Fanling Golf Course – Provision of Ecological Consultancy Services (2022 – 2023)

Bat Survey Report
Summary
(Issue 1)

Job Ref.: 22/2139/594 HKGC-2022 BAT
Date: 2nd May 2023

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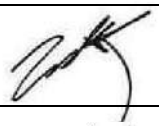
Prepared by:	**Nicholas TAM**	
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EXECUTIVE SUMMARY

- This study was conducted during September 2022 to March 2023. This covers the months i.e. December to February when temperatures are cooler and bat activity (and prey availability) is much reduced, and is thus not the optimal time to surveys bat in Hong Kong.

- Nonetheless, **15 species (60% of bat species found in Hong Kong)** were recorded in Fanling Golf Course (FGC) during the surveys for this 7-month study.

- **Short-nosed Fruit Bat, Lesser Bamboo Bat and Yellow House Bat were recorded from all four Sub-Areas across the 7-month study period**. All were specifically mentioned in the EIA Study Brief ESB-318/2019.

- A total of **12 bat roost locations** were recorded for Japanese Pipistrelle, Least Pipistrelle, **Short-nosed Fruit Bat and Lesser Bamboo Bat,** the latter two species specifically mentioned in the EIA Study Brief ESB 318/2019 **were recorded from roosts in Sub-Area 1. No bat roosts were recorded by the EIA**; whilst the two surveys did not overlap temporally, the differences are considered to reflect shortcomings in the EIA survey methodology rather than an actual increase in roosting bats within Sub-Area 1. Any statements to the effect that no roost sites were found within the PDA are considered misleading.

- A key component of the study was to directly compare the efficacy of handheld bat detectors and Static Bat Detectors. **No differences were found regarding the overall number of species recorded; both methods recorded 14 bat species**. The EIA Study recorded 1 bat species using hand-held detectors from a 12-month study.

- However, transect surveys using hand-held detectors (the same method employed by the EIA Study) allowed for the detection of a greater number of bat species in each Sub-area.

- Data from this study, combined with historical data collected by the Hong Kong Golf Club between 2018-2022, demonstrate e that FGC (Sub-Areas 1-4) is **the best site for bats in Hong Kong.**

1 INTRODUCTION

1.1 Background

1.1.1 aec Limited (aec) has been employed by the Hong Kong Golf Club (HKGC) as ecological consultant to carry out routine ecological monitoring surveys in Fanling Golf Course (FGC) and provide ecological advice and management recommendations since April 2018.

1.1.2 Fanling Golf Course has a rich bat diversity and up to 2022, a total of 16 bat species have been recorded there, representing over 60% of bat species recorded in Hong Kong. Six of these species, Short-nosed Fruit Bat, Chinese Myotis, Rickett's Big-footed Myotis, Least Pipistrelle, Chinese Pipistrelle, Lesser Bent-winged Bat and Greater Bent-winged Bat, are assessed as Near Threatened in China (Jiang *et al.* 2016). Furthermore, Rickett's Big-footed Myotis is assessed as Vulnerable with a decreasing population trend globally by IUCN (2023).

1.2 The EIA study on Partial Development of Fanling Golf Course

1.2.1 In 2019, the Civil Engineering and Development Department (CEDD) commissioned the consultancy study titled "Agreement No. CE17/2019 (CE) Technical Study on Partial Development of Fanling Golf Course Site – Feasibility Study". This study covers 32ha of land of FGC east of Fan Kam Road as a Potential Development Area (PDA) for public housing.

1.2.2 The EIA Report (No. EIA-282/2022) submitted was exhibited for public inspection from 20 May 2022 to 18 June 2022. In the submitted EIA Report, the PDA was subdivided into Sub-Areas (SA) 1 to 4, with Sub Area-1 (SA1) identified for housing development.

1.2.3 According to the submitted EIA Report, only one species of bat, namely Japanese Pipistrelle, was recorded within the PDA during the 12-month survey period, with its abundance noted as "scarce".

1.2.4 On 19 August 2022, the Advisory Council on the Environment (ACE) recommended the Project Proponent to provide Additional Information to facilitate review of the EIA. Based on these recommendations, additional ecological information/survey were required from the Project Proponent:

- Additional Bird Surveys
- Additional Moth Surveys
- Additional Information on Bat Surveys

1.3 Current Study

1.3.1 Given the obvious disparity between the findings of the EIA Report and HKGC's historical data (HKGC 2023), aec was appointed by HKGC to conduct specific bat surveys from September 2023 to March 2023.

1.3.2 Previous bat studies undertaken at FGC have mainly utilized utilised static bat detectors, whereas the EIA Study used only hand-held bat detectors. There was some suggestion at the ACE meeting on 19 August 2002 that the disparity in species diversity and bat abundance recorded from the two studies was due to the differences in the two methodologies.

1.3.3 This report follows the PDA Sub-Areas devised in the EIA Report to allow a direct comparison between the two studies. Here we primarily focus on Sub-Areas 1 to 3 which will be directly impacted by the proposed development and associated mitigation measures, and the 'Clubhouse' area which has the potential to be indirectly impacted by increased lighting from the proposed high-rise development. Sub-Areas are shown in **Figure 1.**

1.3.4 In the EIA Study Brief (ESB-318/2019) Appendix H, Clause 2(v) states the Ecological Impact Assessment should "investigate and describe the existing wildlife uses of various habitats with special attention to those wildlife groups and habitats with conservation importance, including but not limited to the following: … *vertebrates, including … **mammals (both terrestrial and flying**, e.g. … **Cynopterus sphinx, Tylonycteris pachypus and Scotophilus kuhlii**) …".* The three species specifically mentioned in the Clause are Short-nosed Fruit Bat, Lesser Bamboo Bat, and Yellow House Bat, respectively[1].

1.3.5 Clause 2(v) also states the Ecological Impact Assessment should "investigate and describe … ***roosting, breeding and/or feeding** sites of … **mammals**…",* whilst Clause 2. (vii) states that the Ecological Impact Assessment should also "*using suitable methodologies (including but not limited to those adopted in other relevant EIA studies in Hong Kong), and considering also any works activities from other projects reasonably likely to occur at the time, identify and quantify as far as possible any direct (e.g. loss of habitats), indirect (e.g. light pollution, changes in water qualities, hydrodynamics properties, hydrology, noise and other disturbance generated by the construction and operational activities, etc.), on-site, off-site, primary, secondary and cumulative ecological impacts on the wildlife groups and habitats identified such as direct loss of habitats, potential diversion or modification of stream courses, disturbance to wildlife, destruction of habitats, reduction of species abundance/diversity, **loss of roosting, feeding and breeding grounds**, reduction of ecological carrying capacity and habitat fragmentation and any other possible disturbance caused by the Project and the activities of the residents and visitors; and in particular the following*:"

1.3.6 In this report, findings are provided to demonstrate the importance of FGC for bats (including the three species mentioned in the EIA SB), to fill information gaps left by the EIA-282/2022 in order to guide/inform assessments for direct and indirect impacts to the bat community at FGC in line with the specific requirements of the EIA SB. Also, the differences in the survey results generated from the two methodologies (i.e. hand-held bat detectors vs. static detectors) were investigated, provided with a direct comparison between the two.

[1] Scientific names were used in EIA Study Brief No. ESB-318/2019. English common names would be used throughout the main body of this report for ease to the reader.

2 METHODOLOGY

2.1.1 The 7-month Specific Bat Survey covering September 2022 to March 2023 focused on three key areas:

1. Bat Roost Surveys, with a specific focus on SA1 (which will be largely developed)
2. Transect Surveys using hand-held bat detectors across SA1, SA2, SA3 & Clubhouse
3. Static Detector Surveys for bats in SA1, SA2, SA3 & Clubhouse

2.1.2 It should be noted that the survey period is outside of the primary period of maternity/nursery activities for bats in Hong Kong. It also covers the cooler months i.e. December to February when temperatures are cooler and bat activity (and prey availability) is much reduced.

2.1.3 Detailed survey methodologies are provided in **Appendix 1.** Taxonomic nomenclature follows that in **Appendix 2,** though here we use common names throughout the main body of the report for ease to the reader.

2.1.4 Recordings from static detectors were collected from the same time period and the same date as the transect survey (15 minutes before sunset until 1 hour after sunset) for each Sub-Area to allow a direct comparison between methods.

3 SURVEY RESULTS

3.1 Bat Roost Surveys

Built Structure Roosts

3.1.1 A total of 6 built structures/complexes within SA1 with another 3 building structures/complexes within proximity to SA1 and SA2 were identified and assessed for bat roosting potential.

3.1.2 The **Ping Kong Archway was found to be a roost site** for several Pipistrelle bats. This structure falls into the footprint of the SA1 according the EIA Tree Survey report. **Plate 1** shows a Least Pipistrelle Bat returning to roost during a dawn survey.

Plate 1. Least Pipistrelle entering roost space in the Ping Kong Archway at dawn

3.1.3 No definitive roosts were found in other built structures within SA1. Roof tiles on the Private residential area have high potential roosting opportunities for Pipistrelle spp. Bats were regularly seen feeding over these structures shortly after sunset/before sunrise indicating a nearby roost (s), though none were seen entering/leaving the structures.

Tree Roosts

3.1.4 From the 1192 woody trees in SA1 listed in the EIA report, 233 trees were listed as having defects. After a preliminary assessment, 12 trees were determined to be missing or inaccessible while 7 trees that were not listed to have defects were discovered to have roosting potential, bringing the total of assessed trees to 228. These trees were evaluated for potential roost features (PRF) for this study.

3.1.5 Of these, **37 trees were considered to have a Roost Potential** of Medium-Low or higher. These would require further study and assessment before any felling or development nearby to assess direct or indirect impacts. A summary of Roost Potential of the assessed trees is provided below in Table 1. Locations of these trees with roost potential are shown on **Figure 3b.**

Table 1. *Roost Potential of Trees Surveyed in SA 1*

Roost Potential of Trees with Defects	No. of Trees
Confirmed Roost	0
High Potential	3
Medium Potential	8
Medium-Low Potential	26
Low Potential	114
Negative Potential	77
Total	**228**

Fan-palms and Bamboo Roosts

3.1.6 A total of 8 Chinese Fan-palm stands were identified and surveyed within SA1 with 3 **showing evidence of Short-nosed Fruit Bat roosts**. An **active roost of 6 Short-nosed Fruit Bats** was in the gardens north of the residential houses during February 2023. **Plate 2** shows two bats at the same roost on 17th April 2023.

Plate 2. Two Short-nosed Fruit Bats in a Chinese fan-palm roost in Sub-Area 1 on 17th April 2023

3.1.7 In the wider study area, a further 29 Chinese Fan-palms were surveyed with at least 7 showing evidence of roosting (old tent roosts) by Short-nosed Fruit Bat. Locations of these Chinese Fan-palms are indicated in **Figure 3**.

3.1.8 Two bamboo clumps are present in SA1. A single **Lesser Bamboo Bat was recorded roosting** in one clump close to Hole #1 throughout the study period.

Plate 3. Screen grab (from InfraRed Video) of Lesser Bamboo Bat entering roost in Sub-area 1. Roost entrance shown in second image.

3.2 Transect Surveys

3.2.1 Seven monthly transect surveys were conducted across the four Sub-Areas between September 2022 and March 2023, using hand-held detectors. A total of 14 species of bat were recorded from the surveys. **Table 2** below shows the species composition and the peak abundance of bat passes recorded across the study period for each species. Peak abundance was taken from the maximum number of bat passes recorded in each Sub-Area for each species from across the 7-month study period.

Table 2. *Species composition and peak abundance of bat species for each Sub-Area from the 7-month Transect Surveys*

Scientific Name	Common Name	Peak Abundance of Passes per Area			
		Sub-Area 1	Sub-Area 2	Sub-Area 3	Club House
Cynopterus sphinx[1]	Short-nosed Fruit Bat[1]	✓	✓	✓	✓
Rhinolophus sinicus	Chinese Horseshoe Bat	3	1		
Rhinolophus affinis	Intermediate Horseshoe Bat		2	5	2
Rhinolophus pusillus	Least Horseshoe Bat	2	2	3	
Hipposideros armiger	Himalayan Leaf-nosed Bat	12	9	20	16
Myotis horsfieldii	Horsfield's Myotis		1		
Nyctalus plancyi	Chinese Noctule	23	20	55	9
Pipistrellus abramus	Japanese Pipistrelle	77	32	81	54
Pipistrellus tenuis	Least Pipistrelle	36	86	85	61
Hypsugo pulveratus	Chinese Pipistrelle	28	9	6	16
Tylonycteris pachypus	Lesser Bamboo Bat	34	9	26	20
Scotophilus kuhlii	Lesser Yellow Bat	37	16	46	35
Miniopterus magnater	Greater Bent-winged Bat	1	3	14	1
Miniopterus pusillus	Lesser Bent-winged Bat	13	17	19	6
Total Number of Species		**12**	**14**	**12**	**11**

Note:
1. Abundance for Short-nosed Fruit Bat is not provided as the species is not an echo-locating bat, and thus could not be detected by either hand-held detector or static detector. Instead, the species is recorded based on visual detection. Presence/absence is recorded here with '✓' indicating this species was recorded from each Sub-Area.

3.2.2 **Figure 4** shows the cumulative bat contacts made from the transects across the 7-month study[2]. This figure shows the species diversity, distribution and abundance across the four studied areas within FGC. Field observations revealed the site is important for the variety of foraging areas and various flight corridors as bats move between roost sites and foraging grounds.

3.2.3 Different species utilise the area in different ways, occupying different micro-habitats, niches and altitudes such as the interface between woodland and turf, foraging high above both turf areas or tree canopies, foraging within woodland corridors, gleaning insects off of individual trees or foraging on fruiting trees.

3.2.4 Bat activity is recorded very close to sunset, and well after sunrise indicating that FGC is an important foraging resource for bats in the area.

3.2.5 Whilst Japanese and Least Pipistrelle were the most frequently recorded species, Short-nosed Fruit Bat, Lesser bamboo Bat and Lesser House Bat (all mentioned specifically in the EIA Study Brief No. ESB 318/2019) were recorded from all 4 studied areas in every single survey visit (see **Figure 4d, 4e and 4f**).

3.2.6 Short-nosed Fruit Bat were frequently recorded during transect surveys in flight or foraging on fruiting trees. Up to 12 individuals were recorded foraging in *Ficus* trees adjacent to the carpark between November 2022 and March 2023.

3.3 Static Detector Surveys

3.3.1 Static Detectors deployed over the four studied areas between September 2022 and March 2023. A total of 14 bats were recorded. **Table 3** shows the species composition and the peak abundance of bat passes recorded across the study period for each species. Peak abundance was taken from the maximum number of bat passes made in each Sub-Area for each species from across the 7-month study period.

Table 3. *Species composition and peak abundance of bat species for each Sub-Area from the 7-month Static Detector Surveys*

Scientific Name	Common Name	Maximum Number of Passes per Sub-area			
		Sub-area 1	Sub-area 2	Sub-area 3	Club House
Rhinolophus sinicus	Chinese Horseshoe Bat	1			
Rhinolophus affinis	Intermediate Horseshoe Bat			12	
Rhinolophus pusillus	Least Horseshoe Bat	6	6	8	
Hipposideros armiger	Himalayan Leaf-nosed Bat	1	81	1	
Myotis ricketti	Rickett's Big-footed Myotis		8		
Myotis horsfieldii	Horsfield's Myotis		2		
Nyctalus plancyi	Chinese Noctule	222	60	439	55
Pipistrellus abramus	Japanese Pipistrelle	130	238	95	266
Pipistrellus tenuis	Least Pipistrelle	188	711	294	207
Hypsugo pulveratus	Chinese Pipistrelle	25	27	1	160
Tylonycteris pachypus	Lesser Bamboo Bat	99	36	21	35
Scotophilus kuhlii	Lesser Yellow Bat	18	146	81	147
Miniopterus magnater	Greater Bent-winged Bat		1	1	
Miniopterus pusillus	Lesser Bent-winged Bat	4	158	107	17
Total Number of Species		**10**	**12**	**11**	**7**

3.3.2 Whilst Least Pipistrelle and Chinese Noctule were most frequently recorded species, Bat, Lesser Bamboo Bat and Lesser House Bat (all mentioned specifically in EIA Study Brief ESB 318/2019) were

[2] N.b. not all bat contacts will be mapped as the hand-held detector does not always collect GPS coordinates.

recorded from all 4 Sub-areas across the study. Short-nosed Fruit Bat was not recorded on account of its inability to echolocate.

3.4 Comparison between Transect and Static Surveys

3.4.1 Both methods recorded 14 species of bats during the 7-month Study Period. The results demonstrate that the two different methods produce very similar findings in the same study period.

Table 4. *Comparison of number of bat species recorded between Transect and Static Detector Surveys between Sept 2022 and Mar 2023*

Scientific Name	Common Name	Species Recorded	
		Transect Surveys with Hand-held Detectors	Static Detector Surveys
Cynopterus sphinx	Short-nosed Fruit Bat	✓	n/a
Rhinolophus sinicus	Chinese Horseshoe Bat	✓	✓
Rhinolophus affinis	Intermediate Horseshoe Bat	✓	✓
Rhinolophus pusillus	Least Horseshoe Bat	✓	✓
Hipposideros armiger	Himalayan Leaf-nosed Bat	✓	✓
Myotis ricketti	Rickett's Big-footed Myotis		✓
Myotis horsfieldii	Horsfield's Myotis	✓	✓
Nyctalus plancyi	Chinese Noctule	✓	✓
Pipistrellus abramus	Japanese Pipistrelle	✓	✓
Pipistrellus tenuis	Least Pipistrelle	✓	✓
Hypsugo pulveratus	Chinese Pipistrelle	✓	✓
Tylonycteris pachypus	Lesser Bamboo Bat	✓	✓
Scotophilus kuhlii	Lesser Yellow Bat	✓	✓
Miniopterus magnater	Greater Bent-winged Bat	✓	✓
Miniopterus pusillus	Lesser Bent-winged Bat	✓	✓
Total Number of Species		**14**	**14**

3.4.2 However, transect surveys using hand-held detectors (the same method employed by the EIA Study) allowed for the detection of a slightly greater number of bat species in each studied area over the 7-month study period (see **Plate 4** below).

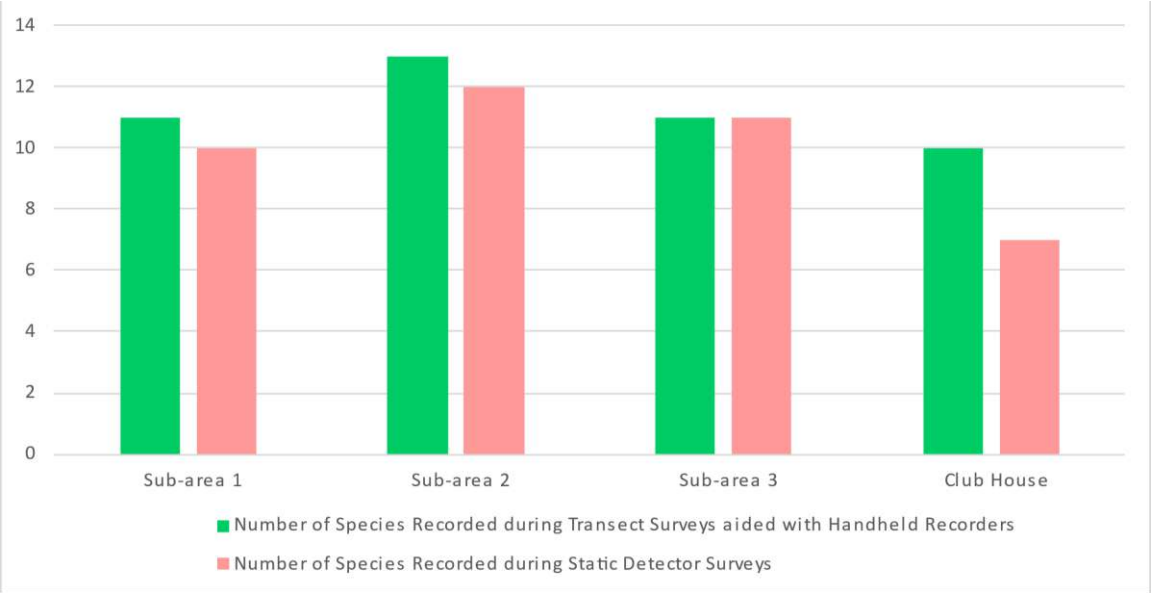

Plate 4. Comparisons of number of bat species recorded between Transect Surveys (using hand-held detectors) and Static Detectors surveys over the 7-month study.

4 DISCUSSION

4.1 Summary of Bat Species

4.1.1 A total of 15 species (60% of bat species found in Hong Kong) were recorded in FGC throughout the whole 7-month study. **Table 5** summarises the distribution and status of these 15 bat species recorded in the study.

Table 5. *A Summary List of Bat Species Found in FGC during the 7-month Study*

Scientific Name	Common Name	Species Recorded in the current 7-month Study			Species Recorded in the EIA's 12-month study
		Roost	Transect	Static	
Cynopterus sphinx	Short-nosed Fruit Bat	✓	✓*		
Rhinolophus sinicus	Chinese Horseshoe Bat		✓	✓	
Rhinolophus affinis	Intermediate Horseshoe Bat		✓	✓	
Rhinolophus pusillus	Least Horseshoe Bat		✓	✓	
Hipposideros armiger	Himalayan Leaf-nosed Bat		✓	✓	
Myotis ricketti	Rickett's Big-footed Myotis			✓	
Myotis horsfieldii	Horsfield's Myotis		✓	✓	
Nyctalus plancyi	Chinese Noctule		✓	✓	
Pipistrellus abramus	Japanese Pipistrelle	✓	✓	✓	✓
Pipistrellus tenuis	Least Pipistrelle	✓	✓	✓	
Hypsugo pulveratus	Chinese Pipistrelle		✓	✓	
Tylonycteris pachypus	Lesser Bamboo Bat	✓	✓	✓	
Scotophilus kuhlii	Lesser Yellow Bat		✓	✓	
Miniopterus magnater	Greater Bent-winged Bat		✓	✓	
Miniopterus pusillus	Lesser Bent-winged Bat		✓	✓	
Total Number of Species Recorded		**4**	**14**	**14**	**1**

Note: * = direct observation

4.1.2 Both transect and static detector surveys recorded 14 species of bat species over the duration the 7-month study period at FGC. In fact, whilst overall numbers of species were comparable, static detectors recorded fewer bat species in each Sub-Area. Transect surveys using hand-held detectors (the same method employed by the EIA Study) allowed for the detection of a greater number of bat species in each studied area.

4.2 Importance of Fanling Golf Course for Bats in a Hong Kong Context

4.2.1 A literature review of comparing species of bats recorded across different sites in Hong Kong is documented in **Appendix 3**.

4.2.2 **Table 6** summarises these findings, and includes those sites found to be of 'high' bat diversity, two EIA studies (with the highest bat diversity), along with three selected urban parks (with the highest diversity, lowest diversity and closest to FGC), all presented for comparison. At 148ha with an altitudinal range of over 400m, Kadoorie Farm & Botanic Gardens (KFBG) is a much larger site and to allow for direct comparison we follow Ades & Chan (2021) and treat it as three sub-sites.

4.2.3 Data from this study demonstrates that FGC (Sub-Areas 1-4) is an important site for bats in Hong Kong and, from the reviewed publicly available literature, is **the best site for bats in Hong Kong** (see **Table 6**). The 17 species recorded at FGC account for 68% of bat species recorded in Hong Kong.

4.2.4 Full details of the literature reviewed can be seen in **Appendix 3**.

Table 6. *Summary of Bat Diversity at Sites in Hong Kong*

Site	Number of bat species recorded
Fanling Golf Course (Sub-Areas 1-4)	**17**
Mai Po Nature Reserve	16
Kadoorie Farm and Botanic Garden - Middle	16
Kadoorie Farm and Botanic Garden - Lower	15
Kadoorie Farm and Botanic Garden - Upper	14
Lin Ma Hang	14
Hong Kong Park	7
North District Park	5
Po Hong Park	3

4.2.5 The habitat mosaic of the FGC results in an extensive edge-effect, with an extended interface between multiple habitats. Combined with the structural diversity of vegetation and niches created by the layout of FGC, numerous foraging opportunities are available to a significant number of bat species. This is a unique setting in lowland Hong Kong and should not be underestimated.

4.3 Bat Roosting Opportunities

4.3.1 Bat roosts are time consuming to locate and identify, however, in this study we identified 12[3] roost locations for four species (**Japanese Pipistrelle, Least Pipistrelle, Short-nosed Fruit Bat and Lesser Bamboo Bat)** and multiple potential roosting opportunities, in built structures, trees, Chinese Fan-Palms and Bamboo clumps within SA1 and the wider study area. **No bat roosts were recorded in the EIA Study;** whilst the two surveys did not overlap temporally, the differences are considered to reflect shortcomings in the EIA survey methodology rather than an actual increase in roosting bats within Sub-Area 1. Any statements to the effect that no roost sites were found within the PDA are considered misleading.

4.3.2 Based on the review of the EIA Tree Survey Report and onsite observations, 233 trees were noted to have defects. Each of these were evaluated in the field to assess any Potential Roost Features that could be utilised by bats. At least 37 trees display potential roosting opportunities for bats within SA1 and would require further assessment prior to any works being performed on these.

4.3.3 Active roosts of Short-nosed Fruit Bats and Lesser Bamboo Bats have been located within SA1. These two species are specifically mentioned in the EIA Study Brief No. ESB-318-2019.

4.3.4 Bats were frequently recorded within FGC very close to sunset and sunrise indicating further roosts within or very close to the areas covered in this study. Obvious flightlines have also been observed along tree lines within SA1 and around the private residential quarters.

4.4 The timing of Bat Roost Surveys

4.4.1 Although 15 species of bat were recorded, it should be noted that bat activity is generally lower in the dry season, and therefore the survey period of September to March is not ideal. However, due to the sub-tropical climate in Hong Kong, activity was still found to be across most of the months included in this study. There is however a higher chance of missing less frequently occurring species at this time of year.

[3] N.b Ping Kong Archway treated as a single roost location, though has multiple roosting opportunities. Likewise, each Chinese Fan-palm is treated as a single roost location though each has multiple roosting opportunities.

4.4.2 Bats in Hong Kong generally give birth (pup) between April and June; as this study was outside of this period maternity roosts within SA1 and the other Sub-areas remain to be fully investigated.

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APPENDIX 1

Survey Methodologies

Bat Roost Surveys

Bat roosting preferences vary between species, time of year and local conditions; they can be very dynamic, and several roost sites may be used by individuals over the course of a calendar year. In Hong Kong, bats have been recorded roosting in buildings/built structures, trees cavities, caves/water tunnels, Fan-palms and bamboos (Shek 2006), depending on each species ecology. In general, roosting of bats in Hong Kong is poorly known with very little literature available locally on this behaviour, although some sources from other regions provides information of some species' roosting behaviour that co-occurs both in other regions and Hong Kong (Smith & Xie 2008), which were referenced in this study. Combined with the dynamism, seasonal changes and variety of roosting substrates used, studies of bat roost are generally accepted as being labour intensive.

From the list of bat species known from FGC, particular focus was made of the following potential roosting locations:

- Any Built Structures,
- Trees that have defects (as listed in the EIA Tree Survey Report).
- Chinese Fan-palms and Bamboo clumps

Identification of roosting resources generally follows the descriptions provided in Andrews (2018) and the Bat Tree Habitat Key (2020), while methods of assessment generally follows the guidelines given by Collins *et al.* (2016).

A daytime evaluation of build structures within, and adjacent to, SA1, was conducted to assess potential for bat use. Any cracks, crevices, loose tiles in the building structure were actively searched for (from ground using binoculars when appropriate) and field signs (oil-strains from fur, urine stains, droppings) searched for on walls etc. to indicate presence of a potential roost.

Finding bat roosts is notoriously difficult in trees. A review of the Tree Survey Report (produced as part of the EIA's Landscape and Visual Impact Assessment) detailed some 1192 trees within SA1, of these 233 were listed to have defects. These trees were further evaluated for their roosting potential following the broad criteria in Table 2, assessing any Potential Roost Features (PRFs).

***Table A1**. Categorisation of roosting potential of surveyed trees*

Roost Potential	Description	
High	Very obvious PRFs in good condition (easy to access, spacious, stable and sturdy roosting surfaces) that are large enough for bats to enter but secluded enough to function as shelter against predators and extreme temperatures.	
Medium	PRFs that are large enough for bats to enter but secluded enough to function as shelter against predators and extreme temperatures.	
Medium Low	PRFs are present, which may be large and deep enough for bats to roost in, however the cavity opening might be upwards, leading to risk of overflowing under precipitation	PRFs are apparent, but opening may not be large enough, or may not be deep enough for bats to roost in, however, these cavities or crevices have the potential to grow larger.
Low	No PRFs observed, but broken branches/wounds on bark has potential to develop further into PRFs.	Suitable PRF is found but tree difficult for bats to access due to large number of obstacles close to the entrance of PRF or is in a highly disturbed area.
Negative	No cavities or crevices found	Tree too young/thin to develop potential roosting sites

Any trees with potential bat roosts were investigated further, where accessible, through a combination of using infra-red cameras or endoscope.

All Chinese Fan-palms within the Study area were searched for 'tent roosts' i.e. folded palm fronds, both active and inactive across the survey period. Visual observations were made, the 'tents roosts' are obvious to experienced surveyors. Checks using binoculars were made of each tent to determine presence of roosting Short-nosed Fruit Bats and record numbers.

All bamboos clumps were visually checked for presence of cracks or splits which are used by Bamboo bats to enter bamboos stems and roost in the internodes.

A combination of dawn (and occasionally) dusk surveys were conducted monthly, for built structures, trees and bamboos with PRFs, to establish if bats were entering/leaving voids in buildings/trees. Usually dawn surveys are more successful if observing bats returning to roost as the morning becomes progressively lighter. At least 8 dawn/dusk surveys were conducted each month to ascertain potential roost use.

Transect Surveys using hand-held detectors

Transect surveys involving surveyors using hand-held bat detectors and walking along transects on foot were conducted monthly across the four studied areas. Surveys commenced 15 mins before sunset and continued for an hour after sunset (sunset time provided by the Hong Kong Observatory). All were conducted in suitable weather conditions. All four Sub-Areas were covered simultaneously with surveyors using an EchoMeter Touch 2 Pro bat detectors (iOS/Android) handheld recorder (Wildlife Acoustics, USA) using the EchoMeter Application (Wildlife Acoustics, USA) on a corresponding smart phone or tablet to record bats encountered during the survey.

Where possible, behaviour of bats was noted to build on the ecological profile and bat use of the studied areas.

Any observations of non-vocalising bats (such as Short-nosed Fruit Bats) within the survey time and transects were also recorded by the surveyors upon visual confirmation.

Recordings were analysed using Kaleidoscope Analysis Software to permit, as far as possible, identification of species from call structure. The known call structure and peak frequency of Hong Kong bat species are currently limited to Horseshoe Bats (*Rhinolophus* spp.) and Leaf-nosed Bats (*Hipposideros* spp.) (Shek and Lau 2006); there is not yet a reference for the call structure of other Hong Kong bats so identification of these species has been made based on literature from elsewhere in the region, e.g. Tong (2016).

Where GPS data were available from hand-held detectors, data points of the encountered species were plotted on maps created for individual transects of each month to demonstrate species distribution of bats.

Static Detector Surveys

During the survey period, four static detectors (three Song Meter SM4BAT FS Ultrasonic Recorder and one Song Meter MINI BAT Ultrasonic Recorder) were set up in the four studied areas, i.e. SA1, SA2, SA3 and the Clubhouse area (each close to the respective survey transect). Location of the static detector were strategically placed at locations that were identified as important foraging areas for bats in the respective sub-areas and remained constant throughout the study period. Locations of the static detectors are shown in **Figure 2**.

Detectors were checked and turned on with battery charged no more than two days before the transect surveys were conducted and were set to record audio from 45 minutes before sunset to 30 minutes after sunrise.

Recordings collected during the same time on the same date as the **transect survey** (15 minutes before sunset until 1 hour after sunset) were extracted and clustered using Kaleidoscope Analysis Software. First 200 recordings in each cluster were analysed and all species occurring within a cluster were recorded and their percentage presence within the cluster was estimated.

A list of species and their overall abundance was compiled for each recorder separated by month, and the number of species recorded by static detectors s were compared to the number of species recorded by **transect surveys**.

It should be noted that the relative abundance is purely for reference as: 1. the same individual can pass the recorder multiple times; 2. the clustering method further divides recordings into different segments based on Artificial Intelligence, hence potentially inflating the number of records of each individual; 3. It is impossible to enumerate the number of recordings for each species for the entire cluster as there will be too much data to process; and 4. the method of targeting specific locations with high bat activity to set up the static recorders inherently introduces bias to the sample and thus reduces the quantitative accuracy of the results.

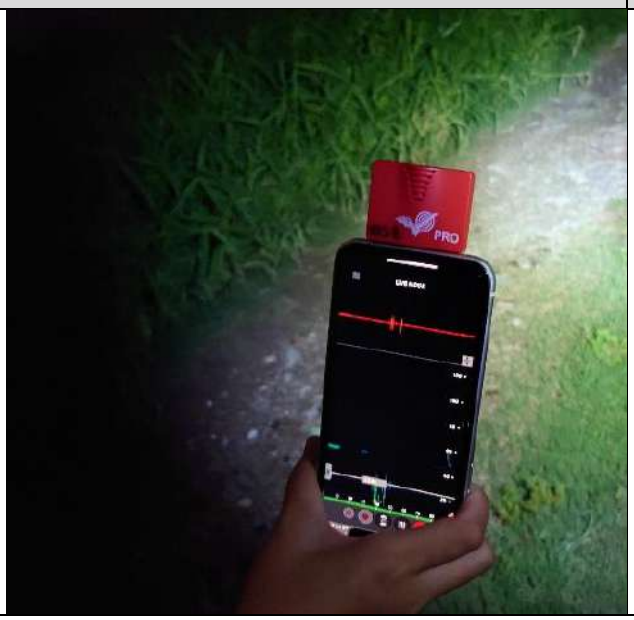
A side-by-side comparison of the results between handheld detectors and static detectors was made to investigate if there are any discrepancies in data, namely species diversity, between the two methods.

Ecological Profile of FGC for Bats

Any additional observations on bat behaviour during **re-entry surveys** for roost features and during the **transect surveys** (not limited to foraging spots, flightlines, usage of resources and activity time) will be recorded. The information will be used to supplement knowledge gaps on the ecological profile of FGC in the context of bats, and to identify important bat-related resources within FGC and its close proximity to aid impact assessment and design mitigation.

Spare static bat detectors were also placed strategically at different locations within SA1 to further establish the ecological profile of FGC.

Plate A1.1 Equipment Used for Study

Song Meter SM4BAT FS Ultrasonic Detector (Static Bat Detector) installed at the Clubhouse Transect	**Song Meter MINI BAT Ultrasonic Detector (Static Bat Detector) installed at the Sub-Area 1 Transect**
	
Echometer Touch 2 Pro (Handheld Bat Detector)	**Surveyor Using Borescope to Investigate Potential Roost Features on Trees**
	

APPENDIX 2

Bat Species Recorded in Transect Surveys and Static Detector Surveys and their Conservation Status

Table A2.1 *List of Bat Species Recorded in Transect Surveys (using Hand-held Detectors & Direct Observation)*

Scientific Name	Common Name	Conservation and Protection Status[1]	Local Distribution[2]
Cynopterus sphinx	Short-nosed Fruit Bat	RLCV(NT); Cap.170	Very widely distributed in urban and countryside areas throughout Hong Kong.
Rhinolophus sinicus	Chinese Horseshoe Bat	Cap.170	Widely distributed in countryside areas throughout Hong Kong.
Rhinolophus affinis	Intermediate Horseshoe Bat	(LC); Cap.170	Widely distributed in countryside areas throughout Hong Kong.
Rhinolophus pusillus	Least Horseshoe Bat	PRC (RC); Cap.170	Widely distributed in countryside areas throughout Hong Kong.
Hipposideros armiger	Himalayan Leaf-nosed Bat	(LC); Cap.170	Widely distributed in countryside areas throughout Hong Kong.
Myotis horsfieldii	Horsfield's Myotis	PRC (RC); Cap.170	Found in Shek Kong, Pak Tam Chung, Fung Yuen, Plover Cove, Pat Sin Leng and Shing Mun Country Parks.
Nyctalus plancyi	Chinese Noctule	PRC (RC); Cap.170	Fairly widely distributed in countryside areas throughout Hong Kong.
Pipistrellus abramus	Japanese Pipistrelle	Cap.170	Widely distributed throughout Hong Kong.
Pipistrellus tenuis	Least Pipistrelle	RLCV(NT); Cap.170	Ten-something records found in Nam Chung, Sheung Wo Hang, Lin Ma Hang, Plover Cove Country Park, Yuen Long, Shek Pik, Deep Water Bay, Ho Pui and Ho Chung.
Hypsugo pulveratus	Chinese Pipistrelle	(LC); RLCV(NT); Cap.170	Only several records in the countryside areas at Ting Kau, Ma On Shan and Lin Ma Hang, and several records of stray individuals inside buildings.
Tylonycteris pachypus	Lesser Bamboo Bat	(LC); Cap.170	Fairly widely distributed in countryside areas throughout Hong Kong.
Scotophilus kuhlii	Lesser Yellow Bat	(LC); Cap.170	Fairly widely distributed in countryside areas throughout Hong Kong.
Miniopterus magnater	Greater Bent-winged Bat	PRC (RC); RLCV(NT); Cap.170	Data deficient.
Miniopterus pusillus	Lesser Bent-winged Bat	(LC); RLCV(NT); Cap.170	Fairly widely distributed in countryside areas throughout Hong Kong.

Notes:

1. Conservation and Protection Status refers to IUCN (2023), Fellowes *et al.* (2002), Red List of China's Vertebrates (RLCV) (Jiang *et al.* 2016) and Cap. 170.
   a. Conservation status by Fellowes *et al.* (2002): LC = Local Concern, PRC = Potential Regional Concern, RC = Regional 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.
   b. Conservation status by Red List of China's Vertebrates (RLCV) (Jiang *et al.* 2016): NT= Near Threatened.
   c. Cap. 170 = Chapter 170. Wild Animals Protection Ordinance.
2. Local distribution follows Hong Kong Biodiversity Information Hub (AFCD 2023).

Table A2.2 *List of Bat Species Recorded in Static Detector Survey*

Scientific Name	Common Name	Conservation and Protection Status[1]	Local Distribution[2]
Rhinolophus sinicus	Chinese Horseshoe Bat	Cap.170	Widely distributed in countryside areas throughout Hong Kong.
Rhinolophus affinis	Intermediate Horseshoe Bat	(LC); Cap.170	Widely distributed in countryside areas throughout Hong Kong.
Rhinolophus pusillus	Least Horseshoe Bat	PRC (RC); Cap.170	Widely distributed in countryside areas throughout Hong Kong.
Hipposideros armiger	Himalayan Leaf-nosed Bat	(LC); Cap.170	Widely distributed in countryside areas throughout Hong Kong.
Myotis ricketti	Rickett's Big-footed Myotis	(LC); IUCN(VU); RLCV(NT); Cap.170	Fairly widely distributed in countryside areas throughout Hong Kong.
Myotis horsfieldii	Horsfield's Myotis	PRC (RC); Cap.170	Found in Shek Kong, Pak Tam Chung, Fung Yuen, Plover Cove, Pat Sin Leng and Shing Mun Country Parks.
Nyctalus plancyi	Chinese Noctule	PRC (RC); Cap.170	Fairly widely distributed in countryside areas throughout Hong Kong.
Pipistrellus abramus	Japanese Pipistrelle	Cap.170	Widely distributed throughout Hong Kong.
Pipistrellus tenuis	Least Pipistrelle	RLCV(NT); Cap.170	Ten-something records found in Nam Chung, Sheung Wo Hang, Lin Ma Hang, Plover Cove Country Park, Yuen Long, Shek Pik, Deep Water Bay, Ho Pui and Ho Chung.
Hypsugo pulveratus	Chinese Pipistrelle	(LC); RLCV(NT); Cap.170	Only several records in the countryside areas at Ting Kau, Ma On Shan and Lin Ma Hang, and several records of stray individuals inside buildings.
Tylonycteris pachypus	Lesser Bamboo Bat	(LC); Cap.170	Fairly widely distributed in countryside areas throughout Hong Kong.
Scotophilus kuhlii	Lesser Yellow Bat	(LC); Cap.170	Fairly widely distributed in countryside areas throughout Hong Kong.
Miniopterus magnater	Greater Bent-winged Bat	PRC (RC); RLCV(NT); Cap.170	Data deficient.
Miniopterus pusillus	Lesser Bent-winged Bat	(LC); RLCV(NT); Cap.170	Fairly widely distributed in countryside areas throughout Hong Kong.

Notes:

1. Conservation and Protection Status refers to IUCN (2023), Fellowes *et al.* (2002), Red List of China's Vertebrates (RLCV) (Jiang *et al.* 2016) and Cap. 170.
   a. Conservation status by IUCN (2023): VU = Vulnerable.
   b. Conservation status by Fellowes *et al.* (2002): LC = Local Concern, PRC = Potential Regional Concern, RC = Regional 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.
   c. Conservation status by Red List of China's Vertebrates (RLCV) (Jiang *et al.* 2016): NT= Near Threatened.
   Cap. 170 = Chapter 170. Wild Animals Protection Ordinance.
2. Local distribution follows Hong Kong Biodiversity Information Hub (AFCD 2023).

APPENDIX 3

Literature Review

Table A3.1 Comparison of Bat Species Recorded Across Different Sites of Hong Kong

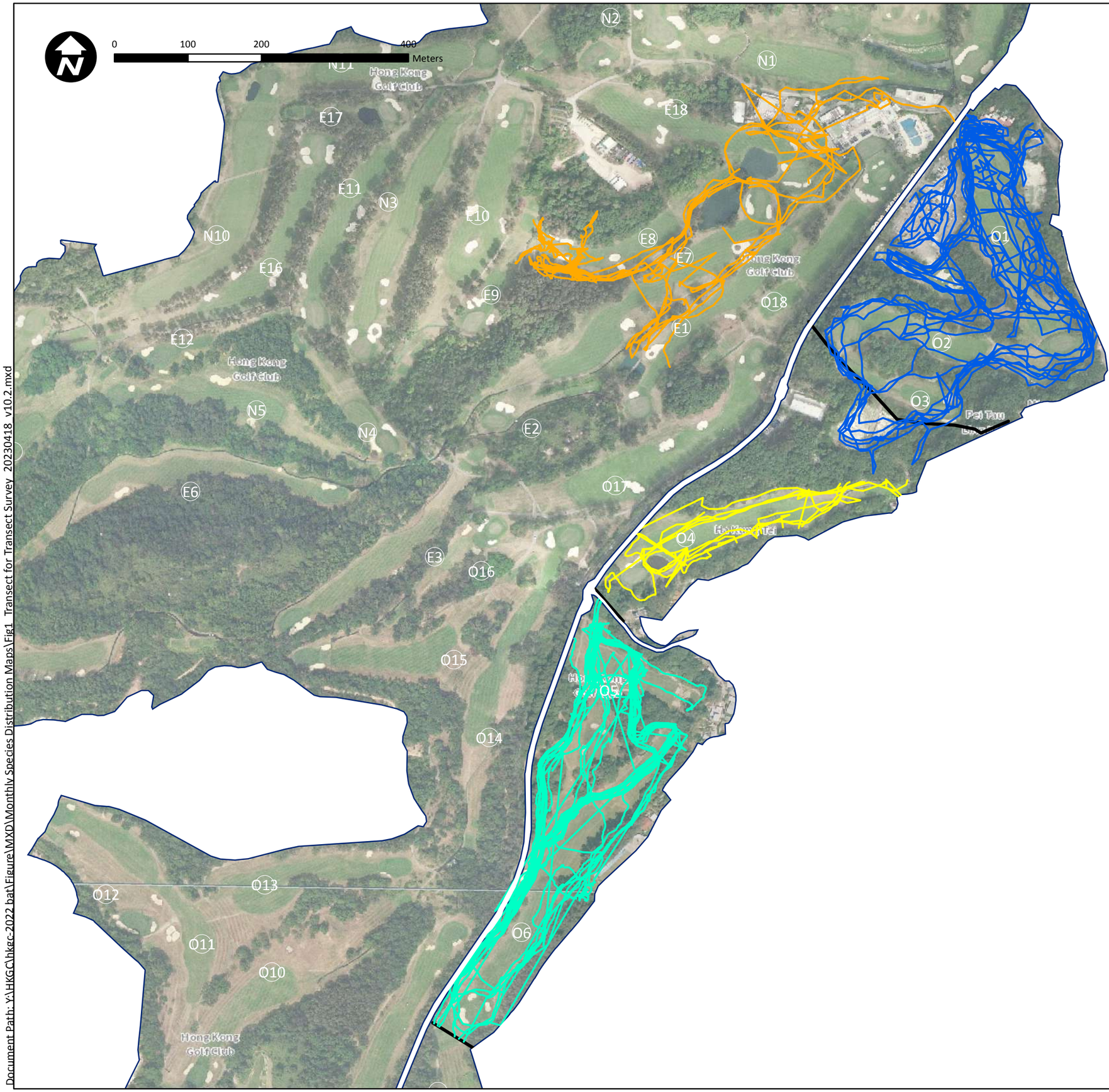
Species	Site	FGC	Kadoorie Farm & Botanic Garden	Mai Po Nature Reserve	Lin Ma Hang	Tai Wai Nullah	Lion Rock	Hong Kong Park	Po Hong Park	North District Park
	Site Type	Current Study	High Diversity Site			EIA Study Site		Urban Park		
	Data Source	aec internal data	Ades & Chan 2021[1]	EIA report[2]	Multiple[3] Sources	EIA report[2]		Tong (2016)[4]		
	Study Year	2015-2023	1995-2020 (?)	2015-2017	-	2020	2020-2022	2015-2016		
Leschenault's Rousette *Rousettus leschenaulti*				✓	✓					
Short-nosed Fruit Bat *Cynopterus sphinx*	✓	✓	✓	✓	✓					
Chinese Horseshoe Bat *Rhinolophus sinicus*	✓	✓	✓	✓	✓					
Intermediate Horseshoe Bat *Rhinolophus affinis*	✓	✓	✓	✓		✓				
Least Horseshoe Bat *Rhinolophus pusillus*	✓	✓	✓	✓	✓					
Himalayan Leaf-nosed Bat *Hipposideros armiger*	✓	✓	✓	✓		✓	✓			
Pomona Leaf-nosed Bat *Hipposideros pomona*		✓			✓					
Serotine *Eptesicus pachyomus*										
Chinese Myotis *Myotis chinensis*	✓	✓		✓						
Rickett's Big-footed Myotis *Myotis ricketti*	✓	✓		✓						
Horsfield's Myotis *Myotis horsfieldii*	✓		✓							
Whiskered Myotis *Myotis muricola*		✓								
Daubenton's Myotis *Myotis daubentonii*										
Fringed Long-footed Myotis *Myotis fimbriatus*										
Chinese Noctule *Nyctalus plancyi*	✓	✓	✓		✓	✓	✓			
Japanese Pipistrelle *Pipistrellus abramus*	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Least Pipistrelle *Pipistrellus tenuis*	✓	✓	✓	✓		✓	✓		✓	
Unidentified Pipistrelle *Pipistrellus sp.*										
Chinese Pipistrelle *Hypsugo pulveratus*	✓	✓	✓	✓	✓	✓	✓	✓	✓	
Lesser Bamboo Bat *Tylonycteris pachypus*	✓	✓	✓		✓	✓	✓	✓	✓	
Greater Bamboo Bat *Tylonycteris robustula*										
Lesser Yellow Bat *Scotophilus kuhlii*	✓	✓	✓				✓		✓	
Greater Bent-winged Bat *Miniopterus magnater*	✓		✓							
Common Bent-winged Bat *Miniopterus fuliginosu*			✓	✓						
Lesser Bent-winged Bat *Miniopterus pusillus*	✓	✓	✓	✓						
Bent-winged Bat sp. *Miniopterus sp.*[5]		✓								
Wrinkle-lipped Free-tailed Bat *Chaerephon plicatus*	✓									
Black-bearded Tomb Bat *Taphozous melanopogon*										

Species	Site	FGC	Kadoorie Farm & Botanic Garden	Mai Po Nature Reserve	Lin Ma Hang	Tai Wai Nullah	Lion Rock	Hong Kong Park	Po Hong Park	North District Park
	Site Type	Current Study	High Diversity Site			EIA Study Site		Urban Park		
	Data Source	aec internal data	Ades & Chan 2021[1]	EIA report[2]	Multiple[3] Sources	EIA report[2]		Tong (2016)[4]		
	Study Year	2015-2023	1995-2020 (?)	2015-2017	-	2020	2020-2022	2015-2016		
Total		17	17	16	14	8	7	7	3	5

Notes:

1. Ades, G. & Chan, B.P.L. (eds). 2021 Checklist of Selected Wildlife at Kadoorie Farm & Botanic Garden, Third Edition. Kadoorie Farm & Botanic Garde, Hong Kong, vi+36pp.
2. References of EIA reports in this comparison is as follows:
   a. SMEC. 2021. Mai Po Nature Reserve Infrastructure Upgrade Project – Environmental Impact Assessment Report.
   b. Drainage Services Department. 2023. Agreement No. CE54/2019(DS) Revitalisation of Tai Wai Nullah and Fo Tan Nullah – Investigation Revitalisation of Tai Wai Nullah - Environmental Impact Assessment Report
   c. Highways Department. 2022. Improvement of Lion Rock Tunnel – Investigation.
3. Sources include:
   a. Ades, G.W.J. 1994. A comparative ecological study of insectivorous bats (Hipposideridae, Vespertilionidae and Rhinolophidae) in Hong Kong, with special reference to dietary seasonality. Unpublished PhD thesis submitted to the University of Hong Kong.
   b. 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.
   c. AFCD. 2023. Hong Kong Biodiversity Information Hub. https://bih.gov.hk/en/species-database/index.html
   d. Shek, C.T. and Chan, C.S.M. 2005. Roost censuses of cave dwelling bats of Hong Kong. Hong Kong Biodiversity, 10, 1–8.
   e. Shek, C.T. and Chan, C.S.M. 2006. Mist net survey of bats with three new bat species records for Hong Kong. Hong Kong Biodiversity, 11, 1–7.
   f. Shek, C.T. 2006. A Field Guide to the Terrestrial Mammals of Hong Kong. Agriculture, Fisheries and Conservation Department, Friends of the Country Parks and Cosmos Books Ltd.
   g. Tam, T.W., Leung, Y.S., Chan, W.C., Yeung, S.W., Shek, C.T. & Wong, K.C. 2008. Discovering North New Territories. Friends of the Country Parks and Cosmos Books Ltd., Hong Kong.
4. Tong, CP. 2016. Distribution and preference of landscape features and foraging sites of insectivorous bats in Hong Kong urban parks (Thesis). The University of Hong Kong, Hong Kong.
5. Includes one *Miniopterus* sp, waiting confirmation from molecular study.

Figures



Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Transecct of Sub-Area 1

Transecct of Sub-Area 2

Transecct of Sub-Area 3

Transecct of Clubhouse

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Member of the Aurecon Group

Project Title:

Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023):
Bat Surveys

Figure Title:

Transect for Transect Surveys
Using Hand-held Detector

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Checked By:	NT	Date:	25 Apr 2023
Approved by:	DJS		
Figure Number:	Figure 1	Revision:	0

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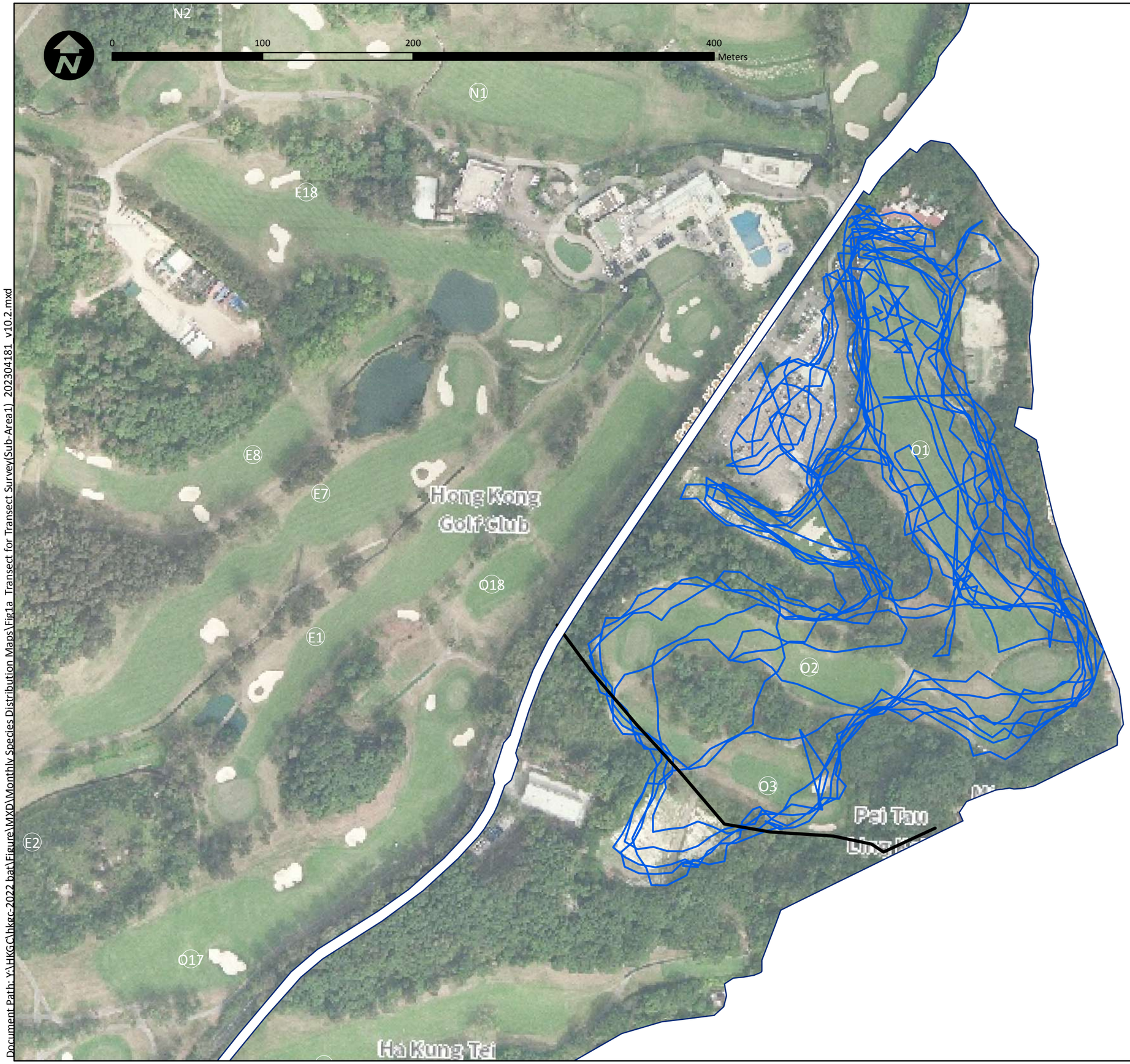

Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Survey Transect

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Bat Surveys

Figure Title:

Transect for Transect Surveys
Using Hand-held Detector
(Sub-Area 1)

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Checked By:	NT	Date:	25 Apr 2023
Approved by:	DJS		
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Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Survey Transect

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Project Title:

Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023):
Bat Surveys

Figure Title:

Transect for Transect Surveys
Using Hand-held Detector
(Sub-Area 2)

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Approved by:	DJS		
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Fanling Golf

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Survey Transect

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Project Title:

Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023):
Batl Surveys

Figure Title:

Transect for Transect Surveys
Using Hand-held Detector
(Sub-Area 3)

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Approved by:	DJS		
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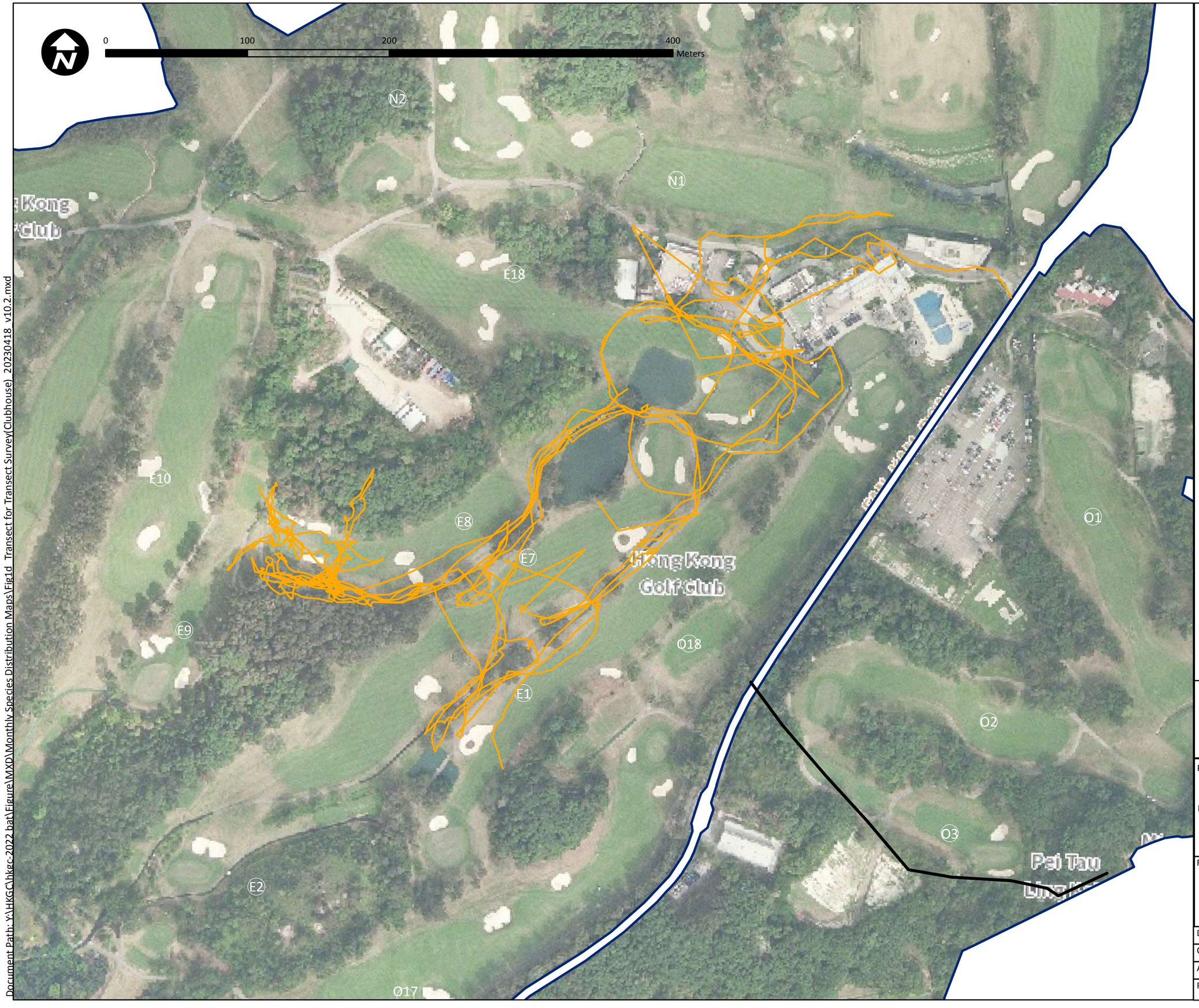

Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Survey Transect

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Project Title:

Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023):
Bat Surveys

Figure Title:

Transect for Transect Surveys
Using Hand-held Detector
(Clubhouse)

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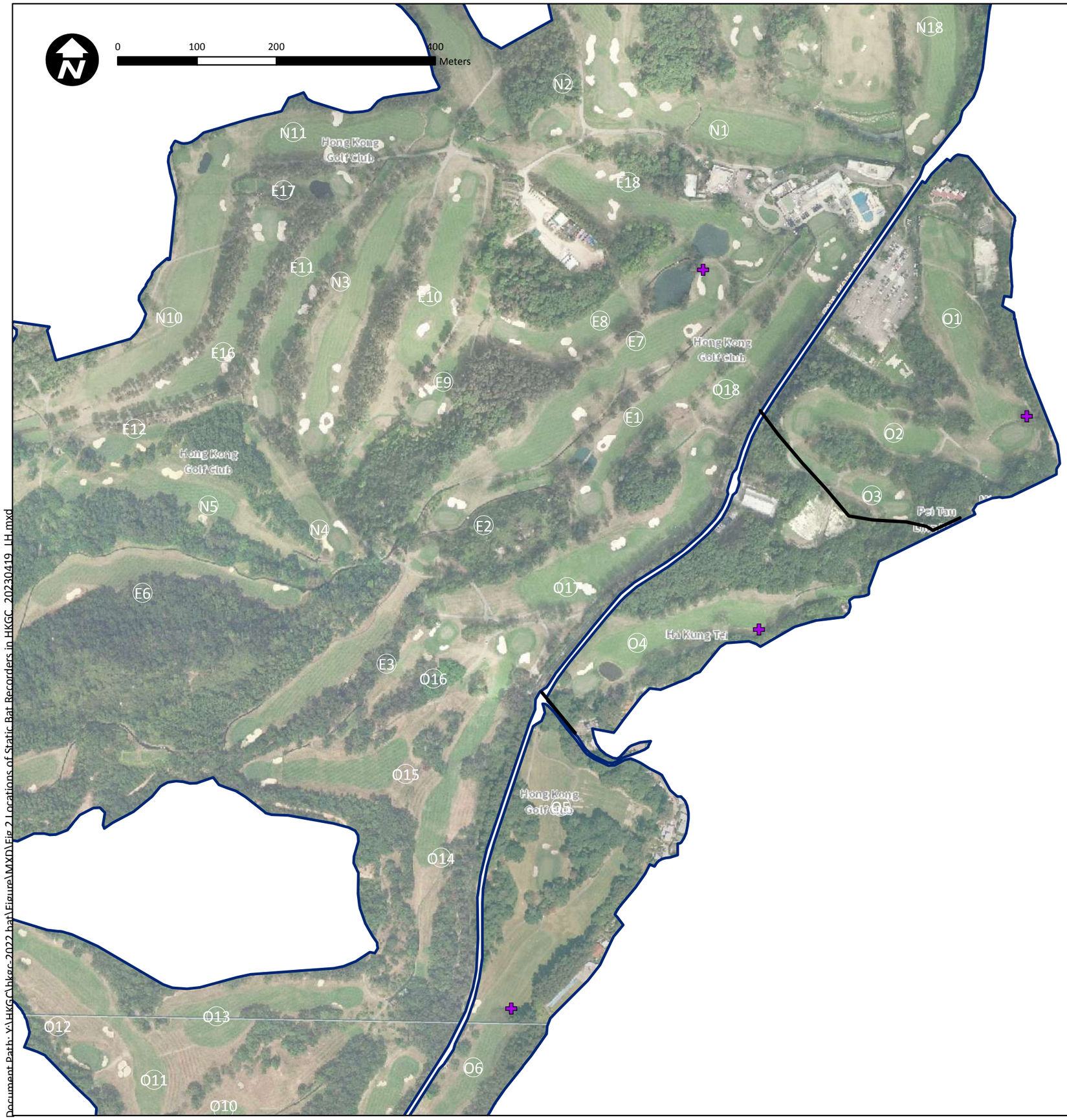

Fanling Golf Course

Hole Number

Bat Recorder Locations

Standard Detector Location

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Project Title:

Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023): Bat Surveys

Figure Title:

Locations of Static Bat Detectors

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Approved by:	DJS		
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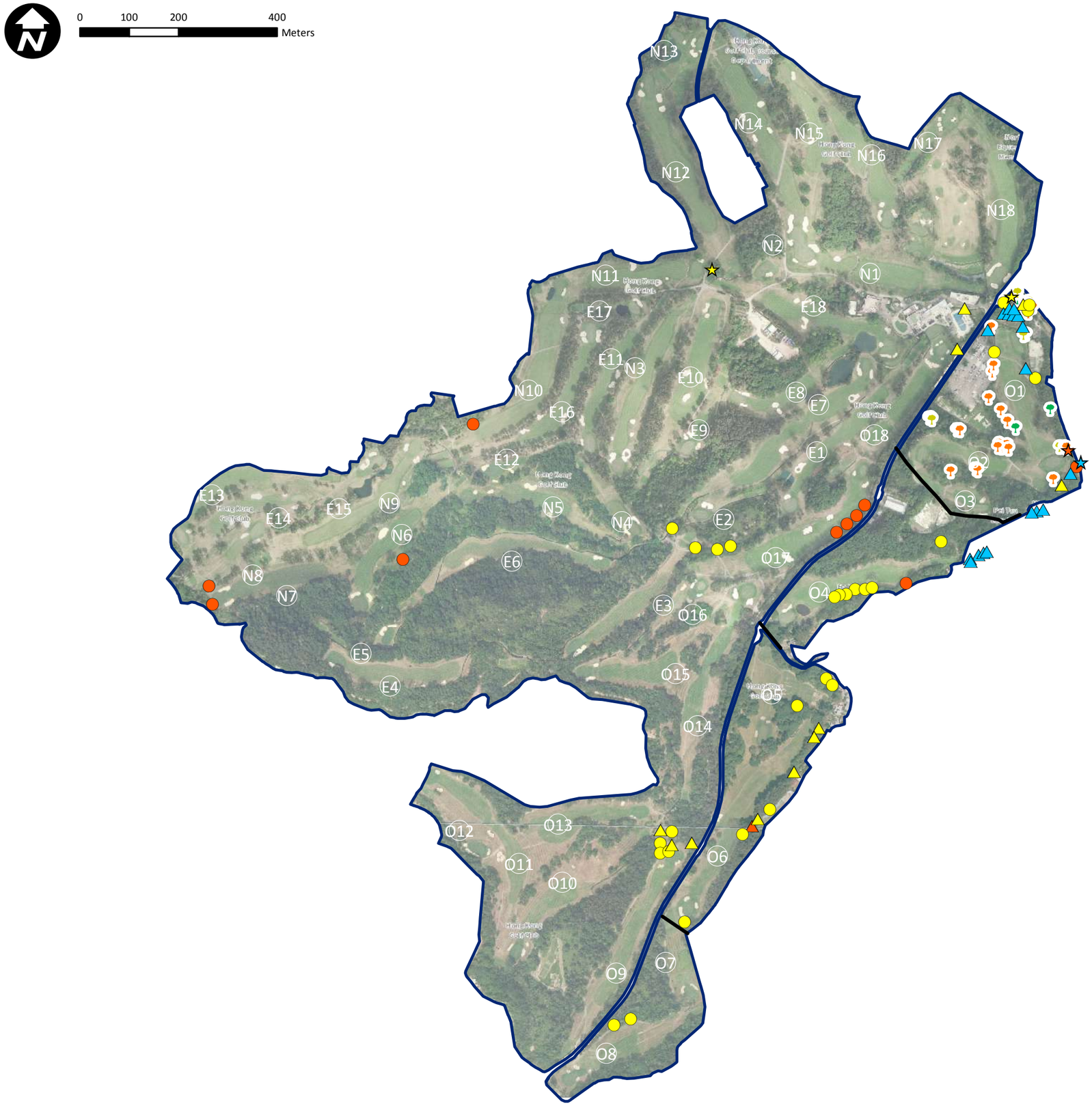

Fanling Golf Course

Hole Number

Building-related Roost Resources

- Building-related Feature with Bat Roost Potential
- Building-related Feature confirmed as Bat Roost

Tree Roost Resources

- Tree of Medium Low Roost Potential
- Tree of Medium Roost Potential
- Tree of High Roost Potential

Fan-Palm and Bamboo Roost Resources

- Bamboo Clump with no Roosting Opportunity
- Potential Bamboo Roost Resource
- Active Bamboo Roost
- Potential Fan-Palm Roost Resource
- Inactive Fan-Palm Tent Roost
- Active Fan-Palm Tent Roost

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Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023):
Batl Surveys

Figure Title:

All Bat Roost Resources in Fanling Golf Course

Drawn by:	LH		
Checked By:	NT	Date:	25 Apr 2023
Approved by:	DJS		
Figure Number:	Figure 3	Revision:	0

Document Path: Y:\HKGC\hkgc-2022 bat\Figure\MXD\Fig 3_All Bat Roost Resources in HKGC_20230419_LH.mxd

Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Building-related Roost Resources

- Building Outline
- Building-related Feature with Bat Roost Potential
- Building-related Feature confirmed as Bat Roost

Tree Roost Resources

- Tree of Medium Low Roost Potential
- Tree of Medium Roost Potential
- Tree of High Roost Potential

Fan-Palm and Bamboo Roost Resources

- Bamboo Clump with no Roosting Opportunity
- Potential Bamboo Roost Resource
- Active Bamboo Roost
- Potential Fan-Palm Roost Resource
- Inactive Fan-Palm Tent Roost
- Active Fan-Palm Tent Roost

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Project Title:

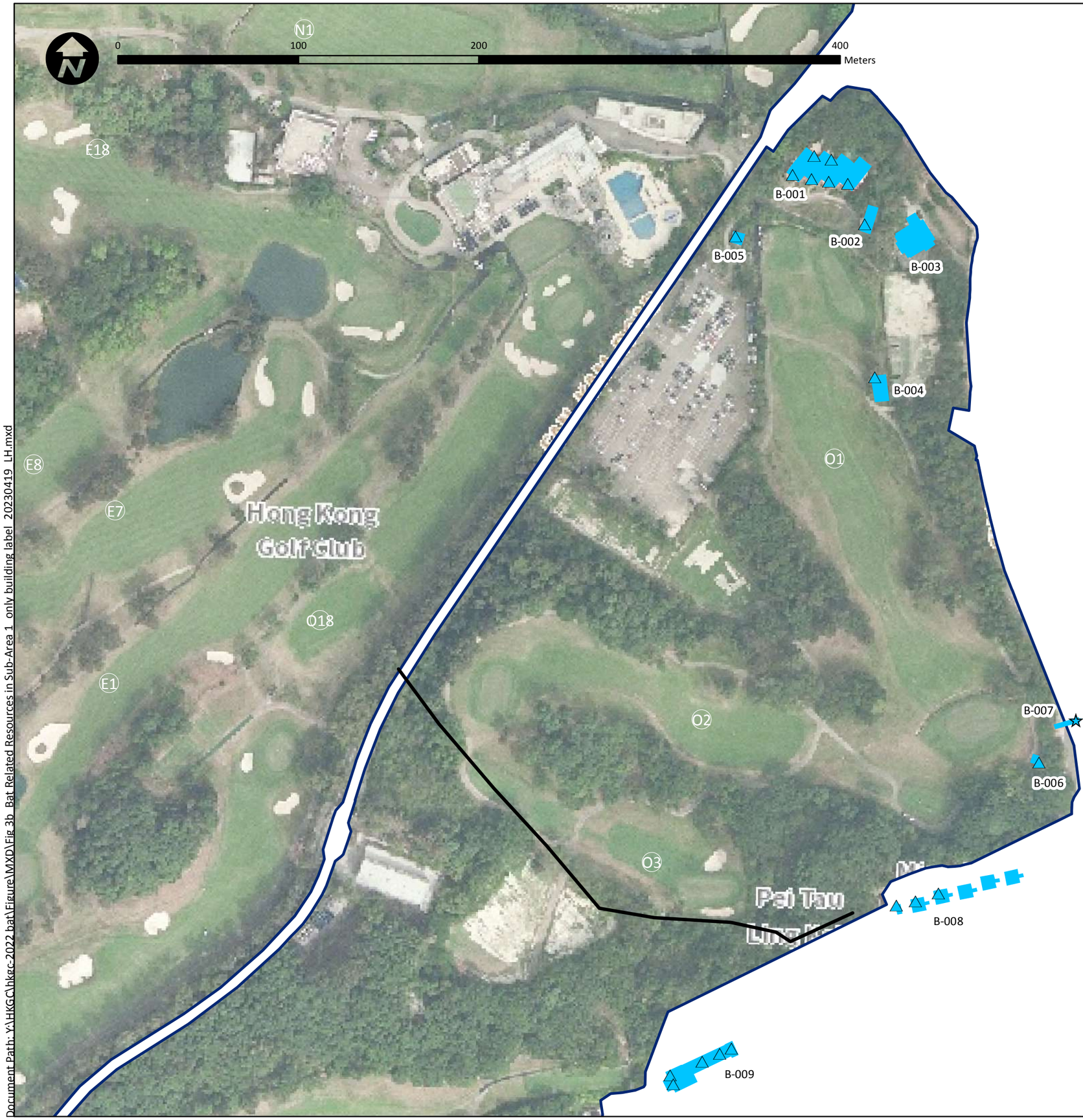
Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023):
Bat Surveys

Figure Title:

All Bat Roost Resources in Sub-Area 1

Drawn by:	LH		
Checked By:	NT	Date:	25 Apr 2023
Approved by:	DJS		
Figure Number:	Figure 3a	Revision:	0

Document Path: X:\HKGC\hkgc-2022 bat\Figure\MXD\Fig 3a_All Bat Roost Resources in Sub-Area 1_20230419_LH.mxd



Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Buildings-related Roost Resources

Building Outline

Building-related Feature with Bat Roost Potential

Building-related Feature confirmed as Bat Roost

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Project Title:

Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023):
Bat Surveys

Figure Title:

Building-based Roost Resources in Sub-Area 1

Drawn by:	LH		
Checked By:	NT	Date:	25 Apr 2023
Approved by:	DJS		
Figure Number:	Figure 3b	Revision:	0

Document Path: X:\HKGC\hkgc-2022 bat\Figure\MXD\Fig 3b_Bat Related Resources in Sub-Area 1_only building label_20230419_LH.mxd

Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Tree Roost Resources

- Tree of Medium Low Roost Potential
- Tree of Medium Roost Potential
- Tree of High Roost Potential

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Project Title:

Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023):
Bat Surveys

Figure Title:

Tree Roost Resources in Sub-Area 1

Drawn by:	LH		
Checked By:	NT	Date:	25 Apr 2023
Approved by:	DJS		
Figure Number:	Figure 3c	Revision:	0

Document Path: Y:\HKGC\hkgc-2022 bat\Figure\MXD\Fig 3c_Bat Related Resources in Sub-Area 1_only tree label_20230419_LH.mxd

Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Fan-Palm and Bamboo Roost Resources

- Bamboo Clump with no Roosting Opportunity
- Potential Bamboo Roost Resource
- Active Bamboo Roost
- Potential Fan-Palm Roost Resource
- Inactive Fan-Palm Tent Roost
- Active Fan-Palm Tent Roost

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Project Title:

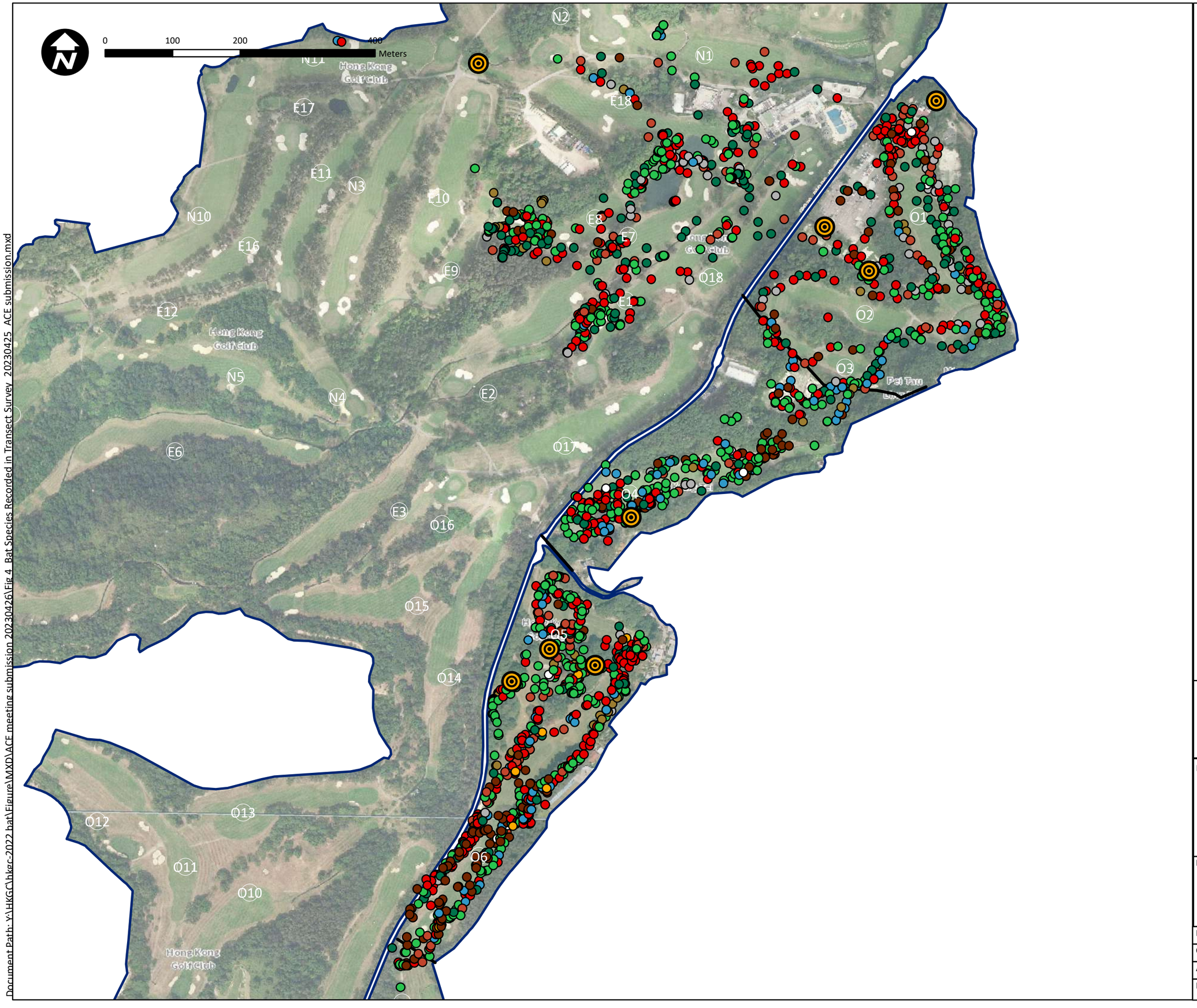
Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023): Bat Surveys

Figure Title:

Fan-Palm and Bamboo Roost Resources in Sub Area 1

Drawn by:	LH		
Checked By:	NT	Date:	25 Apr 2023
Approved by:	DJS		
Figure Number:	Figure 3d	Revision:	0

Document Path: X:\HKG\hkgrc-2022 bat\Figure\MXD\Fig 3d_Bat Related Resources in Sub-Area 1_only plant label_20230419_LH.mxd



Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Recorded Foraging Location of Short-nosed Fruit Bat

- *Rhinolophus sinicus*
- *Rhinolophus affinis*
- *Rhinolophus pusillus*
- *Hipposideros armiger*
- *Myotis horsfieldi*
- *Nyctalus plancyi*
- *Pipistrellus tenuis*
- *Pipistrellus abramus*
- *Hypsugo pulveratus*
- *Scotophilus kuhlii*
- *Tylonycteris pachypus*
- *Miniopterus magnater*
- *Miniopterus pusillus*

n.b. (1): Some recordings may not have corresponding GPS and thus the data point will not be marked on the map. Such is the case for *Myotis horsfieldii* which was recorded in September in Sub-Area 2, but did not have a corresponding GPS co-ordinate to be plotted.
n.b. (2): Short-nosed Fruit Bats were recorded by direct observation instead of hand-held detectors.

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Project Title:

Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023):
Bat Surveys

Figure Title:

Bat Species Recorded in Transect Survey
Using Hand-held Detector

Drawn by:	PC		
Checked By:	NT	Date:	25 Apr 2023
Approved by:	DJS		
Figure Number:	Figure 4	Revision:	0

Document Path: Y:\HKG\hkgc-2022 bat\Figure\MXD\ACE meeting submission 20230426\Fig 4_Bat Species Recorded in Transect Survey_20230425_ACE submission.mxd

Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Recorded Foraging Location of Short-nosed Fruit Bat

- *Rhinolophus sinicus*
- *Rhinolophus pusillus*
- *Rhinolophus affinis*
- *Hipposideros armiger*
- *Myotis horsfieldii*
- *Nyctalus plancyi*
- *Pipistrellus tenuis*
- *Pipistrellus abramus*
- *Hypsugo pulveratus*
- *Scotophilus kuhlii*
- *Tylonycteris pachypus*
- *Miniopterus magnater*
- *Miniopterus pusillus*

n.b. (1): Some recordings may not have corresponding GPS and thus the data point will not be marked on the map. Such is the case for *Myotis horsfieldii* which was recorded in September in Sub-Area 2, but did not have a corresponding GPS co-ordinate to be plotted.
n.b. (2): Short-nosed Fruit Bats were recorded by direct observation instead of hand-held detectors.

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Project Title:

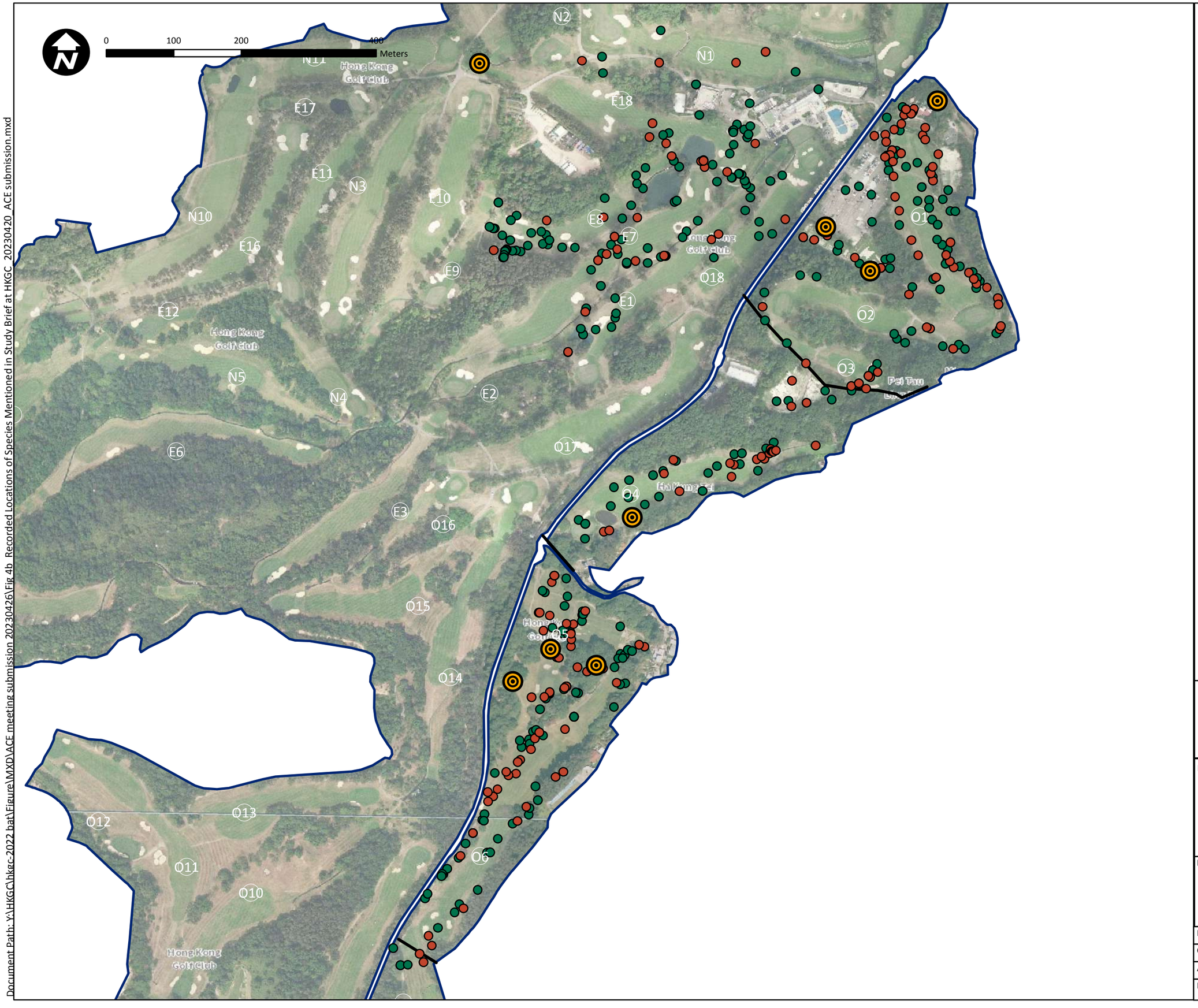
Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023): Bat Surveys

Figure Title:

Bat Species Recorded in Transect Survey Using Hand-held Detectors (Sub-Area1)

Drawn by:	PC		
Checked By:	NT	Date:	25 Apr 2023
Approved by:	DJS		
Figure Number:	Figure 4a	Revision:	0

Document Path: Y:\HKGC\hkgc-2022 bat\Figure\MXD\Monthly Species Distribution Maps\Fig4a_Bat Species Recorded in Transect Survey(Sub-Area1)_20230418_v10.2.mxd



Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Recorded Foraging Location of Short-nosed Fruit Bat

- *Scotophilus kuhlii*
- *Tylonycteris pachypus*

n.b. (1): Some recordings may not have corresponding GPS and thus the data point will not be marked on the map. Such is the case for *Myotis horsfieldii* which was recorded in September in Sub-Area 2, but did not have a corresponding GPS co-ordinate to be plotted.
n.b. (2): Short-nosed Fruit Bats were recorded by direct observation instead of hand-held detectors.

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Project Title:

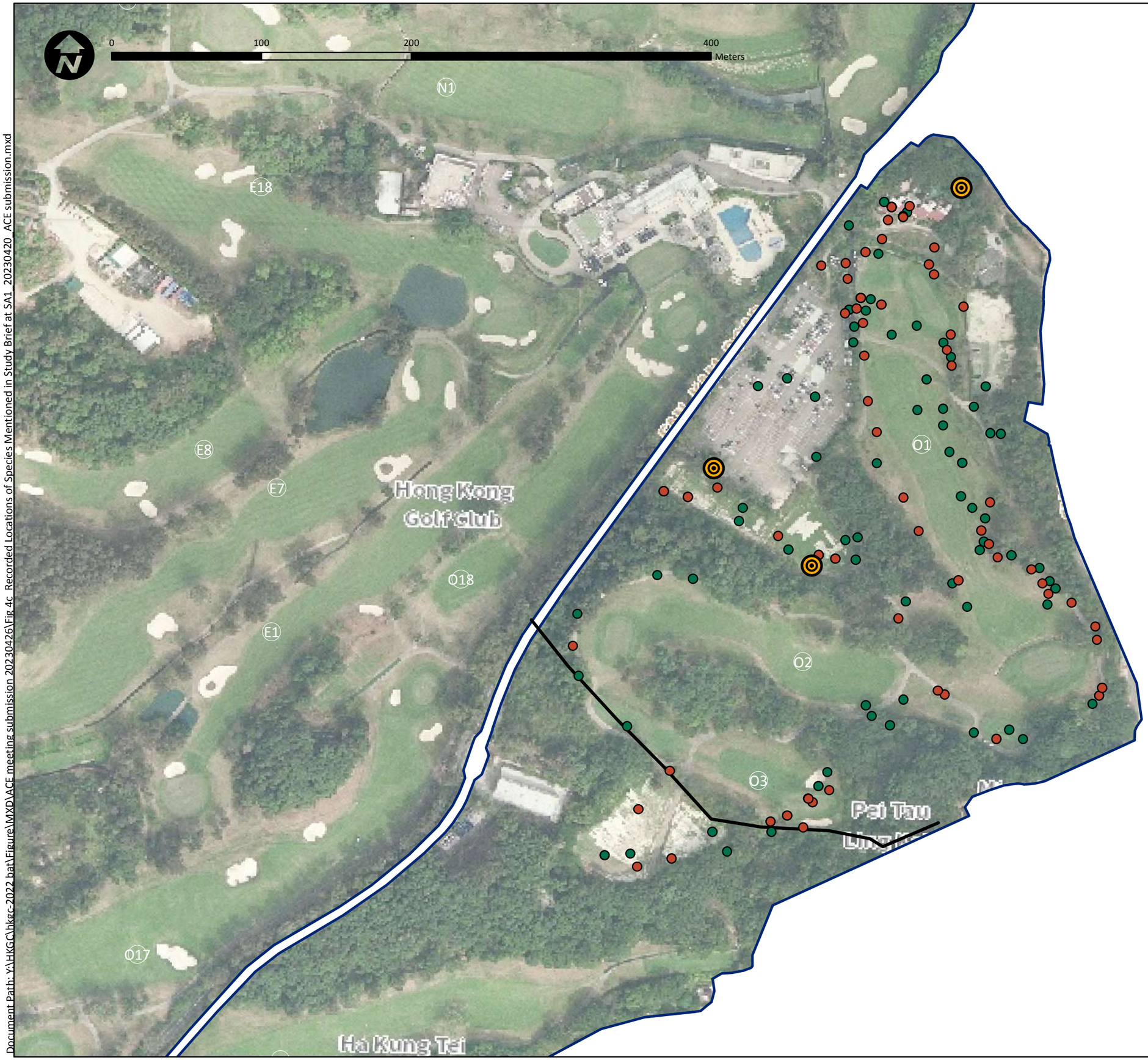
Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023):
Bat Surveys

Figure Title:

Recorded Locations of Species
Mentioned in Study Brief at Fanling Golf Course
Using Hand-held Detectors

Drawn by:	PC		
Checked By:	NT	Date:	25 Apr 2023
Approved by:	DJS		
Figure Number:	Figure 4b	Revision:	0

Document Path: Y:\HKGC\hkec-2022 bat\Figure\MXD\ACE meeting submission 20230426\Fig 4b_Recorded Locations of Species Mentioned in Study Brief at HKGC_20230420_ACE submission.mxd



Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Recorded Foraging Location of Short-nosed Fruit Bat

- *Scotophilus kuhlii*
- *Tylonycteris pachypus*

n.b. (1): Some recordings may not have corresponding GPS and thus the data point will not be marked on the map. Such is the case for *Myotis horsfieldii* which was recorded in September in Sub-Area 2, but did not have a corresponding GPS co-ordinate to be plotted.
n.b. (2): Short-nosed Fruit Bats were recorded by direct observation instead of hand-held detectors.

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Project Title:

Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023):
Bat Surveys

Figure Title:

Recorded Locations of Species
Mentioned in Study Brief at Sub-Area 1
Using Hand-held Detectors

Drawn by:	PC		
Checked By:	NT	Date:	25 Apr 2023
Approved by:	DJS		
Figure Number:	Figure 4c	Revision:	0

Document Path: Y:\HKGC\hkgc 2022 bat\Figure\MXD\ACE meeting submission 20230426\Fig 4c Recorded Locations of Species Mentioned in Study Brief at SA1_20230420_ACE submission.mxd

Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Recorded Foraging Location of Short-nosed Fruit Bat

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Project Title:

Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023): Bat Surveys

Figure Title:

Recorded Locations of Short-nosed Fruit Bat at Fanling Golf Course

Drawn by:	PC		
Checked By:	NT	Date:	25 Apr 2023
Approved by:	DJS		
Figure Number:	Figure 4d	Revision:	0

Document Path: Y:\HKGC\hkgc-2022 bat\Figure\MXD\ACE meeting submission 20230426\Fig 4d Recorded Locations of Short-nosed Fruit Bat of Fanling Golf Course 20230420 ACE submission.mxd

Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Tylonycteris pachypus

n.b. (1): Some recordings may not have corresponding GPS and thus the data point will not be marked on the map. Such is the case for *Myotis horsfieldii* which was recorded in September in Sub-Area 2, but did not have a corresponding GPS co-ordinate to be plotted.

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Project Title:

Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023):
Bat Surveys

Figure Title:

Recorded Locations of Lesser Bamboo Bat
at Fanling Golf Course
Using Hand-held Detectors

Drawn by:	PC		
Checked By:	NT	Date:	25 Apr 2023
Approved by:	DJS		
Figure Number:	Figure 4e		Revision: 0

Document Path: Y:\HKGC\hkec-2022 bat\Figure\MXD\ACE meeting submission 20230426\Fig 4e_Recorded Locations of Lesser Bamboo Bat of Fanling Golf Course_20230420_ACE submission.mxd

Fanling Golf Course

Hole Number ('N'= New Course, 'E'=Eden Course, 'O'=Old Course)

Scotophilus kuhlii

n.b. (1): Some recordings may not have corresponding GPS and thus the data point will not be marked on the map. Such is the case for *Myotis horsfieldii* which was recorded in September in Sub-Area 2, but did not have a corresponding GPS co-ordinate to be plotted.

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Project Title:

Fanling Golf Course –
Provision of Ecological Consultancy Services (2022 – 2023):
Bat Surveys

Figure Title:

Recorded Locations of Lesser Yellow Bat
at Fanling Golf Course
Using Hand-held Detector

Drawn by:	PC		
Checked By:	NT	Date:	25 Apr 2023
Approved by:	DJS		
Figure Number:	Figure 4f	Revision:	0

Document Path: Y:\HKGC\hkgc-2022 bat\Figure\MXD\ACE meeting submission 20230426\Fig 4f Recorded Locations of Lesser Yellow Bat of Fanling Golf Course_20230420_ACE submission.mxd