

Appendix 8.1 Ecological Survey Methodology

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1 Introduction

1.1 Background

- 1.1.1 Black & Veatch Hong Kong Limited (B&V) was commissioned by Civil Engineering and Development Department (CEDD) to examine the technical feasibility on developing housing development at San Hing Road and Hong Po Road, Tuen Mun (the Assignment), location of which is shown on **Drawing No. 198172/B&V/ECO/001**.
- 1.1.2 To increase land supply to meet the demand of the public, the Government has identified the proposed sites at San Hing Road and Hong Po Road for public housing developments, which are currently zoned “Green Belt” and “Residential (Group E)” on the approved Tuen Mun Outline Zoning Plan (TM OZP) No. S/TM/33 and draft Lam Tei and Yick Yuen Outline Zoning Plan No. S/TM-LTY Y/9 (LTY Y OZP).
- 1.1.3 According to the development proposals for San Hing Road Site, San Hing Road Site Extension and Hong Po Road Site in July 2015, CEDD completed the traffic and transport impact assessment report, preliminary environmental review (PER) report, drainage impact assessment report, sewerage impact assessment report, landscape and visual impact assessment report in 2017 under consultancy Agreement Nos. CE 56/2013(CE) “Engineering Study Review for Site Formation and Infrastructure Works at San Hing Road, Tuen Mun – Investigation” and CE 60/2013 (CE) “Engineering Study for Site Formation and Infrastructural Works at Hong Po Road – Feasibility Study”. The Study put forward the feasibility of proposed developments and assessed the development impacts on transport network, infrastructural capacities and environmental quality.
- 1.1.4 In late 2016 and early 2017, the Government decided to include the proposed Public Transport Interchange and enlarge the site boundary for the housing development boundary. Taking into account the increase in development area, the total site area under the Development will exceed 20 ha, therefore an Environmental Impact Assessment (EIA) is required in accordance with the Item 1 under Schedule 3 of the EIA Ordinance (Cap. 499), i.e. “Engineering feasibility study of urban development projects with a study area covering more than 20 ha or involving a total population of more than 100,000”. In this regard, Stage 2 Engineering Study Review with EIA Study are required to ascertain the parameters of the Development proposal.
- 1.1.5 As identified by the Government, the proposed development area at San Hing Road and Hong Po Road have the potential for public housing developments, but the development sites are subject to various development constraints including inadequate infrastructure. A holistic review is required to confirm the feasibility of amending the land use of the sites for the proposed developments. The Assignment will examine the feasibility on developing public housing by conducting preliminary engineering and environmental assessments to formulate Infrastructure proposal, and to formulate the implementation strategies and programme for the Infrastructure to suit the Developments, as well as to support the subsequent rezoning exercise by the Government.

1.2 Project Description

- 1.2.1 Subject to the findings and recommendation of the technical assessments, the proposed site formation and infrastructure works (the Project) to support the public housing developments at the Site comprise the followings:
- a) Site formation works of about 21 hectares of land;
 - b) Slope cutting and earth filling works as well as geotechnical works/structures;
 - c) Decontamination works;
 - d) Roadworks;
 - e) Sewerage infrastructural works;
 - f) Drainage infrastructural works;
 - g) Landscaping works;
 - h) Environmental impact assessment under Environmental Impact Assessment Ordinance (EIAO);
 - i) Environmental mitigation measures; and
 - j) Other infrastructural works including water supply works.

1.3 Objective of this Working Paper (WP)

- 1.3.1 The main objective of this WP is to set out the methodology for the ecological survey for Ecological Impact Assessment (Terrestrial) under Environmental Impact Assessment (EIA) Study Brief No. ESB-299/2017.

2 Approach and Methodology

2.1 Methodology of Ecological Surveys

- 2.1.1 An EIA Study for housing development of the area at the early planning stage of the project was completed and approved in 1999 (Register No.: AEIAR-015/1999). With further progress and development of the project as mentioned in Section 1, two corresponding PER studies were conducted (under Agreement Nos. CE 56/2013(CE) and CE 60/2013(CE)) in 2014-2017 which included an ecological impact assessment aiming at establishing an updated general ecological profile of the assessment area for facilitating the PER studies. In summary, major ecological resources identified in these previous studies include six types of habitats, two plant species of conservation interest and six fauna species of conservation interest (**Annex A**).
- 2.1.2 For the purpose of the ecological impact assessment at this later EIA stage, apart from review of approved EIA and previous PERs, ecological field surveys are proposed and the main objective of the proposed ecological surveys is to verify all those previous findings and further update the ecological condition of the ecological assessment area.
- 2.1.3 As per the requirements of the EIA Study Brief No. ESB-299/2017, the recommended ecological field surveys shall be undertaken within a duration of at least four months covering the wet season. The field surveys shall cover flora, fauna and identified habitats and/or species of conservation importance.
- 2.1.4 The methodology of the ecological surveys will make reference to the technical guidelines of ecological assessment in Annex 16 of EIAO-TM and the relevant Guidance Notes (EIAO GN No. 7/2010 - Ecological Baseline Survey for Ecological Assessment and 10/2010 - Methodologies for Terrestrial and Freshwater Ecological Baseline Surveys).
- 2.1.5 All ecological surveys will be carried out by qualified and experienced ecologists with relevant degree qualification and at least five years of working experience in terrestrial field survey and identification.

2.2 Assessment Area

- 2.2.1 The proposed ecological assessment area will cover all the terrestrial areas within 500m area from the Site boundaries (**Drawing No. 198172/B&V/ECO/001**).

2.3 Habitat and Vegetation Survey

- 2.3.1 Habitat maps of suitable scale showing the type and location of habitats in the assessment area with the overlay plot of the Site will be produced.
- 2.3.2 Most updated aerial photos will be studied to identify the general land use/ habitat type of the assessment area. A preliminary habitat map will be generated through translating the visualized condition in the aerial photos and previous habitat mapping information from the recently completed PER studies (i.e. Agreement Nos. CE 56/2013(CE) and CE 60/2013(CE)) covering comparable ecological assessment area. According to those reports, six types of habitat were identified, including woodland, watercourse, shrub-grassland mosaic, agricultural field/orchard, developed area/open area and urban area.

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- 2.3.3 Ground truthing study will be conducted on-site to verify and delineate the habitat type that was identified or missing during the desktop study. All ecological resources within habitats will be recorded and a more focused survey on those identified important habitats will be conducted to collect further information.
- 2.3.4 Vegetation surveys will be conducted within the ecological assessment area by conducting survey walks covering the whole area of each habitat as far as accessible and special attention will be paid on species of conservation importance (such as woodland habitat where two plant species of conservation interest *Aquilaria sinensis* and *Pyrenaria spectabilis* were identified in previous studies) and habitats within the proposed works area of the project where the vegetation will be directly impacted.
- 2.3.5 All the flora species with their relative abundance will be recorded through visual observation during vegetation surveys. Nomenclature for plant species follows AFCD's online Hong Kong Plant Database (http://www.herbarium.gov.hk/Search_Form.aspx).

2.4 Mammal Survey

- 2.4.1 Despite no particular mammal species were recorded in previous studies, mammal survey is proposed to verify and confirm that observation.
- 2.4.2 Surveys of mammals will be conducted along proposed transect routes (Drawing No. 198172/B&V/ECO/001) by direct observation and active searching of traits such as scats, footprints and feeding signs within the assessment area during daytime and night surveys. All ad hoc records of sightings, tracks and sign of mammals will be identified and recorded. Bat surveys will be carried out by direct counting at potential roosting ground such as abandoned village house and Chinese Fan-palm (*Livistona chinensis*), and foraging ground such as wetlands and associated riparian habitats, woodland fringe and tree lines. Species, abundance and their feeding/foraging behaviours will be identified and recorded. Nomenclature for mammals follows *A Field Guide to the Terrestrial Mammals of Hong Kong* (Shek, 2006).

2.5 Bird Survey

- 2.5.1 Birds communities within the assessment area will be surveyed using a walk over transect survey method for open area habitats while point count survey will be adopted for surveying avifauna in dense vegetation of woodland (Drawing No. 198172/B&V/ECO/001). Two main areas of woodland identified in previous approved EIA and PER studies were located at Chung Shan and Po Tong Ha along a section of Tsing Shan Firing Range boundary respectively. At least one point count location for each woodland is therefore proposed. The two point count locations in woodland at Po Tong Ha are selected for the known previous records of plant and bird species of conservation interest around. The proposed transect routes are spreading over the ecological assessment area as far as possible and accessible to cover all open area habitats (such as agricultural field/orchard, developed/open area, watercourse, shrub-grassland mosaic and urban area identified in previous EIA/PER).
- 2.5.2 Bird surveys will be conducted at early morning to collect representative data for most of the bird species, while nighttime survey will be conducted for nocturnal birds. All birds seen or heard during the survey will be identified and counted. Species showing notable breeding behaviour will be recorded in detail to identify any important breeding ground nearby. Ornithological nomenclature and status follow *The Avifauna of Hong Kong* (Carey et al., 2001).

2.6 Dragonflies and Butterflies Survey

- 2.6.1 Despite no species of conservation interest were recorded in previous studies, dragonfly and butterfly survey is proposed to verify and confirm that observation.
- 2.6.2 Butterflies and dragonflies surveys will be carried out using the same transect route (Drawing No. 198172/B&V/ECO/001) as for the bird survey within the assessment area. All butterflies and dragonflies observed during the transect survey will be identified and counted with an aid of a pair of binoculars. Hand netting will be used for collecting specimens where it is necessary to confirm the species identification, and the live specimen will be released in-situ after identification.

2.6.3 Nomenclature, general distribution and status of dragonflies refer to *The Hong Kong Dragonflies* (Tam et al., 2011); those of butterflies follow *Hong Kong Butterflies* (Lo and Hui, 2005) and *A Review of the Local Restrictedness of Hong Kong Butterflies* (Chan et al., 2011).

2.7 Herpetofauna Survey

2.7.1 Despite no species of conservation interest were recorded in previous studies, herpetofauna survey is proposed to verify and confirm that observation.

2.7.2 Surveys of herpetofauna within the assessment area will be conducted along proposed transect routes (Drawing No. 198172/B&V/ECO/001) through active searching and detection of the mating calls during daytime and night surveys. Survey area will cover both terrestrial and aquatic environment of various habitat types including watercourses and wooded areas. Daytime surveys for herpetofauna will be carried out in line with mammal and insect (i.e. dragonflies and butterflies) surveys. Night surveys will be carried out in wet season when this fauna group is more active. The Nomenclature to be used in this report for amphibians and reptiles follows *A Field Guide to the Amphibians of Hong Kong* (Chan et al., 2005) and *Hong Kong Amphibian and Reptiles* (Karsen et al., 1998) respectively.

2.8 Aquatic Fauna Survey

2.8.1 The Aquatic fauna survey will include freshwater fish and stream invertebrates.

2.8.2 Direct bank side counting along proposed transect route (Drawing No. 198172/B&V/ECO/001) running alongside or crossing existing watercourse will be adopted at vantage observation points for at least 10 minutes period. For aquatic habitats with deeper water, turbulent areas, turbid water or watercourse with dense riparian and aquatic vegetation, pot trapping and hand netting methods will be used for collecting sample for identification if safe access is available. Live specimens will be released in-situ after identification. Nomenclature of freshwater fishes follows *Field Guide to the Freshwater Fish of Hong Kong* (Lee et al., 2004). Apart from selected observation points, direct bank side counting will also be carried out along transect routes with sections running alongside watercourses.

2.8.3 Stream invertebrate surveys will also be conducted in line with the freshwater fish survey transects and sampling points to search for insects, crabs, shrimps, snails and bivalves. Sampling points were selected to cover locations with previous species of conservation interest and major watercourses running across the proposed project area (Drawing No. 198172/B&V/ECO/001). Although no species of conservation interest were identified in the approved EIA in 1999, a freshwater crab species (*Cryptopotamon anacoluthon*) of conservation status was found in the two recent PER studies in 2014-2017 at a mid-course of a stream along Hong Po Road. One sampling point is hence proposed at that section in order to further confirm the record.

2.8.4 Collected specimens will be identified to Family level or as far as possible, supplemented by morphospecies when necessary. Live specimens will be released in-situ after identification. Nomenclature of stream invertebrates follows *Hong Kong Field Guides 2: Hillstreams* (Dudgeon, 2003).

2.9 Proposed Transects and Survey Points

- 2.9.1 Proposed transects and survey points are indicated on the Ecological Survey Plan (**Drawing No. 198172/B&V/ECO/001**). Surveys for mammals, birds, herpetofauna, butterflies and dragonflies will be conducted on the proposed transect routes, and aquatic fauna will be included at sections of the transect running alongside watercourses. Selected point count locations for birds and aquatic fauna are also indicated on the same drawing.

END OF TEXT

Figure

LEGEND:

- PROPOSED DEVELOPMENT AREA BOUNDARY
- PROJECT SITE BOUNDARY
- 500m ASSESSMENT AREA
- SURVEY TRANSECT ROUTE
- WOODLAND (BOUNDARY FROM PREVIOUS RECORD)
- NATURAL/SEMI-NATURAL WATERCOURSE (FROM PREVIOUS RECORD)
- MODIFIED WATERCOURSE (FROM PREVIOUS RECORD)
- MODIFIED WATERCOURSE (FROM UPDATED AERIAL PHOTOGRAPH REVIEW)
- POTENTIAL ADDITIONAL JUNCTION IMPROVEMENT WORKS
- POINT COUNT LOCATION FOR BIRD SURVEY
- POINT COUNT LOCATION FOR AQUATIC FAUNA
- PROPOSED SLOPE
- PROPOSED RETAINED STRUCTURE

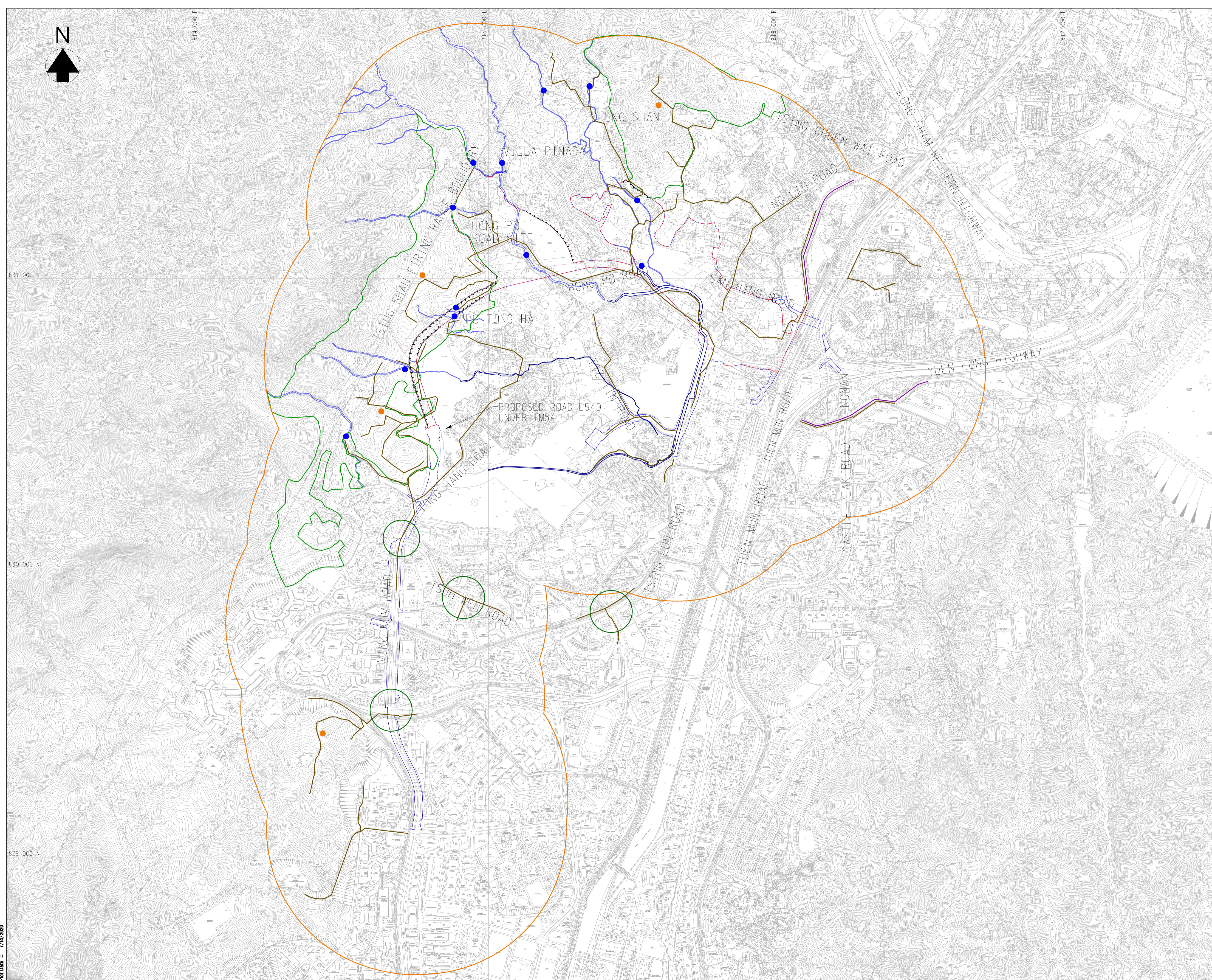
Revision	Date	Description			Initial
		Designed	Checked	Drawn	
Initial	BF	CMW	SZ	JW	
Date	05/18	05/18	05/18	05/18	

Approved

Project title
 AGREEMENT NO. CE68/2017 (CE)
 SITE FORMATION AND
 INFRASTRUCTURAL WORKS FOR THE
 DEVELOPMENT AT SAN HING ROAD
 AND HONG PO ROAD, TUEN MUN -
 FEASIBILITY STUDY

Drawing title
 ECOLOGICAL SURVEY PLAN

Drawing No.	Scale
198172/B&V/ECO/001	1 : 6000 (A1) 1 : 12000 (A3)



Annex A
Habitat Map and Location of Species of Conservation Interest
from Previous PER Studies under
Agreement Nos. CE 56/2013(CE) and CE 60/2013(CE)

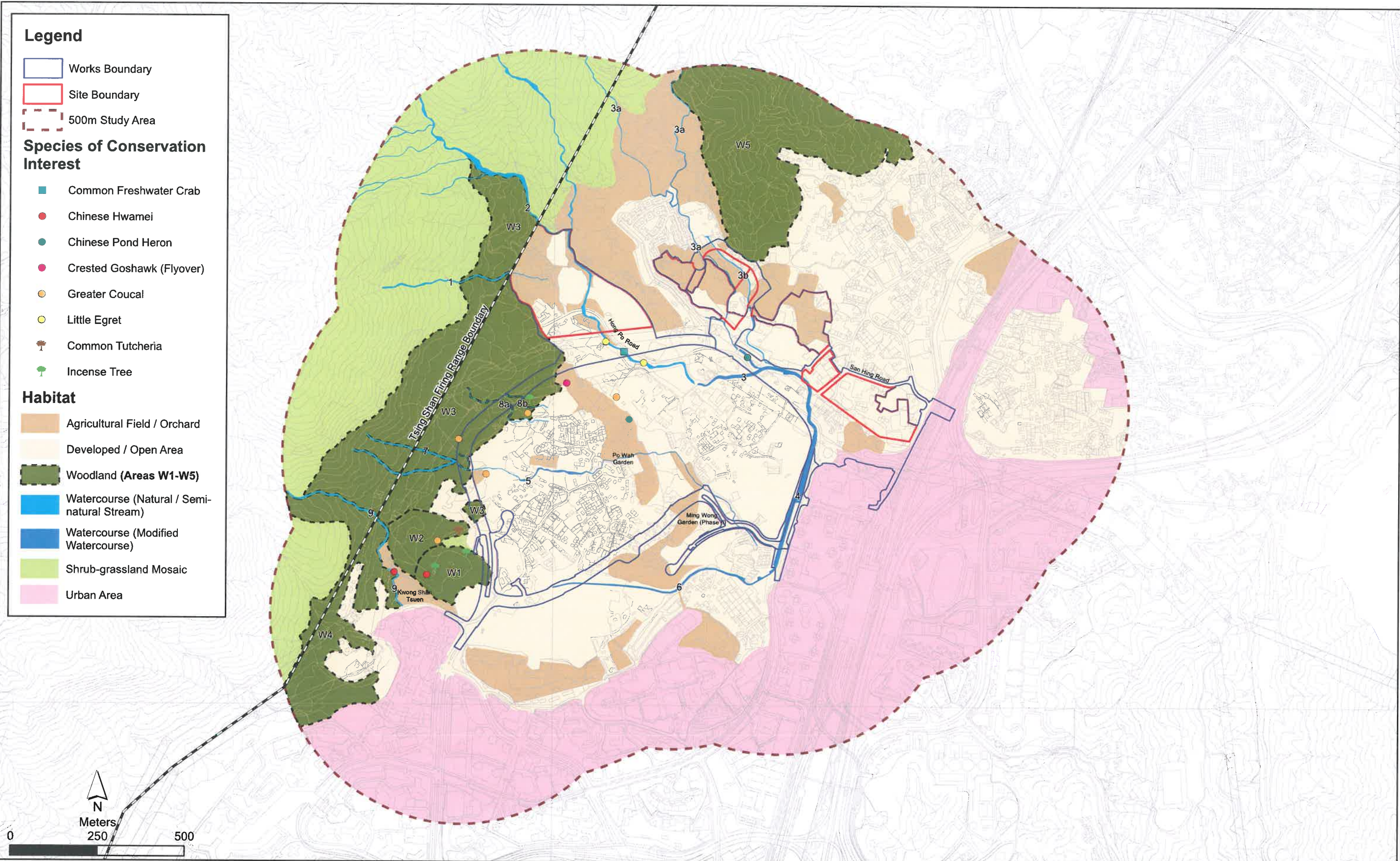


Figure B13

Habitat Map & Location of Species of Conservation Interest