact on avifauna and bats, if any, is limited. With the implementation of good site practice and current practice of GFS in avoiding bird strike, no significant impact to the avifauna and bats is anticipated.

6.11 Reference

Agriculture, Fisheries and Conservation Department (2015). *Pok Fu Lam Country Park.*
Available from: http://www.afcd.gov.hk/english/country/cou_vis/cou_vis_cou/cou_vis_cou_pfl/cou_vis_cou_pfl.html [29 March 2016]

Agriculture, Fisheries and Conservation Department (2015). *Lung Fu Shan Country Park.*
Available from: http://www.afcd.gov.hk/english/country/cou_vis/cou_vis_cou/cou_vis_cou_lfs/cou_vis_cou_lfs.html [29 March 2016]

Ades, G.W.J. (1999). The species composition, distribution and population size of Hong Kong bats. *Memoirs of the Hong Kong Natural History Society*. 22:183-209

Black & Veatch (2005). Agreement No. CE25/2002 Drainage Improvement in Northern Hong Kong Island – Hong Kong West Drainage Tunnel – Report of Ecological Baseline Survey.

Carey, G.J., Chalmers, M.L., Diskin, D.A., Kennerley, P.R., Leader, P.J., Leven, M.R., Lewthwaite, R.W., Melville, D.S., Turnbull, M. and Young, L. (2001). *The Avifauna of Hong Kong.* Hong Kong, Hong Kong Bird Watching Society.

Csorba, G., Bumrungsri, S., Francis, C., Bates, P., Gumal, M., Kingston, T., Molur, S. & Srinivasulu, C. (2008).*Cynopterus brachyotis*. The IUCN Red List of Threatened Species 2008: e.T6103A12432460.http://dx.doi.org/10.2305/IUCN.UK.2008.RLTS.T6103A12432460.en. Downloaded on 31 March 2016.

del Hoyo, Josep, Illiott, Andrew, Sargatal, Jordi (ed) (1999) Handbook of the Bird of the World. *Handbook of the Bird of the World*. Volume 5. Barcelona, Lynx Edicions.

Kwong, C.Y., Leung, H.S., Leung, S.H., Mak, C.F., Li, Y.Y., Tsang, P.N.T., Chu, W.K. and Du, Z. (2014). *Exploring Lung Fu Shan – A Nature Guide*. Hong Kong. Hong Kong University Press.