



**HONG KONG
GOLF CLUB**

Old•New•Eden
O.N.E. living heritage

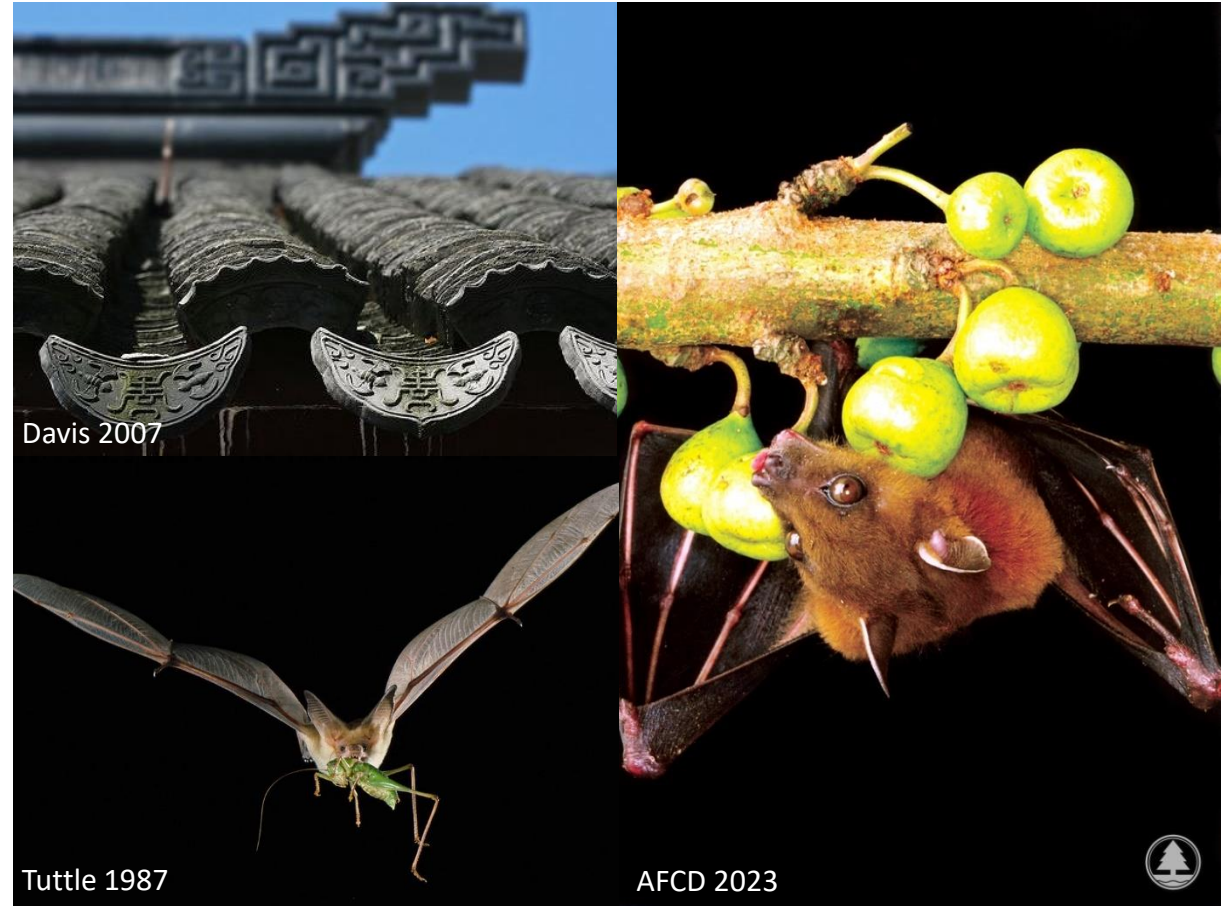
Representation in respect of The Draft Fanling/Sheung Shui Extension Area OZP No. S/FSSE/1

June 2023

Ecology - Bats

Benefits of Bats

- They are very much maligned & misunderstood
- Despite their secretive nature, bats are excellent ecological indicators because **they are sensitive to human-induced changes in climate and habitat quality**
- Tell us a lot about the state of the environment, as they are top predators of common nocturnal insects
- Sensitive to changes in land use practices
- Can eat up to 3000 mosquitos a night
- Fruit-bats help with pollination and seed dispersal
- Associated with good fortune in Chinese culture – 福



Threats to Bats

- Landscape change
- Development
- Agricultural intensification
- Habitat fragmentation
- Loss of ecological corridors
- Light Pollution



EIA Findings

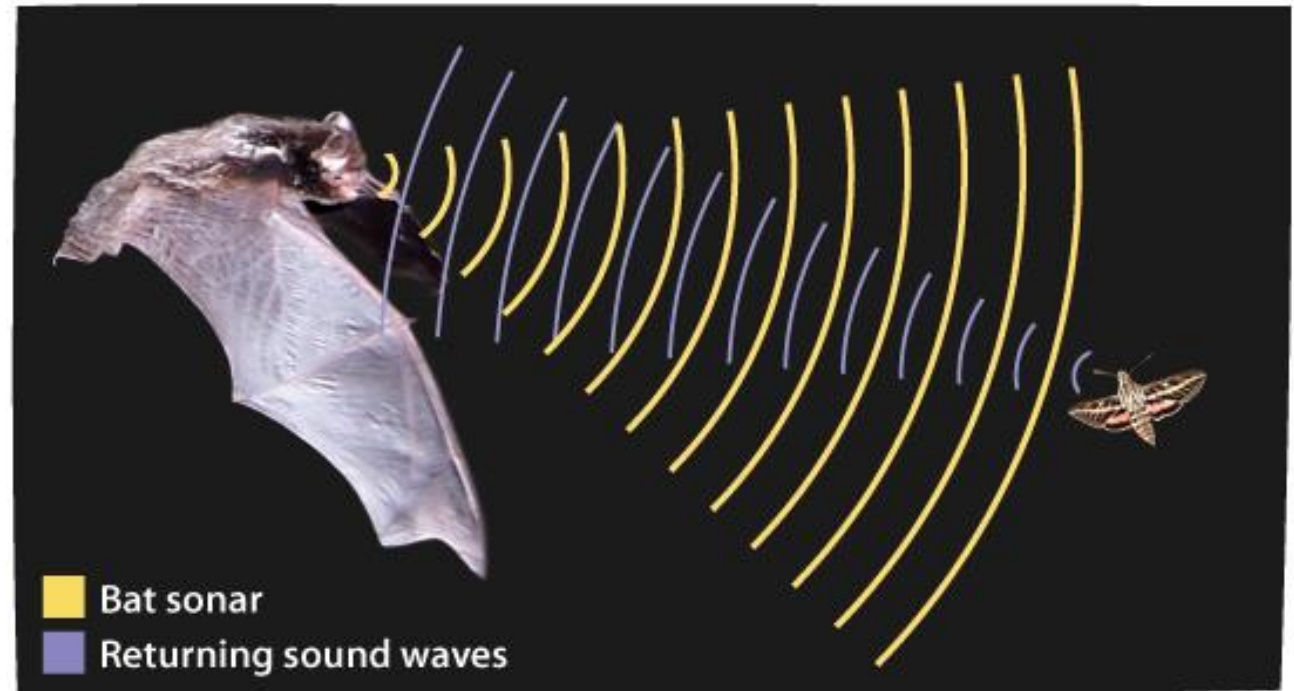
- EIA report found a single Species (Japanese Pipistrelle) in 'Scarce' Numbers
- 10 month study
- No roosts found
- Three species named in ESB:
 - Short-nosed Fruit Bat
 - Lesser Bamboo Bat
 - Lesser Yellow Bat
- None were elaborated on or investigated further
- Literature review not used in survey design nor assessments
- Surveys were restricted to the PDA



HKGC Data

- The mosaic of habitats at FGC is clearly important for bats
- 8 species of bat are listed from HKGC's PP Submissions
- *"A preliminary review suggests that there is a moderate to high number of insectivorous bat extensively using the fairways and greens of the Old Course and these are present in moderate to high number"*
- HKGC provided the DEP two further reports in June 2022 and May 2023 (i.e. HKGC's Statutory Submissions and HKGC's Further Information).
- These two reports provide details on totals of 16 and 17 bat species from the Project Site respectively.
- None of these data or findings have been used in the EIA Report or Additional Information, despite the extensive data provided on the 3 species explicitly mentioned in the SB
- Questions raised over HKGCs survey methodology for Bat data supplied in June 2022 (Static Detector)
- How can you find more bats than are actually there?!
- Given the obvious disparity between the findings of the EIA Report and HKGC's findings, 7-month study using handheld detectors in Sept 2022 – Mar 2023

- Bats echolocate to navigate in the dark through their environment and to hunt their prey
- Bat detectors take the ultrasonic calls of bats and converts them into low frequency audible sounds to humans



<https://askbiologist.asu.edu/echolocation>

HKGC Surveys

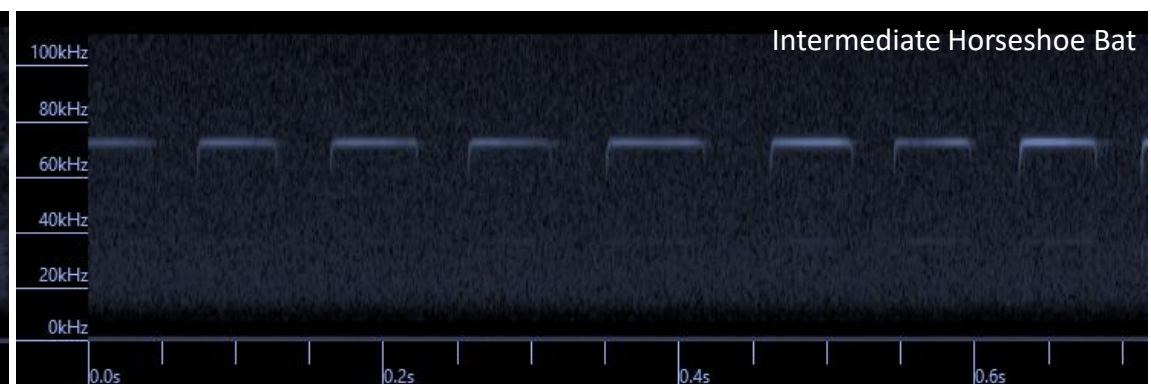
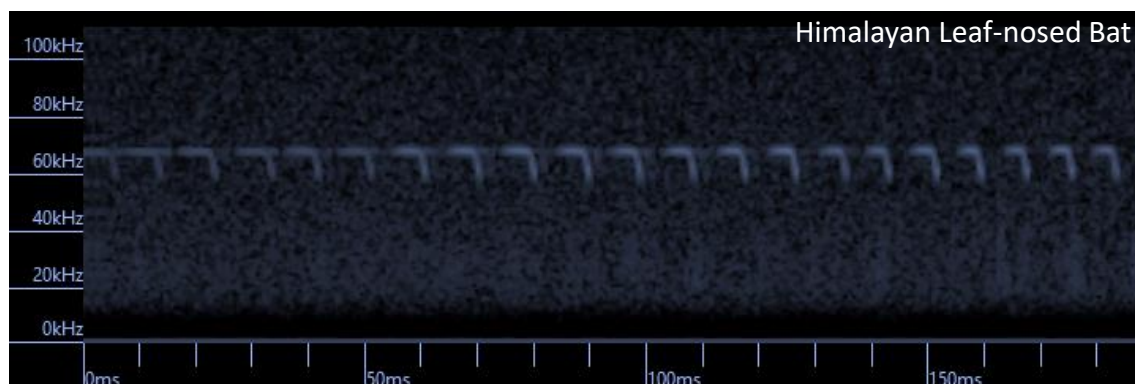
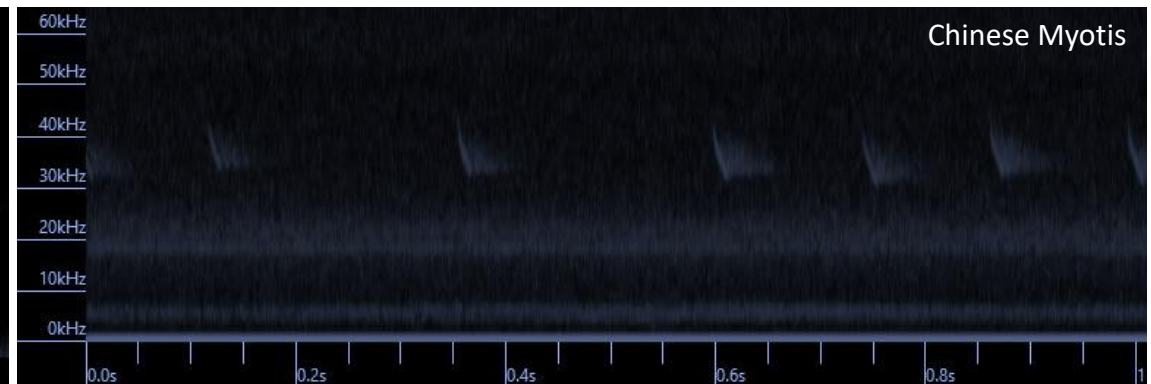
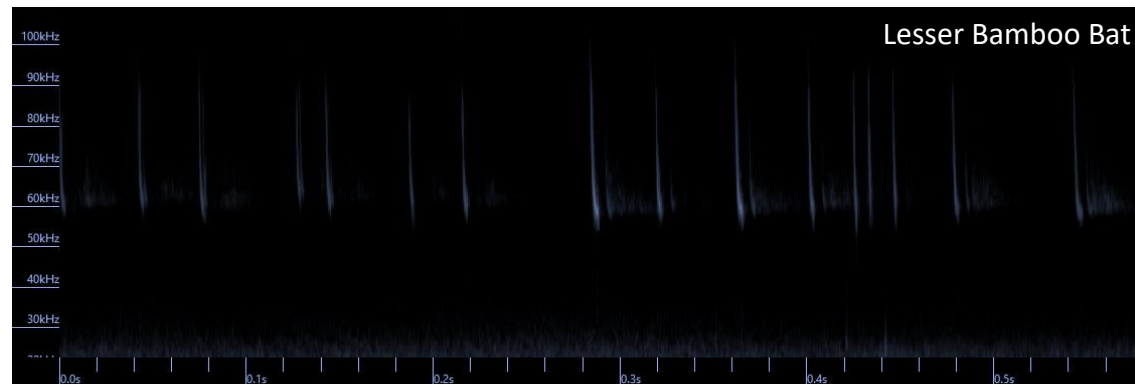
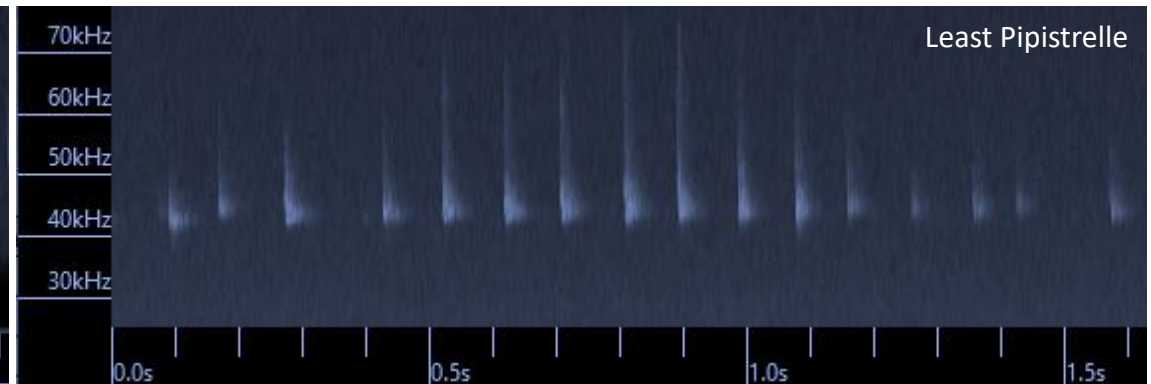
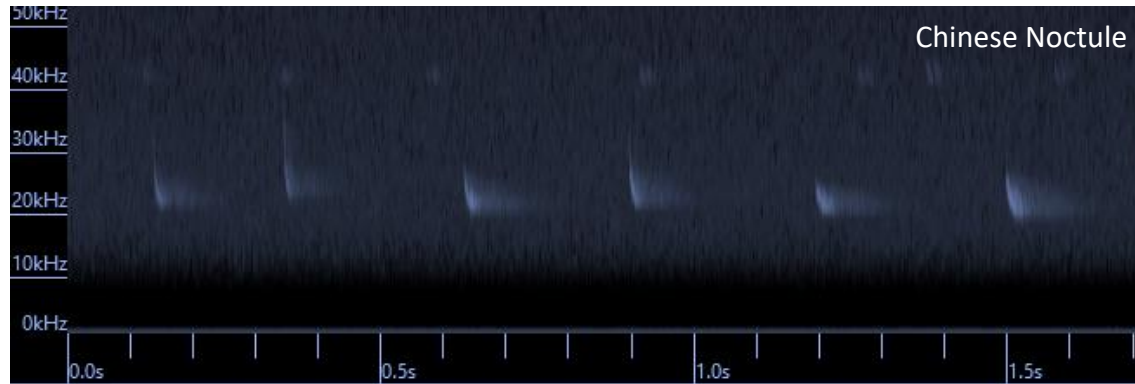
- Co-ordinated monthly surveys for 4 Areas
- 7-months Survey (Sept 2022 - Mar 2023)
- Start 15 min before sunset until an hour after sunset
- Peak time of bat activity
- Use handheld detectors on each transect
 - Wildlife Acoustics Echo Meter Touch 2 Pro Bat Detector (iOS and Android)
- Static Detectors in fixed location on each transect
 - Wildlife Acoustics Song Meter SM4BAT FS Ultrasonic Recorder
 - Wildlife Acoustics Song Meter SM4BAT ZC Ultrasonic Recorder
- Data extracted from corresponding time period
- Calls analysed using Kaleidoscope Analysis Software to permit, as far as possible, identification of species from call structure





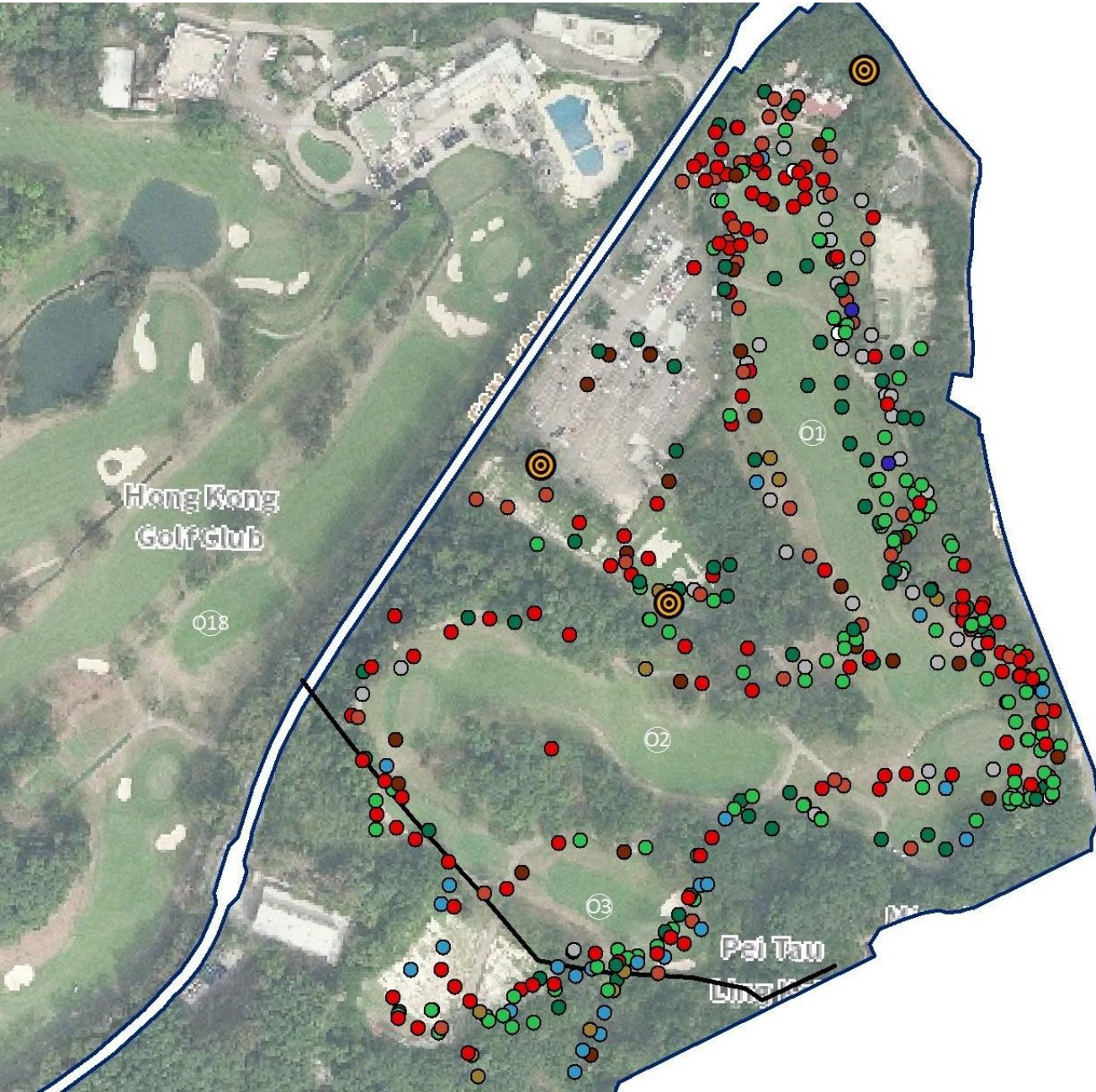


Surveys



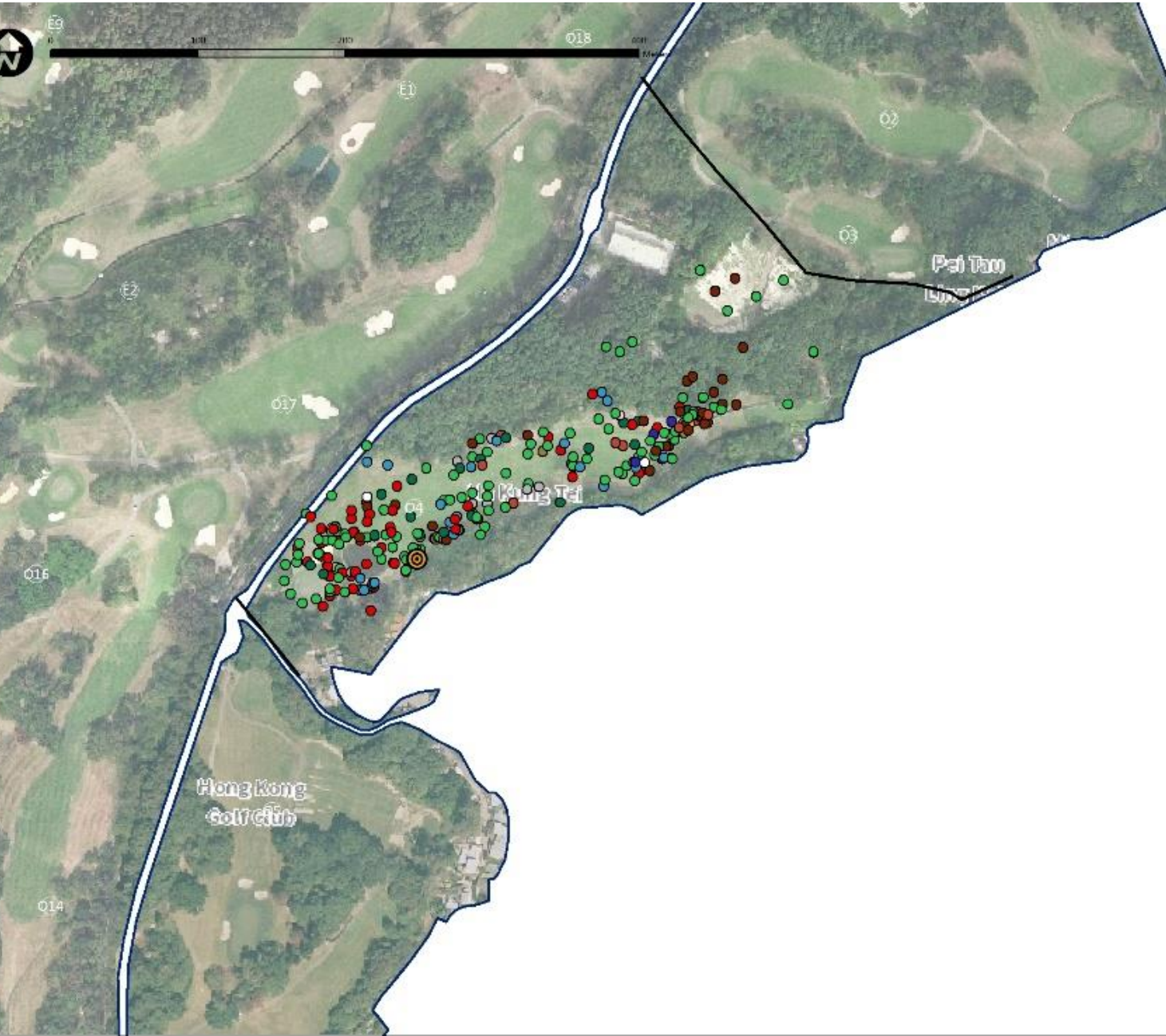
EIA Transect Surveys

- For EIA Study, Wildlife Acoustics EM3+ used
 - no details of how calls were identified, recorded or analysed
- This equipment is old with microphone discounted in 2012. No longer on general sale
- *The EM3+ was, sadly, a bit deaf, which is a major handicap for a sound recording device. (Martin Bailey, Wildlife & Countryside Services in litt.)*
- Claimed was used in NENT NDAs – but not the case
- Desktop review of FGC only in this EIA
- No bat survey transects outside of the PDA



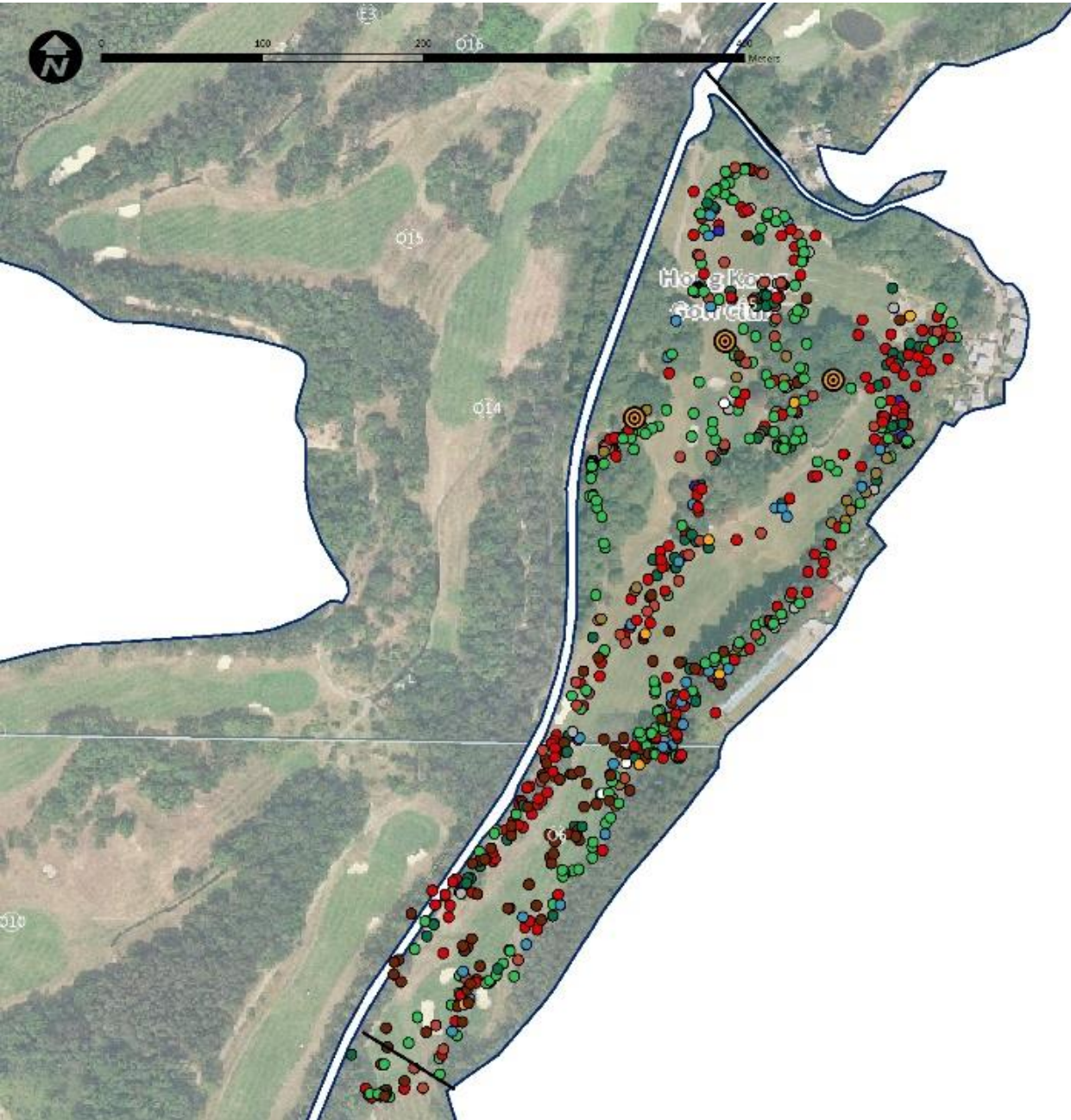
Sub-Area 1

- Sept 22 – Mar 23
- 12 species of bat recorded
- All 3 species mentioned in ESB were recorded
- 1 species recorded in EIA



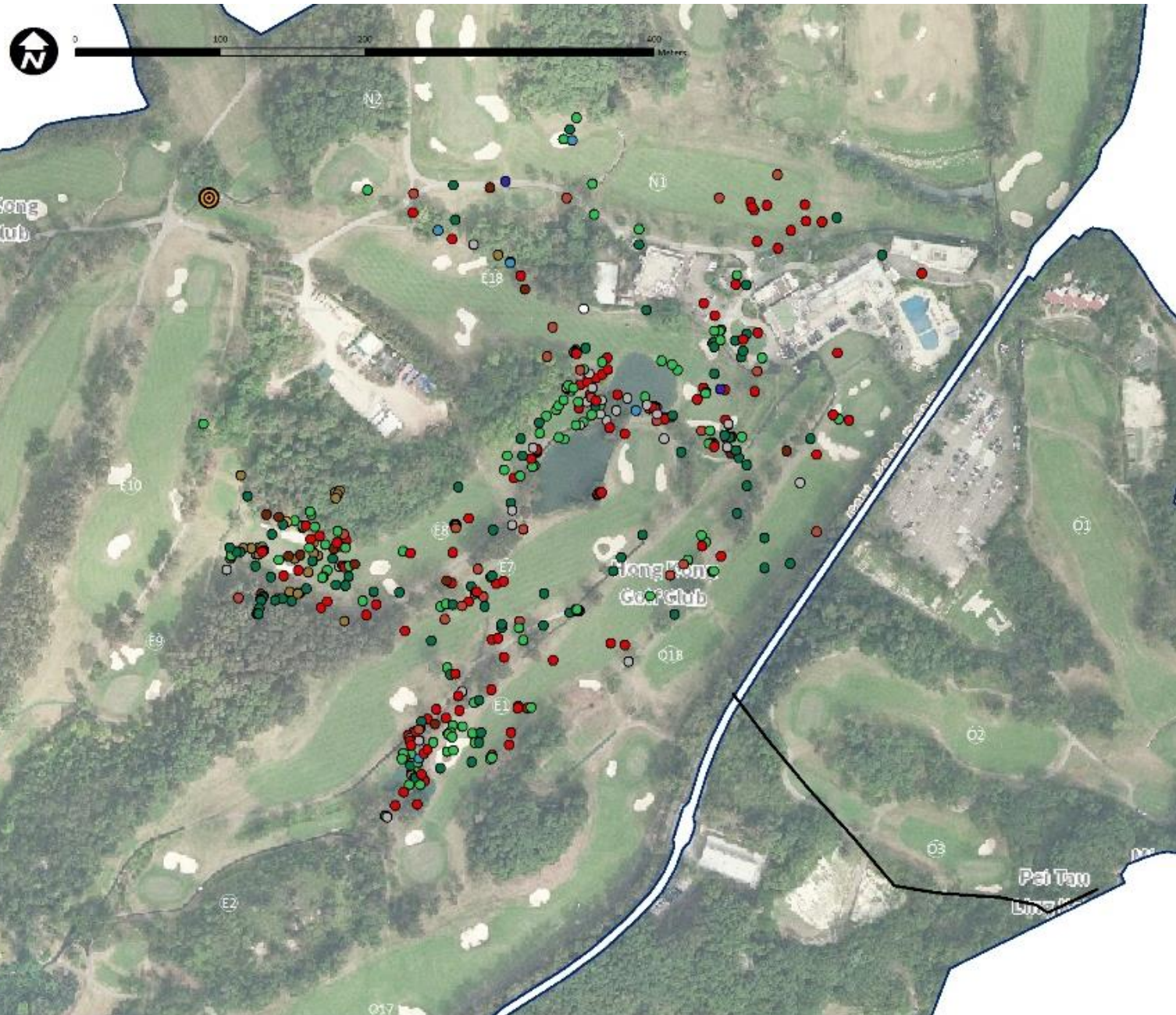
Sub-Area 2

- Sept 22 – Mar 23
- 14 species of bat recorded
- All 3 species mentioned in ESB were recorded
- None recorded in EIA



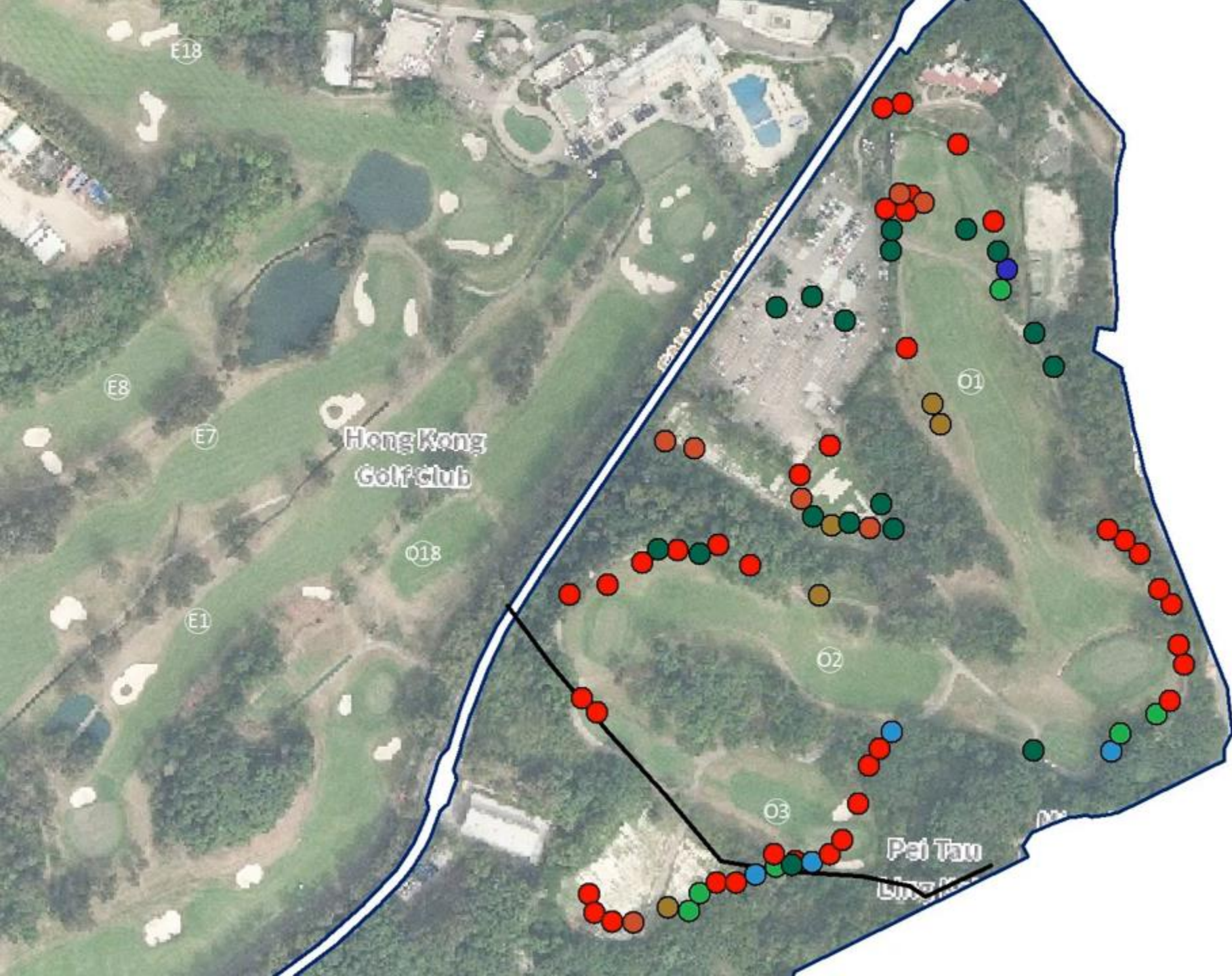
Sub-Area 3

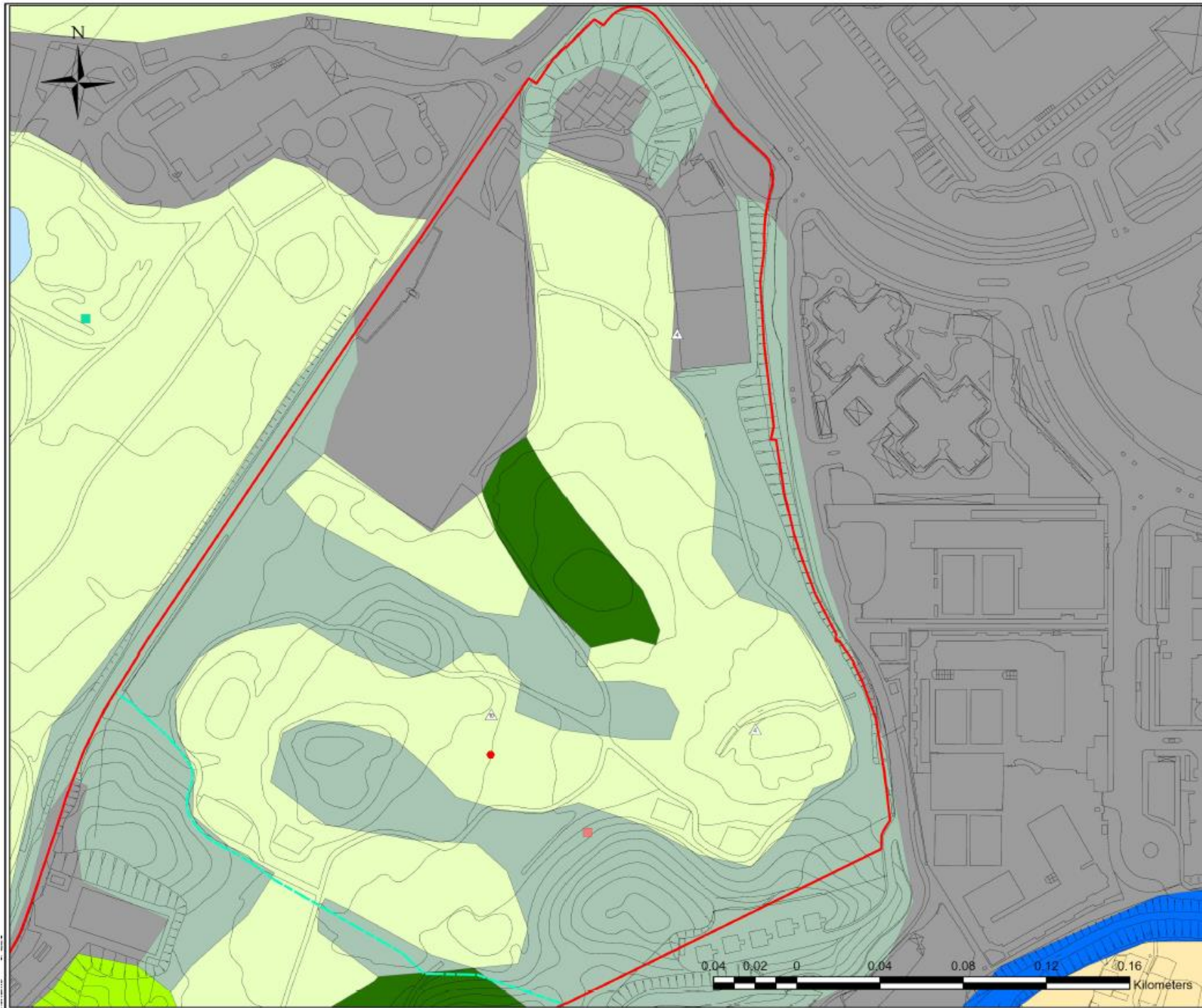
- Sept 22 – Mar 23
- 12 species of bat recorded
- All 3 species mentioned in ESB were recorded
- None recorded in EIA



Club House

- Sept 22 – Mar 23
- 11 species of bat recorded
- All 3 species mentioned in ESB were recorded
- Area not covered in EIA





- Project Site
- Assessment Area
- Zone Boundary
- Active Agricultural Land
- Developed Area
- Mixed Woodland
- Plantation
- Pond
- Turfgrass
- Watercourse
- Woodland
- △ Chinese Pond Heron
- △ Crested Serpent Eagle
- Japanese Pipistrelle
- Common Rat Snake
- Scarlet Basker

Rev.	Description	By	Date
Consultants			
Project Title			
AGREEMENT NO. CE17/2019 (CE) TECHNICAL STUDY ON PARTIAL DEVELOPMENT OF FAN LING GOLF COURSE SITE - FEASIBILITY STUDY			
Drawing Title			
Figure 9.5a Habitat Map and Locations of Fauna Species of Conservation Importance (Zoom-in to Project Site Zone 1)			
Drawing no.		Rev.	
Drawn CH LEE	Date	Checked	Approved CH
Scale		Status	



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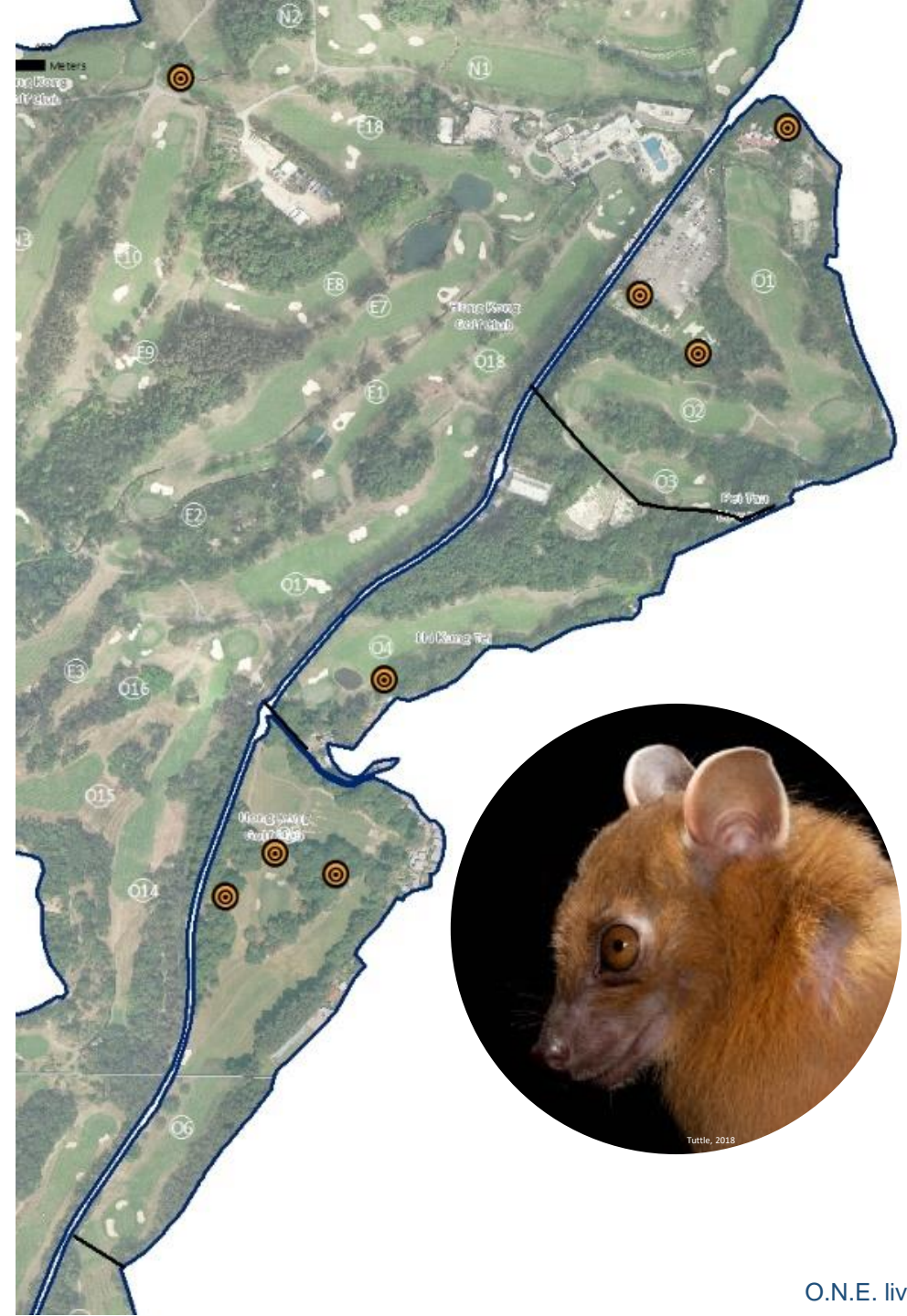
土木工程拓展署
 CIVIL ENGINEERING AND DEVELOPMENT
 DEPARTMENT
 北約克處
 NORTH DEVELOPMENT OFFICE



Short-nosed Fruit Bat

Cynopterus sphinx

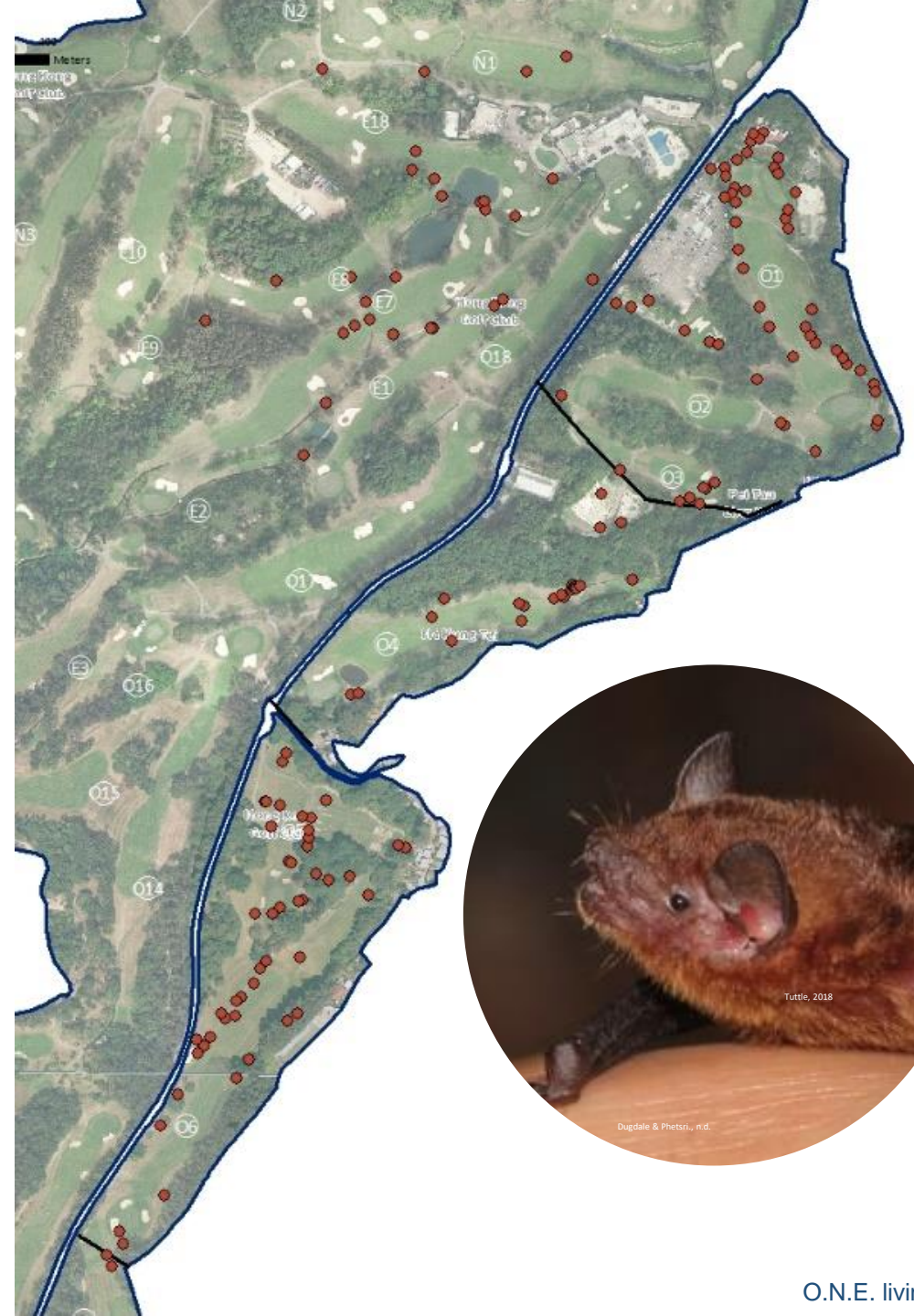
- Does not echolocate
- Active at dusk and throughout the night, it feeds on fruit and nectar
- Common & widespread in Hong Kong and can be found in both rural areas and urban areas (Shek 2006)
- Builds shelters by chewing the veins of the fronds of Fan-palms which collapse to form 'tent-roosts'
- Recorded monthly feeding on *Ficus* in SA1





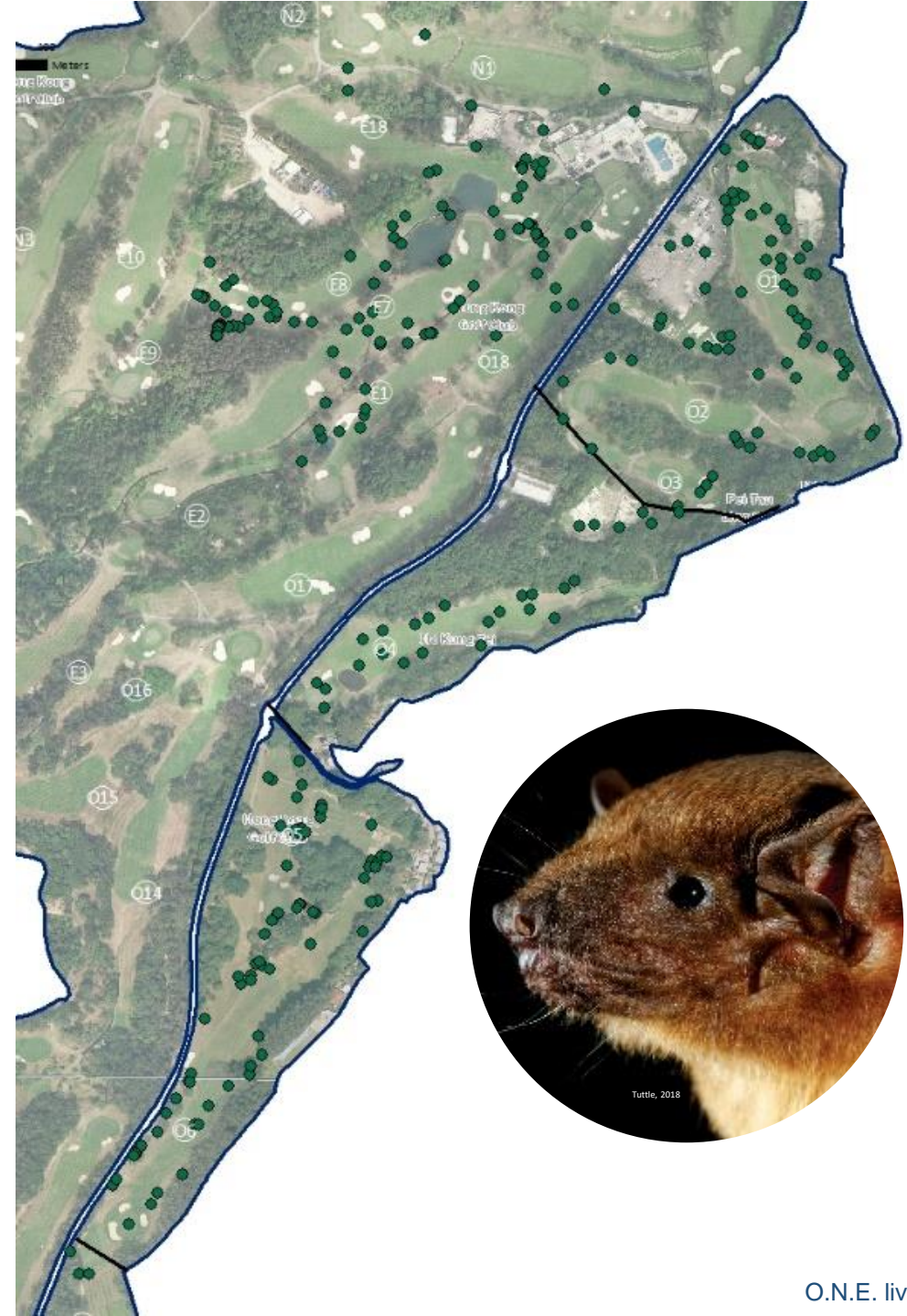
Lesser Bamboo Bat *Tylonycteris pachypus*

- One of the smallest bats in the world.
- Insectivorous
- Roosts in the internodes of bamboo stems.
- 2 bouts of activity c. 30minutes, right after dusk and just before dawn, with an intervening period of night roosting at diurnal roosts (Zhang *et al.* 2015)
- A distinct 'edge' species, with an ability to forage in complex habitat (Jones & Zhang 2023)
- Wider distribution in Hong Kong than previously recognised, though generally occurs in low abundance where documented (Tong 2016)



Lesser Yellow Bat *Scotophilus kuhlii*

- An aerial insectivore eats beetles, termites, moths and other flying insects
- Roosts in buildings and trees
- Forages early in the evening and is one of the first to emerge (Smith & Xie 2008)
- Fairly widely distributed throughout Hong Kong (Shek 2006)





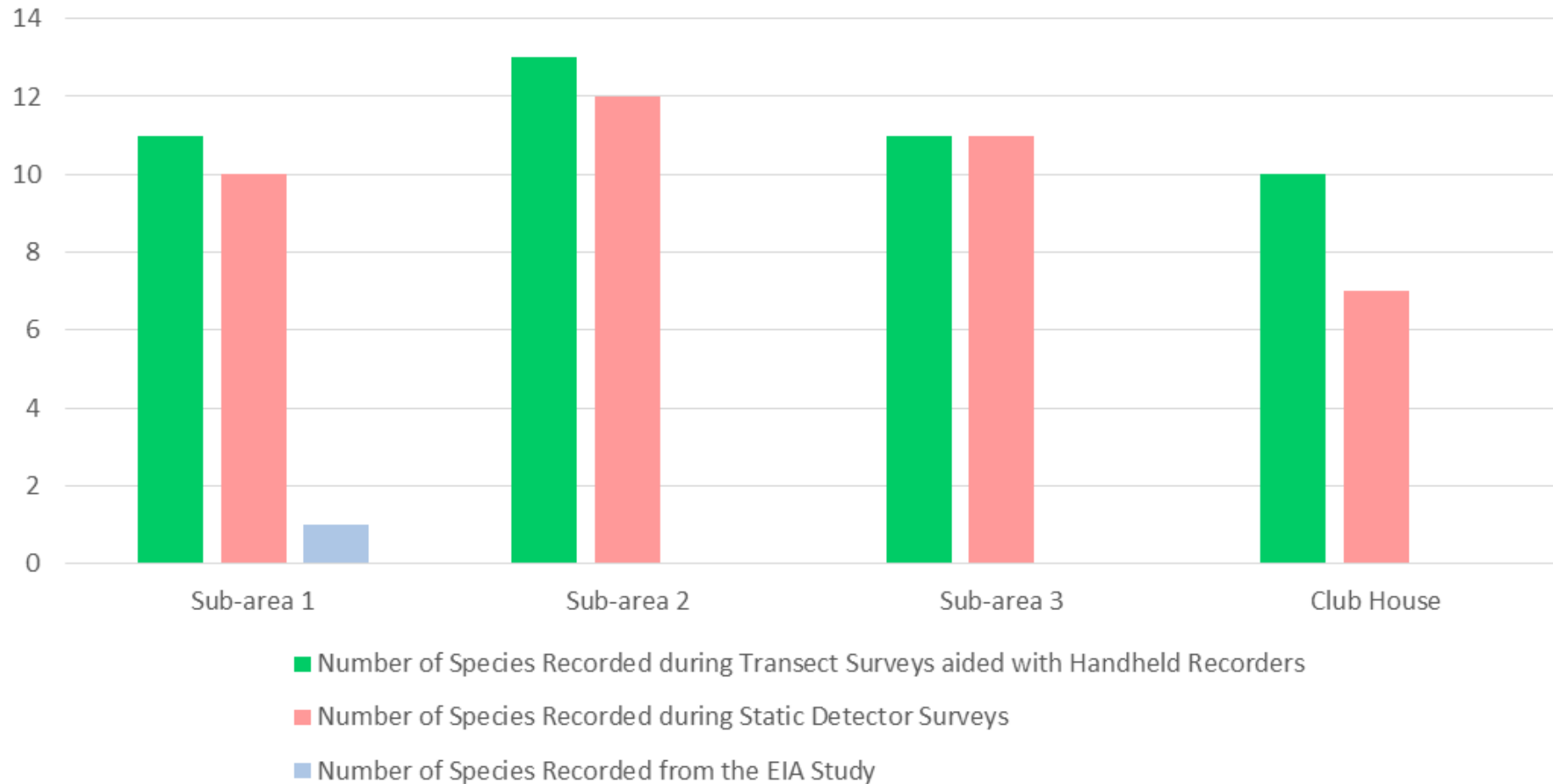
Comparison of Methodologies

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

Species	Species Recorded		
	Transect Surveys with Hand-held Bat Detectors	Static Detector Surveys	EIA Study
Short-nosed Fruit Bat	✓	n/a	
Chinese Horseshoe Bat	✓	✓	
Intermediate Horseshoe Bat	✓	✓	
Least Horseshoe Bat	✓	✓	
Himalayan Leaf-nosed Bat	✓	✓	
Rickett's Big-footed Myotis		✓	
Horsfield's Myotis	✓	✓	
Chinese Noctule	✓	✓	
Japanese Pipistrelle	✓	✓	✓
Least Pipistrelle	✓	✓	
Chinese Pipistrelle	✓	✓	
Lesser Bamboo Bat	✓	✓	
Lesser Yellow Bat	✓	✓	
Greater Bent-winged Bat	✓	✓	
Lesser Bent-winged Bat	✓	✓	
	14	14	1

Comparison of Methodologies

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



Bat Roosts



0 100 200 400 Meters

- Common misconception is of '000s of individuals clustered together in caves
- Roosts tend to be species specific but can vary between summer and winter, and between sexes
- Individuals & colonies will use large number of roosts

Suitable roost locations within SA1 :

- Built structures
- Trees
- Bamboos
- Chinese Fan-palms
- Bat Boxes

Built Structure Roost Resources

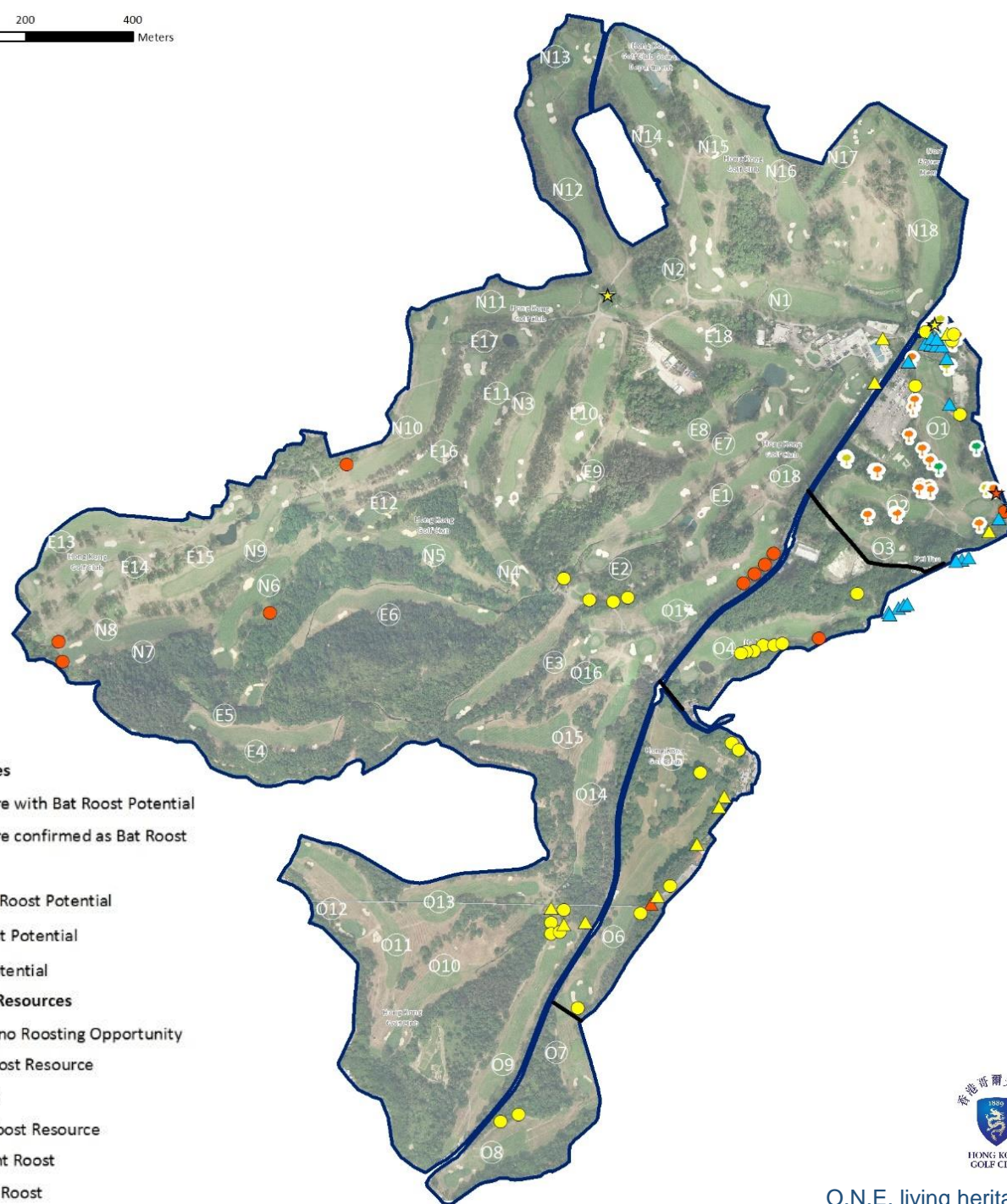
- ▲ Built Structure Feature with Bat Roost Potential
- ★ Built Structure Feature confirmed as Bat Roost

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

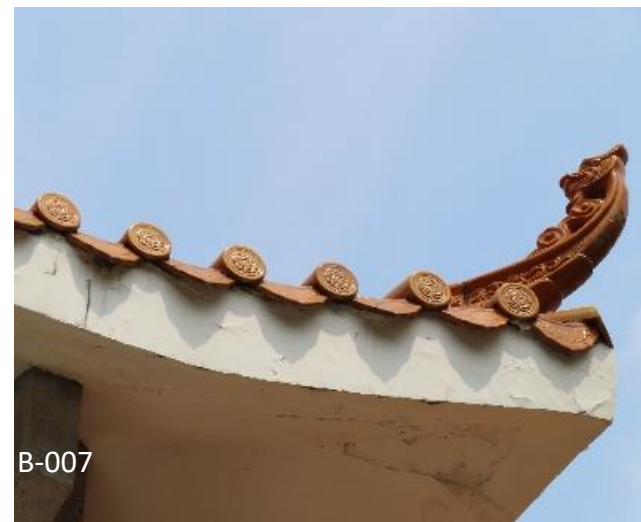






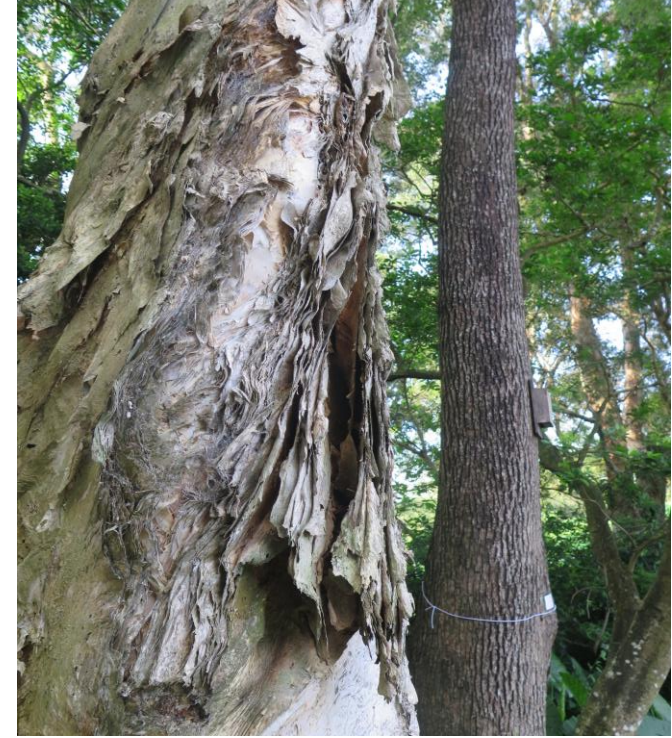


- Built Structure Roost Resources**
- Building Outline
 - Built Structure Feature with Bat Roost Potential
 - Built Structure Feature confirmed as Bat Roost









Bat Roosts



Tree Roost Resources

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



Potential Roost Features - Trees

- 1192 Woody trees in LVIA report
- 233 had defects
- **Surveyed 228 to assess for roost potential**
- **37 with PRFs** that require further investigation

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

Bat Roosts



Tent Roost – Chinese Fan-Palms

- 8 Chinese Fan-palm stands in SA1
- **3 showing evidence of old Tent roosts.**
- **An active roost of 6 Short-nosed Fruit Bats** was in the gardens of the residential houses
- None found in EIA



Bamboo Bat Roosts

- Two bamboo clumps are present in SA1
- A single **Lesser Bamboo Bat** was recorded **roosting** close to Hole #1
- None found in EIA







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Tent Roosts & Bamboo Roosts



Bat Roosts



Artificial Bat Boxes



Bat Roosts

Roost Type in SA1	EIA Findings	HKGC Findings
Built Structures	0	1 Location (Several Roosts)
Trees	0	37 with PRFs
Bamboos	0	1 active roost
Chinese Fan-Palms	0	4 - with 1 active roost
Bat Boxes	0	12

- 12 roost locations for four species and multiple potential roosting opportunities
- Whilst the two surveys did not overlap temporally, the differences reflect the 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.

Bat Roosts

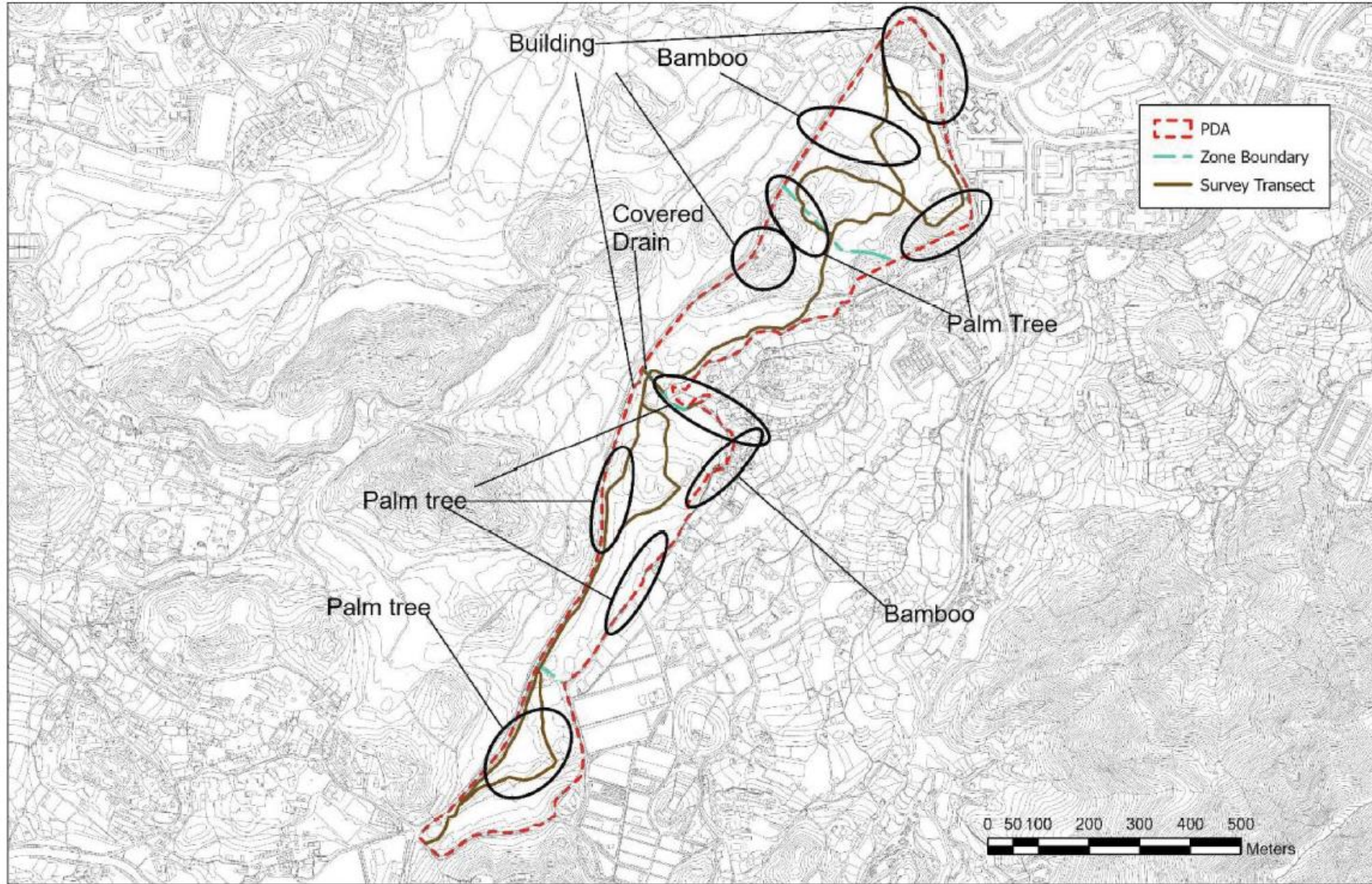


Figure 4A – Bat survey location under the EIA Report (woodlands covered by the survey transects were also actively searched)

Fanling Golf Course Bat List

Species		Conservation and Protection Status	FGC	O1-O8	SA1
Common Name	Scientific Name				
Short-nosed Fruit Bat	<i>Cynopterus sphinx</i>	RLCV(NT); Cap.170	Y	Y	Y
Chinese Horseshoe Bat	<i>Rhinolophus sinicus</i>	Cap.170	Y	Y	Y
Intermediate Horseshoe Bat	<i>Rhinolophus affinis</i>	(LC); Cap.170	Y	Y	Y
Least Horseshoe Bat	<i>Rhinolophus pusillus</i>	PRC (RC); Cap.170	Y	Y	Y
Himalayan Leaf-nosed Bat	<i>Hipposideros armiger</i>	(LC); Cap.170	Y	Y	Y
Chinese Myotis	<i>Myotis chinensis</i>	(LC); RLCV(NT); Cap.170	Y		
Horsfield's Myotis	<i>Myotis horsfieldii</i>	PRC (RC); Cap.170	Y	Y	
Rickett's Big-footed Myotis	<i>Myotis ricketti</i>	(LC); IUCN(VU); Cap.170	Y	Y	
Chinese Noctule	<i>Nyctalus plancyi</i>	PRC (RC); Cap.170	Y	Y	Y
Japanese Pipistrelle	<i>Pipistrellus abramus</i>	Cap.170	Y	Y	Y
Least Pipistrelle	<i>Pipistrellus tenuis</i>	RLCV(NT); Cap.170	Y	Y	Y
Chinese Pipistrelle	<i>Hypsugo pulveratus</i>	(LC); RLCV(NT); Cap.170	Y	Y	Y
Lesser Bamboo Bat	<i>Tylonycteris pachypus</i>	(LC); Cap.170	Y	Y	Y
Lesser Yellow Bat	<i>Scotophilus kuhlii</i>	(LC); Cap.170	Y	Y	Y
Greater Bent-winged Bat	<i>Miniopterus magnater</i>	PRC (RC); RLCV(NT); Cap.170	Y	Y	Y
Lesser Bent-winged Bat	<i>Miniopterus pusillus</i>	(LC); RLCV(NT); Cap.170	Y	Y	Y
Wrinkle-lipped Free-tailed Bat	<i>Chaerephon plicatus</i>	Cap. 170	Y	Y	
Total number of species recorded			17	16	13
Total number of species with conservation importance			17	16	13

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).

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

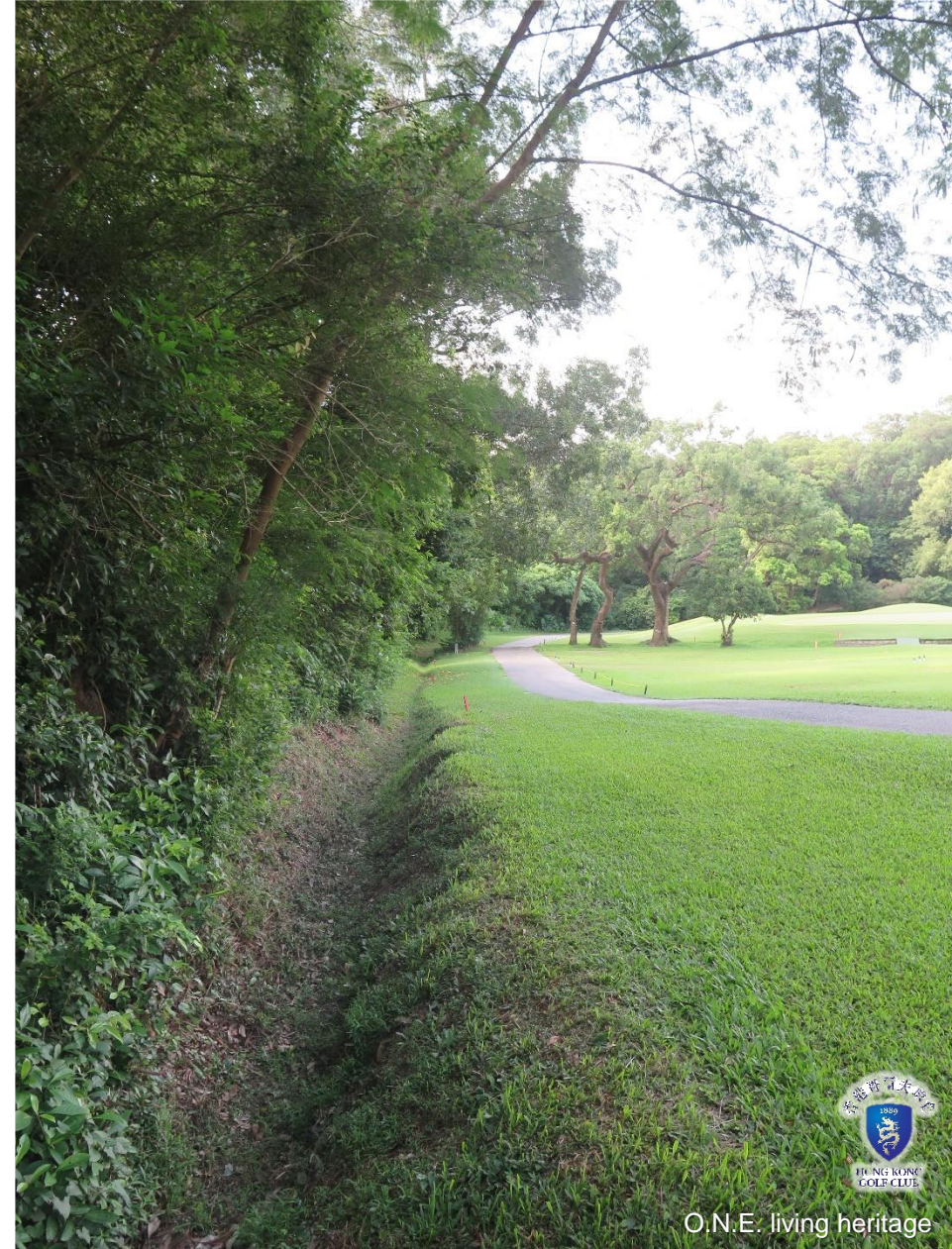
- Literature review of comparing different sites in Hong Kong
- Includes sites of ‘high’ bat diversity
- FGC (Sub-Areas 1-4) at 32ha is an important site for bats in Hong Kong
- From the reviewed publicly available literature, is **the best site for bats in Hong Kong**
- **Species recorded at FGC account for 68% of bat species recorded 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 SSSI (for Bats)	14
Hong Kong Park	7
North District Park	5
Po Hong Park	3

Importance of Fanling Golf Course for Bats

- The mosaic of habitats at FGC important for bats
- Ecological Corridors
- Structural diversity of vegetation
- Roosting opportunities
- Abundance of invertebrates (inc. moths)
- Low levels of light pollution (one of the darkest locations in lowland HK)
- Low levels of night time disturbance





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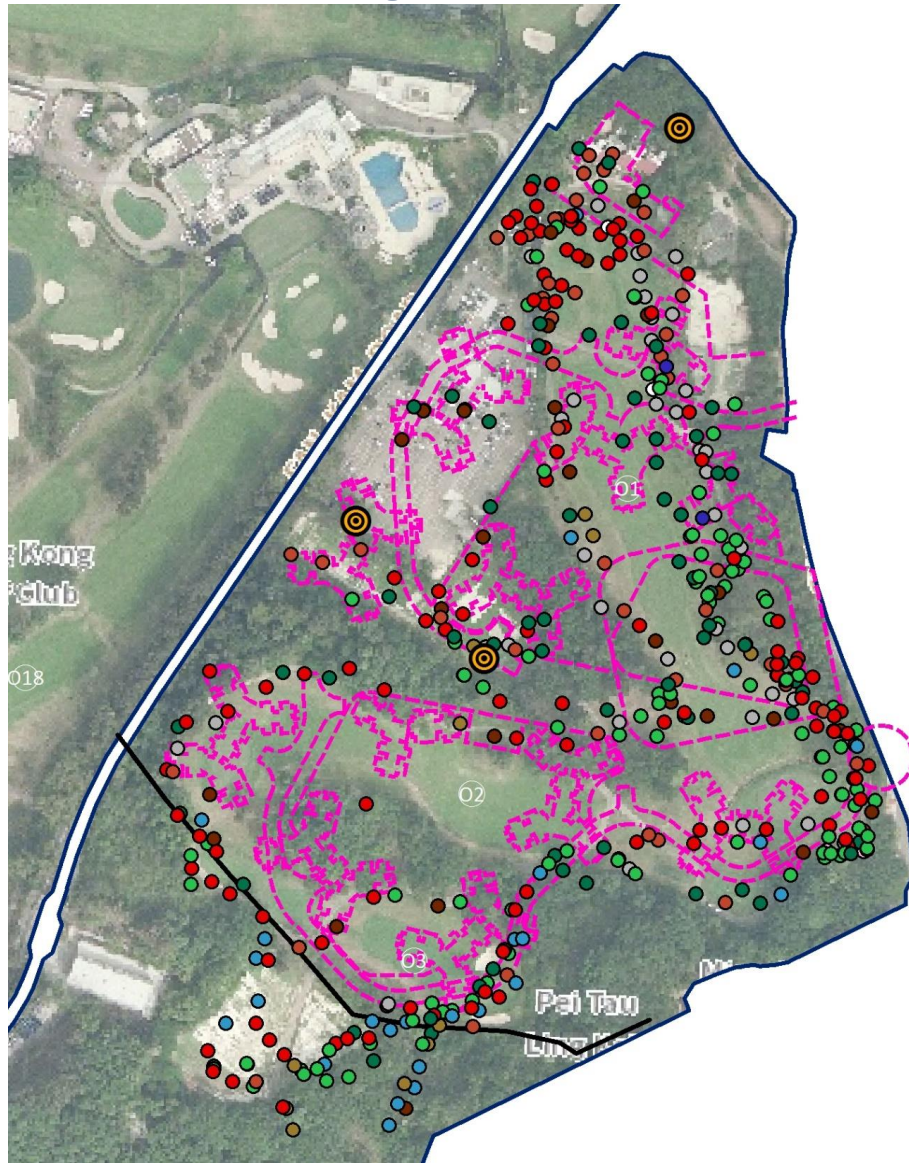
EIA Failings

- Failure to conduct a proper Ecological Baseline Information
 - Incomplete Literature Review- does not take into account bat diversity and abundance
 - Failure to understand bat ecology
 - Poor survey methodology given 3 species in ESB
 - No surveys outside of the PDA – no way to assess indirect impacts to the wider area
- Missed importance of site for roosting, foraging and importance as an ecological corridor
- Failed to properly evaluate ecological value of habitat and Sub-Areas
- Failure to evaluate ecological impact based on the **best and latest information available**

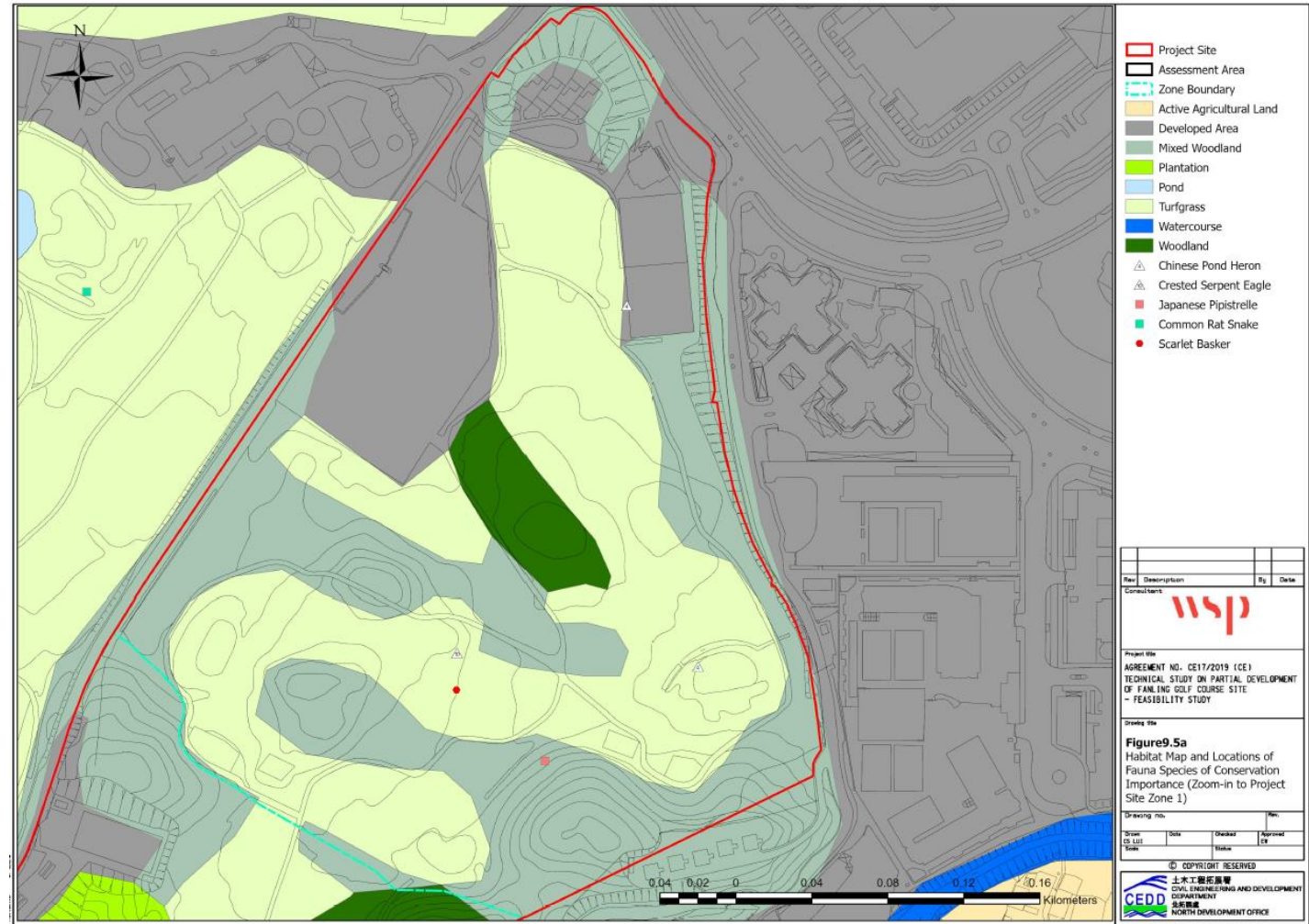
EIA Failings

- Identification & assessments of the following impacts were not considered
 - Loss of Foraging Habitat
 - Through development
 - Secondary impacts through change of habitat/planting of compensation woodland
 - How does this affect prey (e.g. see moths)
 - Loss of ecological corridors (within FGC and beyond) & fragmentation of habitats
 - 3 species in ESB not considered in detail as not included in the Ecological baseline
- Failure to adopt precautionary approach
 - Bats are protected under Wild Animals Protection Ordinance (CAP.170)
 - Bat roosts destroyed could lead to death of individual bats
- Applicable for **change of management following rezoning**

EIA Failings



HKGC 7-month study



10-month EIA study

Change of management following rezoning

- Rezoning use does not safeguard the site
- LCSD have no track record of managing sites of conservation value
- Application of insecticides likely to increase leading to loss of invertebrate prey
- Unsympathetic vegetation management could impact bat roosts directly, fruiting plants as food sources or invert prey
- Increase in lighting across the site



Change of management following rezoning

Current management process

- HKGC excellent custodians of this habitat mosaic
- Conservation Management Plan in place – dynamic and adaptable
- Opportunities for ecological enhancement
- Control of access - reduces human disturbance
- Reduced lighting levels at night
- Audubon Accreditation means lower pesticide and insecticide applications



Conclusion

- FGC **best site in Hong Kong** for Bat Diversity
- Important lowland habitat mosaic – unique in a HK context
- EIA failed to properly form an ecological baseline by not using the **best and latest information available**, thus compounding problems throughout later stages of EIA
- **Rezoning does not safeguard the management of the site for conservation. LCSD has no track record in managing sites of ecological value**

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