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**ANNEX**

*Annex 8      Terrestrial Ecological Resources for Black Point*

## 8 TERRESTRIAL ECOLOGY IMPACT ASSESSMENT

### 8.1 INTRODUCTION

This section presents the ecological baseline information gathered from the literature review and field surveys, which covered a period of 6 months of both wet and dry seasons (February to July 2004) to establish the baseline ecological conditions of the Study Area (covering the headland of Black Point and up to 500 m from the Project boundary). Additional ecological surveys were conducted in October 2005 to review and update the existing ecological profile.

This section also presents the results of an assessment of the ecological importance of the terrestrial habitats and resources at Black Point and the potential impacts from the construction and operation of the proposed Liquefied Natural Gas (LNG) terminal. The assessment has been based on the preliminary design of the Black Point terminal as discussed in the Project Description (*Part 3 – Section 3*). Measures required to mitigate adverse impacts are recommended, where appropriate.

### 8.2 LEGISLATIVE REQUIREMENTS AND EVALUATION CRITERIA

Relevant legislative requirements and evaluation criteria for the protection of species and habitats of terrestrial ecological importance are summarized as follows:

1. *Country Parks Ordinance (Cap 208);*
2. *Forests and Countryside Ordinance (Cap 96);*
3. *Wild Animals Protection Ordinance (Cap 170);*
4. *Protection of Endangered Species of Animals and Plants Ordinance (Cap 586);*
5. *Town Planning Ordinance (Cap 131);*
6. *Hong Kong Planning Standards and Guidelines Chapter 10 (HKPSG);*
7. *The Technical Memorandum on Environmental Impact Assessment Process under the Environmental Impact Assessment Ordinance (EIAO-TM);*
8. *United Nations Convention on Biodiversity (1992);*
9. *Convention on Wetlands of International Importance Especially as Waterfowl Habitat (the Ramsar Convention); and,*
10. *PRC Regulations and Guidelines.*

### 8.2.1 *Country Parks Ordinance (Cap 208)*

The *Country Parks Ordinance* (Cap 208) provides for the designation and management of Country Parks and Special Areas. Country Parks are designated for the purpose of nature conservation, countryside recreation and outdoor education. Special Areas are designated mainly for the purpose of nature conservation.

### 8.2.2 *Forests and Countryside Ordinance (Cap 96)*

The *Forests and Countryside Ordinance* (Cap 96) prohibits the felling, cutting, burning or destroying of trees and growing plants in forests and plantations on Government land. The subsidiary *Forestry Regulations* prohibit the picking, felling or possession of listed rare and protected plant species. The list of protected species in Hong Kong which comes under the *Forestry Regulations* was last amended on 11 June 1993 under the *Forestry (Amendment) Regulation 1993* made under *Section 3* of the *Forests and Countryside Ordinance*.

### 8.2.3 *Wild Animals Protection Ordinance (Cap 170)*

Under the *Wild Animals Protection Ordinance* (Cap 170), designated wild animals are protected from being hunted, whilst their nests and eggs are protected from destruction and removal. All birds and most mammals, including all cetaceans, are protected under this Ordinance, as well as certain reptiles, amphibians and invertebrates. The *Second Schedule* of the Ordinance that lists all the animals protected was last revised in June 1997.

### 8.2.4 *Protection of Endangered Species of Animals and Plants Ordinance (Cap 586);*

The *Protection of Endangered Species of Animals and Plants Ordinance* (Cap 586) was enacted to align Hong Kong to control regime with the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES). With effect from 1 July 2006, it replaces the *Animals and Plants (Protection of Endangered Species) Ordinance* (Cap 187). The purpose of the *Protection of Endangered Species of Animals and Plants Ordinance* is to restrict the import and export of species listed in CITES Appendices so as to protect wildlife from overexploitation or extinction. The Ordinance is primarily related to controlling trade in threatened and endangered species and restricting the local possession of them.

### 8.2.5 *Town Planning Ordinance (Cap 131)*

The recently amended *Town Planning Ordinance* (Cap 131) provides for the designation of areas such as "Coastal Protection Areas", "Sites of Special Scientific Interest (SSSI)", "Green Belt" and "Conservation Areas" to promote conservation or protection or protect significant habitat.

## 8.2.6 *Hong Kong Planning Standards and Guidelines (HKPSG) Chapter 10*

*Chapter 10* of the *HKPSG* covers planning considerations relevant to conservation. This chapter details the principles of conservation, the conservation of natural landscape and habitats, historic buildings, archaeological sites and other antiquities. It also addresses the issue of enforcement. The appendices list the legislation and administrative controls for conservation, other conservation related measures in Hong Kong and Government departments involved in conservation.

## 8.2.7 *Technical Memorandum on Environmental Impact Assessment Process under the Environmental Impact Assessment Ordinance (EIAOTM)*

*Annex 16* of the *EIAOTM* sets out the general approach and methodology for assessment of ecological impacts arising from a project or proposal, to allow a complete and objective identification, prediction and evaluation of the potential ecological impacts. *Annex 8* recommends the criteria that can be used for evaluating ecological impacts.

## 8.2.8 *Other Relevant Legislation*

The Peoples' Republic of China (PRC) is a Contracting Party to the *United Nations Convention on Biological Diversity* of 1992. The Convention requires signatories to make active efforts to protect and manage their biodiversity resources. The Government of the Hong Kong Special Administrative Region has stated that it will be "committed to meeting the environmental objectives" of the Convention.

The *Convention on Wetlands of International Importance Especially as Waterfowl Habitat (the Ramsar Convention)* applies to the HKSAR. The Convention requires parties to conserve and make wise use of wetland areas, particularly those supporting waterfowl populations. *Article 1* of the Convention defines wetlands as 'areas of marsh, fen, peatland or water, whether natural or artificial, permanent or temporary, with water that is static or flowing, fresh, brackish or salt, including areas of marine water the depth of which at low tide does not exceed six meters.'. The Mai Po/Inner Deep Bay wetland was declared a Wetland of International Importance ("Ramsar site") under the Convention in 1995.

The PRC in 1988 ratified the *Wild Animal Protection Law*, which lays down basic principles for protecting wild animals. The Law prohibits the killing of protected animals, controls hunting, and protects the habitats of wild animals, both protected and non-protected. The Law also provides for the creation of lists of animals protected at the state level, under Class I and Class II. There are 96 animal species in Class I and 156 in Class II. Class I provides a higher level of protection for animals considered to be more threatened.

### 8.3 ECOLOGICAL STUDY AREA

The Study Area for the ecological assessment is based on the footprint of the proposed LNG terminal at Black Point and the surrounding land-based habitats (500 m from the Project Area), which is approximately 120 ha. The Black Point LNG terminal is proposed to be located on the north face of the Black Point headland, as presented in *Figure 8.1*. Due to the steep slopes on the existing headland, some reclamation will be required to provide sufficient land for development. The jetty for the LNG carrier extends northwest, perpendicular to the coastline.

### 8.4 TERRESTRIAL ECOLOGICAL RESOURCES

This section details the baseline conditions of terrestrial ecological resources at Black Point.

#### 8.4.1 *Description and Historical Background of Black Point*

The northwest New Territories has a long history of human impact on the landscape, from deforestation and repeated hill fires on granitic slopes. The steep terrain of the Castle Peak Range has mainly grass cover due to exposure to strong wind, thin top soil and frequent erosion <sup>(1)</sup>.

Black Point is the western most part of the New Territories, and is comprised of a headland extending from the east (land) to the west (sea) with granitic soil underneath, typical of the Tuen Mun and Castle Peak areas. The major development at Black Point was the Black Point Power Station (BPPS), (the first natural gas-fired plant in Hong Kong) which is located at the north side of the headland. The lowland areas on the southeast face of the headland are occupied by orchards, a barging point and fabrication yard for Shenzhen Western Corridor Project and a cargo storage site. The orchard was originally cultivated land, managed by villagers in the 19<sup>th</sup> century <sup>(2)</sup>.

An aerial photograph of Black Point (2003) is shown in *Figure 8.2*.

#### 8.4.2 *Literature Review*

##### *Methodology*

A preliminary desktop study and literature review has been conducted to determine the existing conditions within the Study Area, which encompasses the area within 500m of the proposed Project Area (*Figure 8.1*). The literature review included Government and private sector reports, independent and Government published literature, academic studies, vegetation maps, recent aerial photographs and land use maps. These included, but not limited to:

- (1) ERL Asia Ltd (1992). *Environmental Impact Assessment of the Proposed 6000MW Thermal Power Station at Black Point: Initial Assessment Report Volume 1 The Surrounding Environment*.
- (2) ERL Asia Ltd (1992). *Ibid*

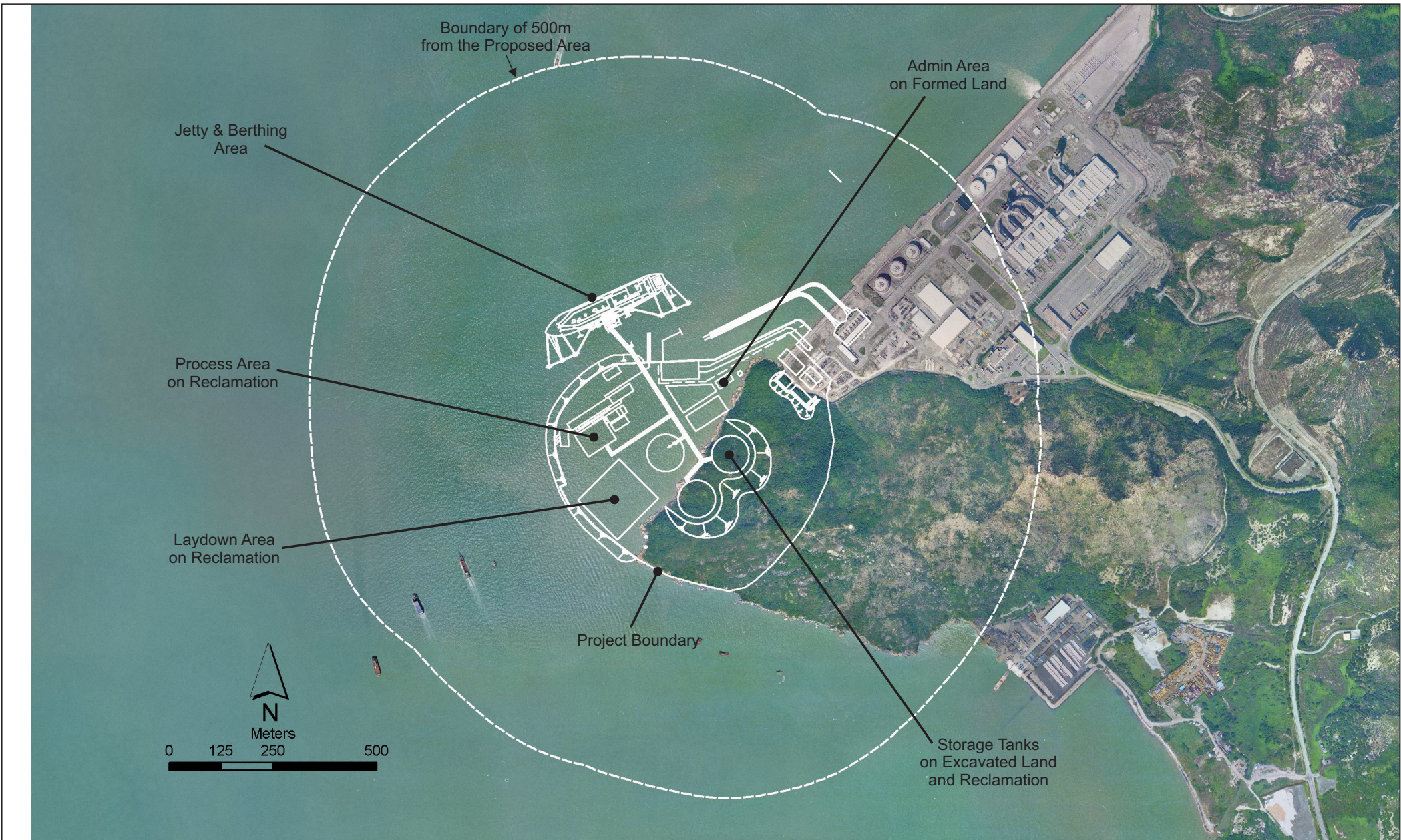


Figure 8.1

Layout for the Proposed Black Point LNG Terminal  
(Aerial photograph source: Lands Department)

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0018180\_Jpg\_output-BK.mxd  
DATE: 29/09/2006

Environmental  
Resources  
Management



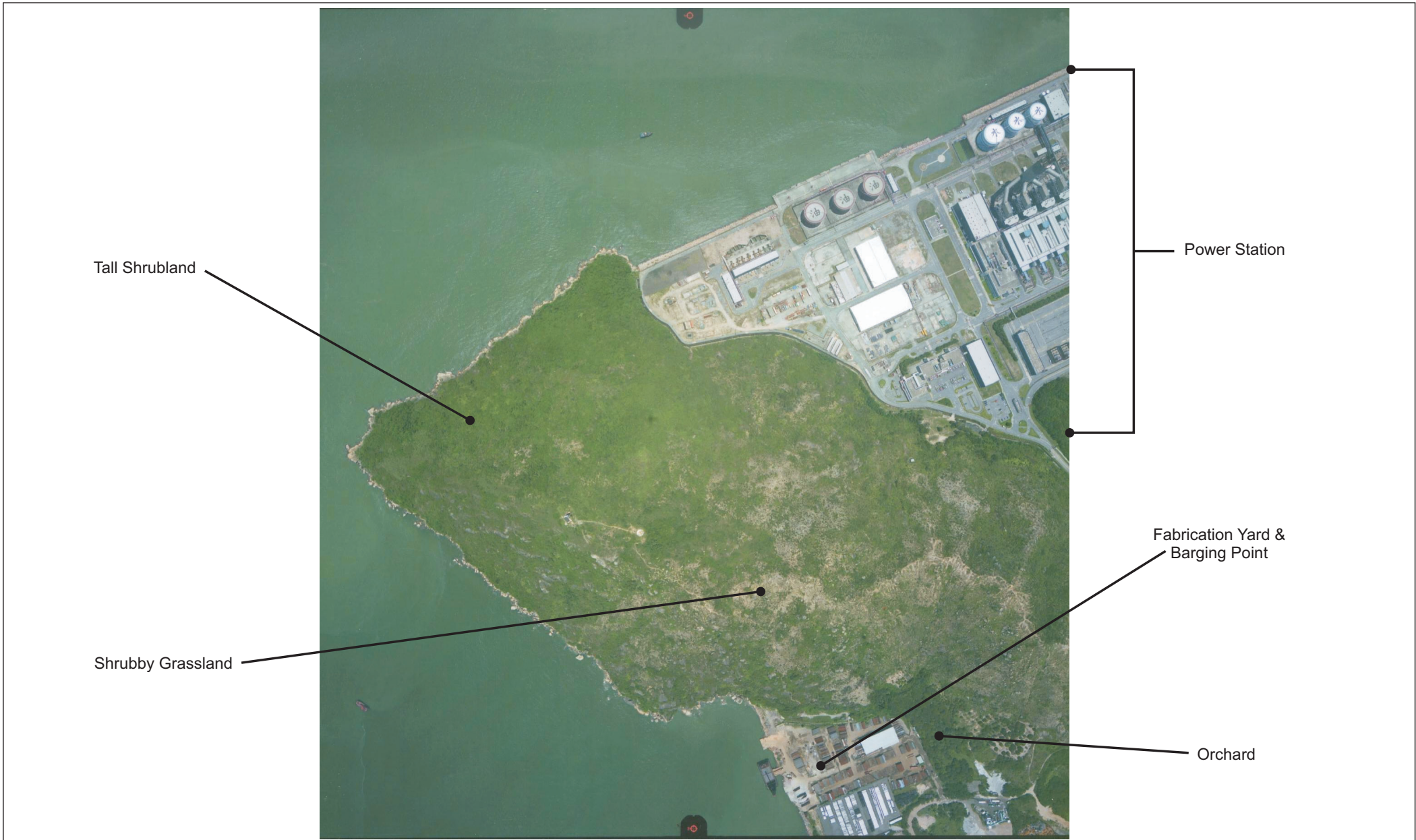


Figure 8.2

Aerial Photograph of Black Point in 2003 - This aerial photograph presents the existing condition of Black Point (Aerial photograph source: Lands Department)

- EIA of the Proposed 6000 MW Thermal Power Station at Black Point: Initial Assessment Report <sup>(1)</sup>;
- Aerial photographs of Black Point <sup>(2)</sup>;
- *Porcupine!* <sup>(3)</sup>;
- The Ecology and Biodiversity of Hong Kong <sup>(4)</sup>;
- Hong Kong Biodiversity. Agriculture, Fisheries and Conservation Department Newsletters;
- Annual Report of the Hong Kong Bird Watching Society;
- Butterfly Watching in Hong Kong <sup>(5)</sup>;
- Field Guide to Butterfly Watching in Hong Kong <sup>(6)</sup>;
- Field Guide to the Dragonflies of Hong Kong <sup>(7)</sup>;
- Gymnosperms and Angiosperms of Hong Kong <sup>(8)</sup>;
- Hong Kong Amphibians and Reptiles <sup>(9)</sup>;
- Hong Kong Butterflies <sup>(10)</sup>;
- Orchidaceae of Hong Kong <sup>(11)</sup>; and,
- The Avifauna of Hong Kong <sup>(12)</sup>..

### Results

The results of the literature review indicated that limited information was available on the terrestrial ecological resources in the Study Area. This information is summarised in the following sections.

### Habitat and Vegetation

Most of the area surrounding Black Point exhibited signs of disturbance and appears to contain no special communities or species <sup>(1)</sup>. This is related to the

- (1) ERL Asia Ltd (1992). *Op cit.*
- (2) CW48877 dated 3<sup>rd</sup> July 2003 at 3,000 feet.
- (3) Newsletter of Department of Ecology & Biodiversity, University of Hong Kong Issues 1 to 33.
- (4) Dudgeon D and Corlett R (2004). *The Ecology and Biodiversity of Hong Kong*. The Hong Kong University Press.
- (5) Young J. J. and Yiu V. (2002). *Butterfly Watching in Hong Kong*. Wan Li Book Co Ltd..
- (6) Yiu V (2004) *Butterfly Watching in Hong Kong*. Hong Kong Lepidopterist's Society, Hong Kong.
- (7) Wilson, K.D.P 2004. *Field Guide to the Dragonflies of Hong Kong*. Agriculture, Fisheries and Conservation Department, Hong Kong.
- (8) Xing, F.W., Ng, S.C., Chau, L.K.C. (2000). Gymnosperms and angiosperms of Hong Kong. *Memoirs of the Hong Kong Natural History Society* 23: 21-136.
- (9) Karsen, S. J., Lau, M. W. N. and Bogadek, A. (1998). *Hong Kong Amphibians and Reptiles*. Urban Council, Hong Kong.
- (10) Lau Paul (1997). *Butterflies of Hong Kong*. Brilliant Printing Company.
- (11) Wu, S. H and Lee.T. C (2000). Pteridophytes of Hong Kong. *Memoirs of the Hong Kong Natural History Society*: 23:5-20.
- (12) Carey, G.J., Chalmers, M.L., Diskin, D.A., Kennerley, P.R., Leader, P.J., Leven, M.R., Lewthwaite, R.W., Melville, D.S., Turnbull, M., and Young, L. (2001). *The Avifauna of Hong Kong*. Hong Kong Bird Watching Society Hong Kong.



the high frequency of hill fires, common in rural areas, which maintains a grassland habitat on the hillsides <sup>(2)</sup>. The habitat types recorded at Black Point have been reported in a previous ERL study <sup>(3)</sup>.

In general, probably due to the relatively sheltered position and thicker top soil on the north slopes, the headland has comparatively denser and taller shrub cover on the north face than the south. The latter is largely grassland with scattered barren boulders. This type of vegetation is an unpromising habitat for mammals, other than the common hillside rat.

The vegetation of Black Point consisted of a mosaic of grassland, fernland and shrubland communities, with all possible intermediates. The grassland was dominated by *Ischaemum* spp., *Arundinella* sp., *Eulalia* sp. and *Cymbopogon* sp., whereas the shrubland mainly consisted of *Rhodomyrtus* sp., *Eurya* sp. and *Rhaphiolepis* sp. The fernland consisted of a pure stand of *Discranopteris linearis*, which is an indicator plant for habitat frequently burned.

The southern fringe of the headland is a levelled area which was once actively cultivated. Most of the cultivated fields have been converted to orchard and was under active management <sup>(4)</sup>. There was no native woodland or shrubland and only a few planted trees were present, which are mostly exotic. They did not constitute a significant wooded area.

Land that was not cultivated was covered in a varying mixture of native (eg *Ischaemum* spp. and *Cymbopogon* sp.) and exotic weedy species (*Agave* sp. and *Crassocephalum* sp.), whereas at the rear of the rocky shore along the coastline was a mixture of native coastal species (*Hibiscus* sp. and *Scaevola* sp.). The poor vegetation at Black Point contributed to the generally poor ecological value of the site <sup>(5)</sup>.

## Birds

From the HKBWS Breeding Bird Survey <sup>(6)</sup>, 27 species were recorded at Black Point, shown in *Table 8.1*. The majority are common and widespread in Hong Kong of which the Black Kite, Greater Coucal, Chinese Pond Heron, Bonelli's Eagle and White-bellied Sea Eagle are recognised as Class II Protected Species in PRC and *Appendix 2* of CITES.

- (1) ERL Asia Ltd (1992). *Op cit.*
- (2) Dudgeon D and Corlett R (2004). *Op cit.*
- (3) ERL Asia Ltd (1992). *Op cit.*
- (4) ERL Asia Ltd (1992). *Op cit.*
- (5) ERL Asia Ltd (1992). *Op cit.*
- (6) Carey, G.J., *et al* (2001). *Op cit.*

Table 8.1 Bird Species Recorded in Black Point in HKBWS Breeding Bird Survey

Common Name	Species Name	Status
Black Drongo	<i>Dicrurus macrocercus</i>	Widespread and common.
Black Kite	<i>Milvus migrans</i>	Widespread and common in Hong Kong, Class II Protected Species in PRC and Appendix 2 of CITES.
Black-collared Starling	<i>Sturnus nigricollis</i>	Widespread and common.
Blue Magpie	<i>Urocissa erythrorhyncha</i>	Widespread and common.
Bonelli's Eagle	<i>Hieraaetus fasciatus</i>	Localised in Hong Kong, Class II Protected Species in PRC and Appendix 2 of CITES.
Chinese Bulbul	<i>Pycnonotus sinensis</i>	Widespread and common.
Chinese Francolin	<i>Francolinus pintadeanus</i>	Widespread and common.
Chinese Pond Heron	<i>Ardeola bacchus</i>	Localised in Hong Kong, Class II Protected Species in PRC and Appendix 2 of CITES.
Common Kingfisher	<i>Alcedo atthis</i>	Widespread and common.
Common Koel	<i>Eudynamys scolopacea</i>	Widespread and common.
Common Magpie	<i>Pica pica</i>	Widespread and common.
Common Tailorbird	<i>Orthotomus sutorius</i>	Widespread and common.
Crested Myna	<i>Acridotheres cristatellus</i>	Widespread and common.
Greater Coucal	<i>Centropus sinensis</i>	Localised in Hong Kong, Class II Protected Species in PRC and Appendix 2 of CITES.
Hair-crested Drongo	<i>Dicrurus hottentottus</i>	Widespread and common.
Little Egret	<i>Egretta garzetta</i>	Widespread and common.
Long-tailed Shrike	<i>Lanius schach</i>	Widespread and common.
Masked Laughingthrush	<i>Garrulax perspicillatus</i>	Widespread and common.
Oriental Magpie Robin	<i>Copsychus saularis</i>	Widespread and common.
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	Widespread and common.
Richard's Pipit	<i>Anthus richardi</i>	Widespread and common.
Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>	Widespread and common.
Spotted Dove	<i>Streptopelia chinensis</i>	Widespread and common.
White Wagtail	<i>Motacilla alba</i>	Widespread and common.
White-bellied Sea Eagle	<i>Haliaeetus leucogaster</i>	Localised in Hong Kong, Class II Protected Species in PRC and Appendix 2 of CITES.
White-throated Kingfisher	<i>Halcyon smyrnensis</i>	Widespread and common.
Yellow-bellied Prinia	<i>Prinia flaviventris</i>	Widespread and common.

## Mammals

The literature review revealed that limited information on mammals was available within the Study Area.

## Herpetofauna

The literature review revealed that limited information on herpetofauna was available within the Study Area.

## Invertebrates

### Dragonfly

The literature review revealed that limited information on dragonflies was available within the Study Area.

### Butterflies

The literature review revealed that limited information on butterflies was available within the Study Area.

## Stream Fauna

The literature review revealed that limited information on stream fauna was available within the Study Area.

### 8.4.3 *Baseline Ecological Surveys*

### 8.4.4 *Methodology*

Following a literature review of available ecological information characterising the Study Area, reconnaissance surveys were undertaken in February 2004 to update and field check the validity of the information gathered in the review and to fill information gaps. A number of more focussed baseline field surveys were then carried out to characterise the existing ecological conditions.

The baseline surveys covered a period of six months during both dry (February to March 2004) and wet (April to July 2004) seasons. Additional ecological surveys were conducted on 27 and 28 October 2005 to review and update the existing ecological profile of the Study Area.

The following baseline surveys were identified as necessary and the details are summarized in *Table 8.2*.

Table 8.2 *Types and Dates of Baseline Surveys*

Survey Type	Methodology	Date
Habitat and Vegetation	Habitat mapping and vegetation identification through ground truthing in major habitats.	16 February, 19 and 29 March, 15 July 2004, 27 and 28 October 2005.
Bird	Quantitative (point count method) and qualitative (recorded within Study Area) survey; including day and night surveys covering both wet and dry season.	22, 29 February, 6 and 13 March, 12 April, 23 May, 19 June and 15 July 2004. Recent field verification was undertaken on 27 and 28 October 2005.
Mammal	Quantitative (active searching along the survey transect) and qualitative (recorded within Study Area); including day and night surveys covering both wet and dry season.	14, 16 and 29 February, 9 March, 19 April, 23 and 25 May and 9 July 2004. Recent field verification was undertaken on 27 and 28 October 2005.
Herpetofauna	Quantitative (active searching along the survey transect) and qualitative (recorded within Study Area); including day and night surveys covering both wet and dry season.	14, 16 and 29 February, 9 March, 19 April, 23 and 25 May and 9 July 2004. Recent field verification was undertaken on 27 and 28 October 2005.
Butterfly	Quantitative (point count method) and qualitative (recorded within Study Area) survey; including only day surveys covering both wet and dry season.	14, 16 and 29 February, 9 March, 19 April, 23 and 25 May and 9 July 2004. Recent field verification was undertaken on 27 and 28 October 2005.
Dragonfly	Quantitative (point count method) and qualitative (recorded within Study Area) survey; including only day surveys covering both wet and dry season.	14, 16 and 29 February, 9 March, 19 April, 23 and 25 May and 9 July 2004. Recent field verification was undertaken on 27 and 28 October 2005.
Aquatic fauna	Active searching in stream, including only day surveys covering both wet and dry season.	16 February and 25 May 2004. Recent field verification was undertaken on 27 and 28 October 2005.

### *Habitats and Vegetation*

Field surveys focussing on the habitats and vegetation within the Study Area were performed on 16 February, 19 and 29 March, 15 July 2004, 27 and 28 October 2005. The aim of the surveys was to record and map habitat characteristics and distribution, as well as floral composition within the Study Area, and to establish the ecological profile. The methodologies of habitat and vegetation survey made reference to those proposed in the *Technical Guidance Notes 7/2002* and *10/2004* of the *EIA Ordinance*.

Habitats were mapped based on recent government aerial photographs (year 2003) and field ground truthing, and are presented in *Figure 8.3*.

Representative areas of each habitat type were surveyed on foot. Plant species of each habitat type encountered and their relative abundance were recorded with special attention to any rare or protected species.

Nomenclature and conservation status of plant species follow Xing *et al* (2000)<sup>(1)</sup>, Wu and Lee (2000)<sup>(2)</sup> and AFCD (2003)<sup>(3)</sup>. The habitat mapping and vegetation surveys were undertaken by an experienced vegetation specialist.

### *Birds*

The methodology for the bird surveys made reference to those proposed in the *Technical Guidance Notes 7/2002* and *10/2004* of the *EIA Ordinance*. The quantitative (point count method) bird surveys were undertaken in the major habitat types (plantation, shrubland, shrubby grassland, stream/channel, orchard and developed area) within the Study Area. Locations of sampling points are shown in *Figure 8.4*.

Bird surveys were conducted on 22 and 29 February, 6 and 13 March, 12 April, 23 May, 19 June and 15 July 2004 covering both dry and wet seasons. Night surveys for birds were conducted on 29 February and 19 June 2004.

Qualitative surveys were undertaken on 27 and 28 October 2005 to update the ecological profile of the Study Area.

For the point count method, a total of ten minutes was spent counting birds at each point for each visit. All birds seen or heard within 30 m of each point were counted and identified to species where possible. Relative abundance of birds recorded within point count sites has been expressed as mean number of birds per sampling point and per sampling time (total birds counted divided by total number of point count sites surveyed and total number of visits). Species richness was expressed in terms of mean number of species per sampling point and per sampling time.

All the bird species encountered outside counting points but within the Study Area were also recorded in order to produce a complete species list. Signs of breeding (e.g., recently fledged juveniles and the presence of actively used nest) and the habitat utilisation of different species was also recorded.

Ornithological nomenclature followed Carey *et al* (2001)<sup>(4)</sup>.

### *Mammal*

The methodology for the mammal surveys made reference to those proposed in the *Technical Guidance Notes 7/2002* and *10/2004* of the *EIA Ordinance*. As most mammals occur at low densities, all sightings, tracks, and signs of

(1) Xing, F.W., Ng, S.C., Chau, L.K.C. (2000). *Op cit*.

(2) Wu, S. H and Lee.T. C (2000). *Op cit*.

(3) AFCD (2003). *Rare and Precious Plants of Hong Kong*. Cosmos Books Ltd.

(4) Carey, G.J.,*et al*. (2001). *Op cit*.

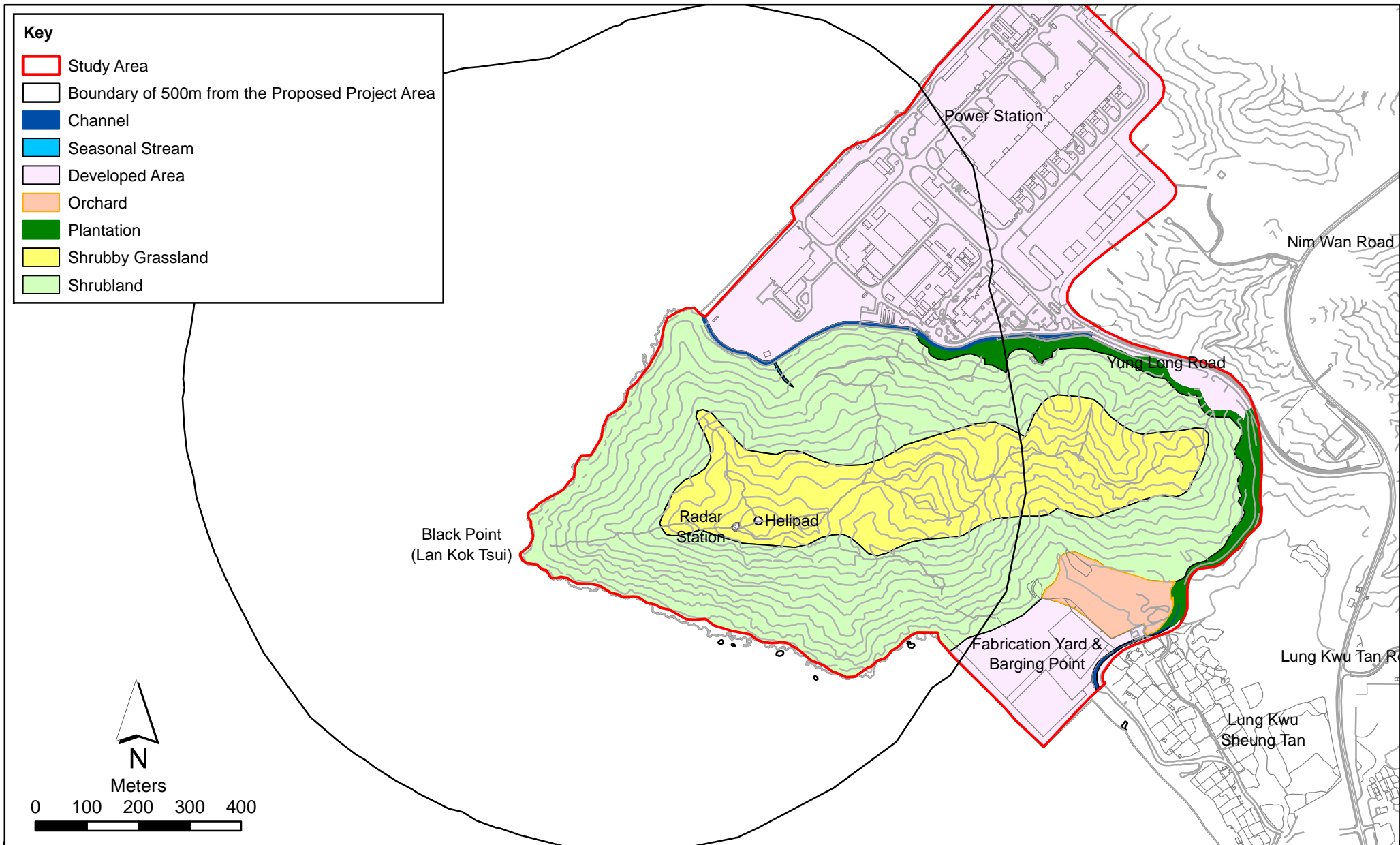


Figure 8.3

Habitat Map of the Black Point Project Site

mammals were actively searched. Surveys were focussed on areas within 10m either side of the survey transects (*Figure 8.4*).

Mammal surveys were carried out on 14, 16 and 29 February, 9 March, 19 April, 23 and 25 May and 9 July 2004 covering both dry and wet seasons. A night survey for mammals was carried out on 25 May 2004. Qualitative surveys were undertaken on 27 and 28 October 2005 to update the ecological profile of the Study Area. Nomenclature for mammals follows Wilson and Reeder (1992) <sup>(1)</sup>.

### *Herpetofauna*

The methodology for the herpetofauna surveys made reference to those proposed in the *Technical Guidance Notes 7/2002* and *10/2004* of the *EIA Ordinance*. All reptiles and amphibians were recorded by direct observation and active searching in potential concealed locations such as in leaf litter, under stones and logs. Auditory detection of species-specific advertisement calls was used to survey frogs and toads. Surveys were focussed on areas within 10 m either side of the survey transects (*Figure 8.4*).

Herpetofauna surveys were carried out on 14, 16 and 29 February, 9 March, 19 April, 23 and 25 May and 9 July 2004 through active searching within the Study Area covering both dry and wet seasons. A night survey for amphibians was carried out on 25 May 2004. Qualitative surveys were undertaken on 27 and 28 October 2005 to update the ecological profile of the Study Area. Nomenclature used in this report for reptiles follows Karsen *et al* (1998) <sup>(2)</sup> while that for amphibians follows Lau and Dudgeon (1999) <sup>(3)</sup> and AFCD (2005) <sup>(4)</sup>.

### *Invertebrate (Dragonflies and Butterflies)*

The methodology for the invertebrate surveys made reference to those proposed in the *Technical Guidance Notes 7/2002* and *10/2004* of the *EIA Ordinance*. Dragonflies and butterflies of different habitats within the Study Area were surveyed on 14, 16 and 29 February, 9 March, 19 April, 23 and 25 May and 9 July 2004 using the transect count method. Qualitative surveys were undertaken on 27 and 28 October 2005 to update the ecological profile of the Study Area.

During the transect count surveys, all of the dragonflies and butterflies found within 10 m either side of the transect (except for stream/channel) were identified and counted. The locations of the survey transects for dragonflies and butterflies are shown in *Figure 8.4*

(1) Wilson D.E. and D.M. Reeder. (1992). *Mammal species of the world: A taxonomic and geographic reference*. Smithsonian Institution Press, Washington & London.

(2) Karsen, S. J., Lau, M. W. N. and Bogadek, A. (1998). *Op cit*.

(3) Lau, M.W.N. and D. Dudgeon (1999). Composition and distribution of Hong Kong Amphibian fauna. *Memoirs of the Hong Kong Natural History Society* 22: 1-80.

(4) AFCD (2005). *A Field Guide to the Amphibians of Hong Kong*. Friends of the Country Parks.

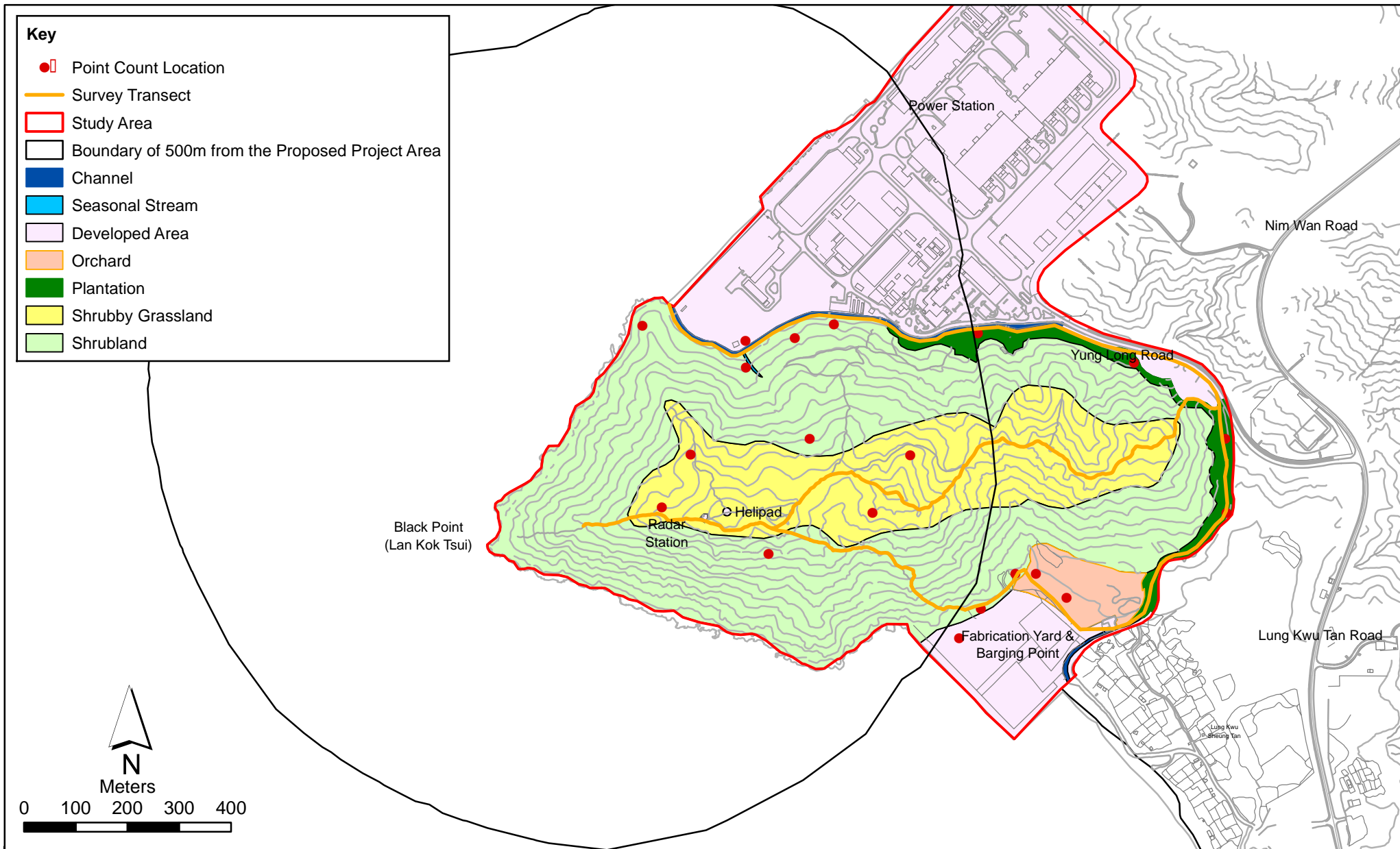


Figure 8.4

Sampling Locations and Survey Transects for Ecological Baseline Survey with Study Area



Stream habitat within the Study Area was surveyed using the point count method, due to the small size of this habitat. For the point count method, a total of five minutes was spent counting butterflies and dragonflies at each point for each visit. All butterflies and dragonflies seen within 10 m of each point were counted and identified to species where possible. Relative abundance of the dragonflies and butterflies in each type of habitat were estimated. Dragonflies and butterflies encountered outside survey transects and counting points but within the Study Area were also recorded in order to produce a complete species list. Nomenclature for butterflies follows Walthew (1997) <sup>(1)</sup> and Yiu (2004) <sup>(2)</sup> and dragonfly nomenclature follows Wilson (2004) <sup>(3)</sup>.

### *Aquatic Fauna*

The methodology for the aquatic fauna surveys made reference to those proposed in the *Technical Guidance Notes 7/2002* and *10/2004* of the *EIA Ordinance*. Field surveys were undertaken on 16 February and 25 May 2004 to identify the water bodies and aquatic resources in the Study Area. Qualitative surveys were undertaken on 27 and 28 October 2005 to update the ecological profile of the Study Area. The stream fauna were studied by direct observation and active searching. The classification of the stream fauna followed Chong and Dudgeon 1992 <sup>(4)</sup>, Nelson 1994 <sup>(5)</sup> and AFCD (2004) <sup>(6)</sup> while the conservation status of the stream fauna followed Fowler 1972 <sup>(7)</sup>, AFCD (2004) <sup>(8)</sup>, Yue and Chen 1998 <sup>(9)</sup>.

The information presented in the following sections is based on the findings of the baseline surveys performed during the period February to July 2004 and October 2005. The baseline ecological conditions have been evaluated based on the criteria laid out in *Annexes 8 & 16* of the *EIAO-TM*. The findings of the baseline surveys undertaken at Black Point were also used to compare with other coastal areas in the vicinity including North Lantau, West New Territories, and Lung Kwu Chau, in order to obtain a more comprehensive understanding of the existing resources and ecological importance of Black Point.

### *Results of Baseline Ecological Surveys*

#### **Existing Habitat and Vegetation**

- (1) Walthew G (1997). The status and flight periods of Hong Kong butterflies *Porcupine!* 16: 34-37.
- (2) Yiu V (2004). *Op cit.*
- (3) Wilson, K.D.P (2004). *Op cit.*
- (4) Chong, D. H. and D. Dudgeon (1992). Hong Kong stream fishes: an annotated checklist with remarks on conservation status. *Memoirs of the Hong Kong Natural History Society* Vol. 19 pp. 79-112.
- (5) Nelson, J. S., (1994), *Fishes of the World*, 3rd ed, John Wiley & Sons, Inc. United States of America. Pp. 600.
- (6) AFCD (2004). *Field Guide to the Freshwater Fish of Hong Kong*. Friends of the Country Parks.
- (7) Fowler, H. W., (1972), *A Synopsis of the Fishes of China*, Vols. 1 & 2 (reprint), Antiquariaat Junk, Dr. R. Schierenberg & Sons N. V., P. O. Box 5, Netherlands. Pp. 1459.
- (8) AFCD (2004). *Field Guide to the Freshwater Fish of Hong Kong*. Friends of the Country Parks.
- (9) Yue, P. and Y. Chen (ed), 1998, *China Red Data Book of Endangered Animals, Pisces*, Science Press, Beijing, China. Pp. 247, pls. VII.

Black Point is the western most part of the New Territories, extending as a promontory approximately 1 km westwards of the general outline of the coast. The Study Area lies on this headland. Areas within the Study Area are covered by shrubland and shrubby grassland, a small patch of exotic plantation along the eastern fringe of the headland, a seasonal stream of short length and two channels, a developed area including the power station, barging point and fabrication yard for Shenzhen Western Corridor Project and wastelands located at the northern and southern fringes of the headland and an orchard under active management for cultivation of fruits located at the southern fringe of the headland.

As a result of the long history of deforestation, repeated hill fire and exposure to strong wind, thin top soil and frequent erosion, the headland within the Study Area is comprised of shrubland and shrubby grassland, without any significant woodland area. Shrubland covers the steep terrain, the gully and the sheltered areas of the headland where sufficient water supply is present. Shrubby grassland with scattered barren rocks was found along the ridges of the headland. Electricity transmission lines, helipad and marine radar station are also present on the headland.

A total of 91 plant species were recorded (*Table 1 of Annex 8*) within the Study Area. Two locally protected plant species, Pitcher plant *Nepenthes mirabilis* and Bamboo Orchid *Arundina graminifolia* were recorded within the Study Area. A habitat map of the habitat types surveyed is presented in *Figure 8.3*. *Table 8.3* lists the number of plant species recorded in each habitat type.

**Table 8.3** *Habitat Types Recorded Within the Study Area*

Habitat Type*	Area (hectare)/ Length (Km)	Number of Plant Species Recorded
Plantation	2.9 ha	18
Shrubland	46.6 ha	70
Shrubby Grassland	18.2 ha	25
Stream/Channel	7.2 Km	18
Orchard	1.4 ha	6
Developed Area	43.6 ha	7

Note: \* Bare rocks, artificial shore and sandy beach were grouped to marine ecological resources and will be discussed in detail in *Part 3 Section 9*.

### Plantation

Plantation is defined as man-made woodland with a selection of particular tree species that are well adapted to the adverse conditions of hillsides in Hong Kong <sup>(1)</sup>. In Hong Kong, plantation consists of several exotic and fast growing species such as *Acacia confusa* and *Lophostemon conferta*, which are planted to establish as canopy species and provide habitat for colonisation of native undergrowth. Plantation was found as a small area (total 2.9 ha)

(1) Dudgeon D and Corlett R (2004). *The Ecology and Biodiversity of Hong Kong*. The Hong Kong University Press.

beside the power station and along the pathway from Yung Long Road to the barging point and fabrication yard for Shenzhen Western Corridor Project. Photographic records of plantation within the Study Area are shown in *Figure 8.5*.

The plantation was dominated by exotic plant species including *Acacia confusa*, *Albizia lebbek*, *Melaleuca leucadendron*, *Lophostemon conferta* and *Cassia surrattensis*. The plantation was young in age (less than 15 years) with a developed canopy that reached heights of 10 to 12 m. The understorey was open and sparsely vegetated by native shrubs and climbers including *Rhodomyrtus tomentosa*, *Melastoma candidum*, *Melastoma sanguineum*, *Dalbergia benthami* and *Dalbergia millettii*. Eighteen plant species were recorded within the plantations and no rare/protected species were found. The floral diversity and structural complexity of the plantation were low.

It can be seen from *Table 2a* of *Annex 8* that plantations in most of the areas in the vicinity selected for comparison were low in floristic diversity and structural complexity and the dominant plant species are mostly exotic and fast growing. In conclusion, the ecological importance of plantation at Black Point is low.

### Shrubland

Shrubland is defined as woody vegetation with a modal height of between 1 m and 4 m and is in a transitional stage in the ecological succession between grassland and woodland/forest <sup>(1)</sup>. Shrubland was the main habitat covering the headland and was also located in gully. Photographic records of shrubland within the Study Area are shown in *Figure 8.6*. The continuous patches of shrubland at the northern and western parts of the Study Area, which were more sheltered than that of the southern part, were densely vegetated with native shrubs and climbers. The vegetation was well developed and the canopy species reached a height of 2 to 3 metres.

Shrubland at the southern part of the Study Area had a lower percentage cover of shrub species than that of the west and north parts and was more subject to natural erosion and human disturbance. A greater amount of rocks were found in the shrubland at the southern part.

Shrubland was dominated by native plant species including *Celtis sinensis*, *Aporosa dioica*, *Cassytha filiformis*, *Gordonia axillaries*, *Litsea rotundifolia*, *Sterculia lanceolata* and *Caesalpinia vernalis*. A total of 70 plant species were recorded within the shrubland and all of them are common or very common in Hong Kong. The exceptions were two locally protected plant species, the Pitcher Plant *Nepenthes mirabilis* and the Bamboo Orchid *Arundina graminifolia*. Both of these were recorded at the northwest part of the shrubland (*Figure 8.7*). Bamboo Orchid *Arundina graminifolia* is a herb that usually inhabits grassland or streamsides in Hong Kong. The Pitcher Plant *Nepenthes mirabilis* is a

(1) Dudgeon D and Corlett R 2004. *Op cit*.

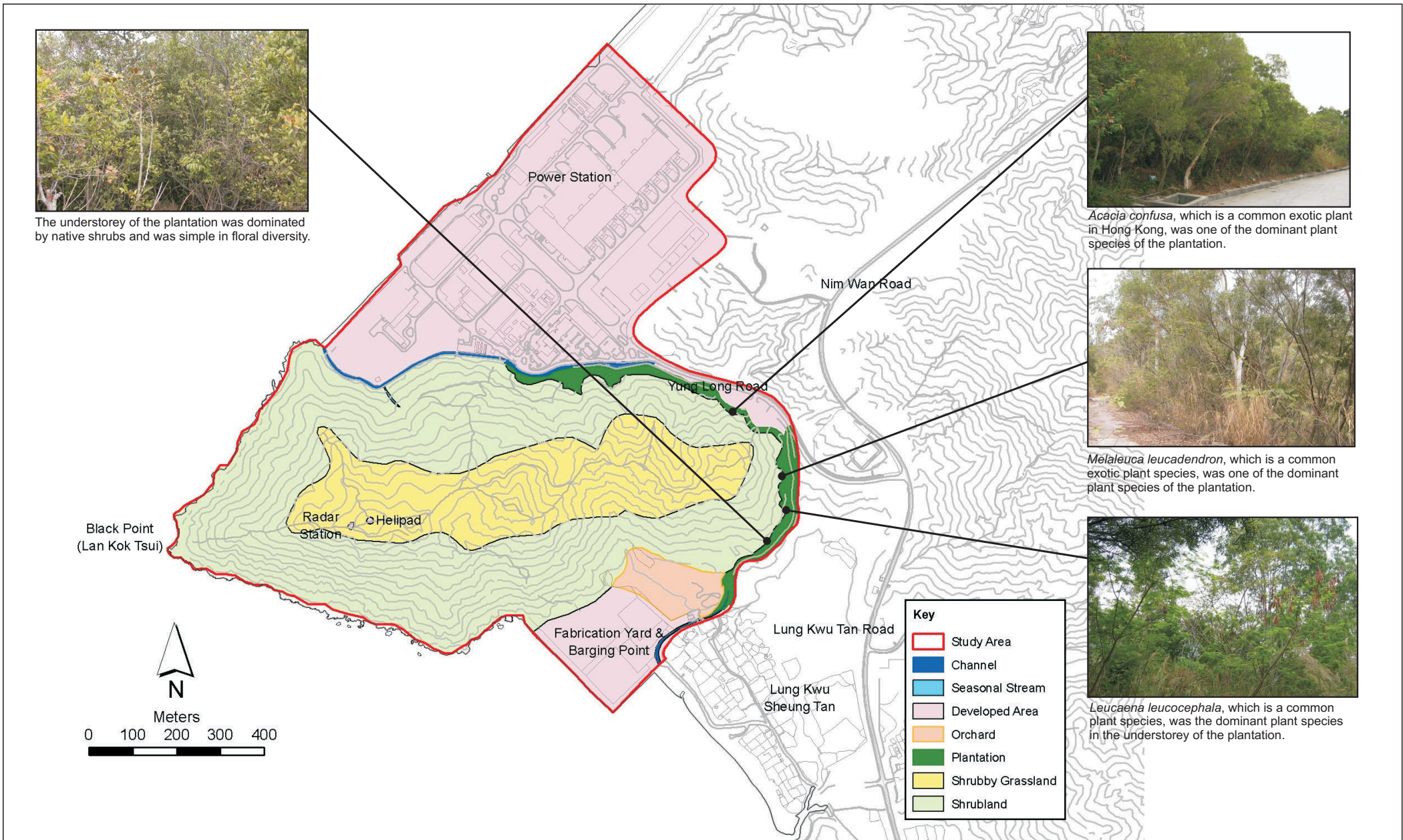


Figure 8.5

Photographic Records of the Plantation Habitat

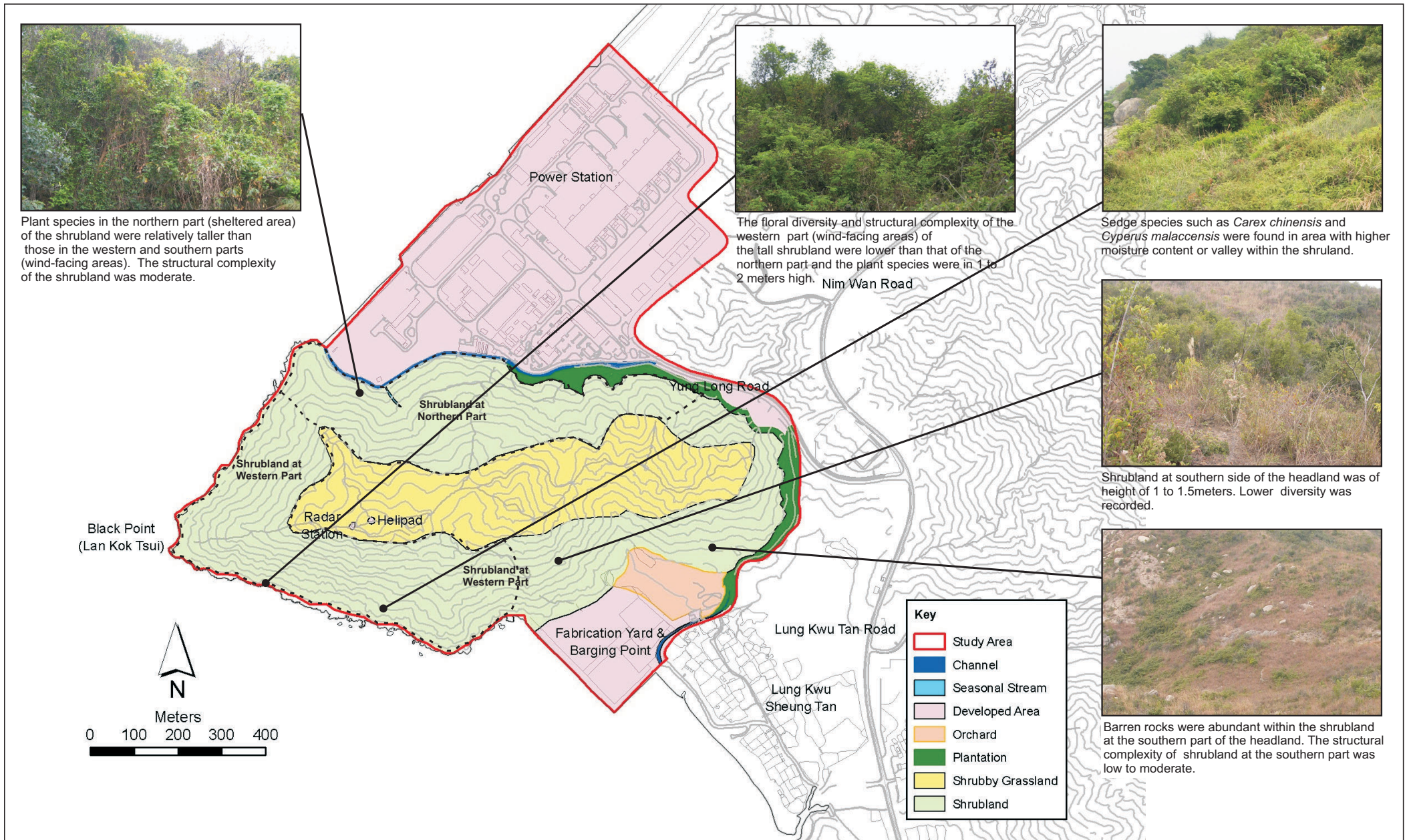


Figure 8.6

Photographic Records of the Shrubland Habitats

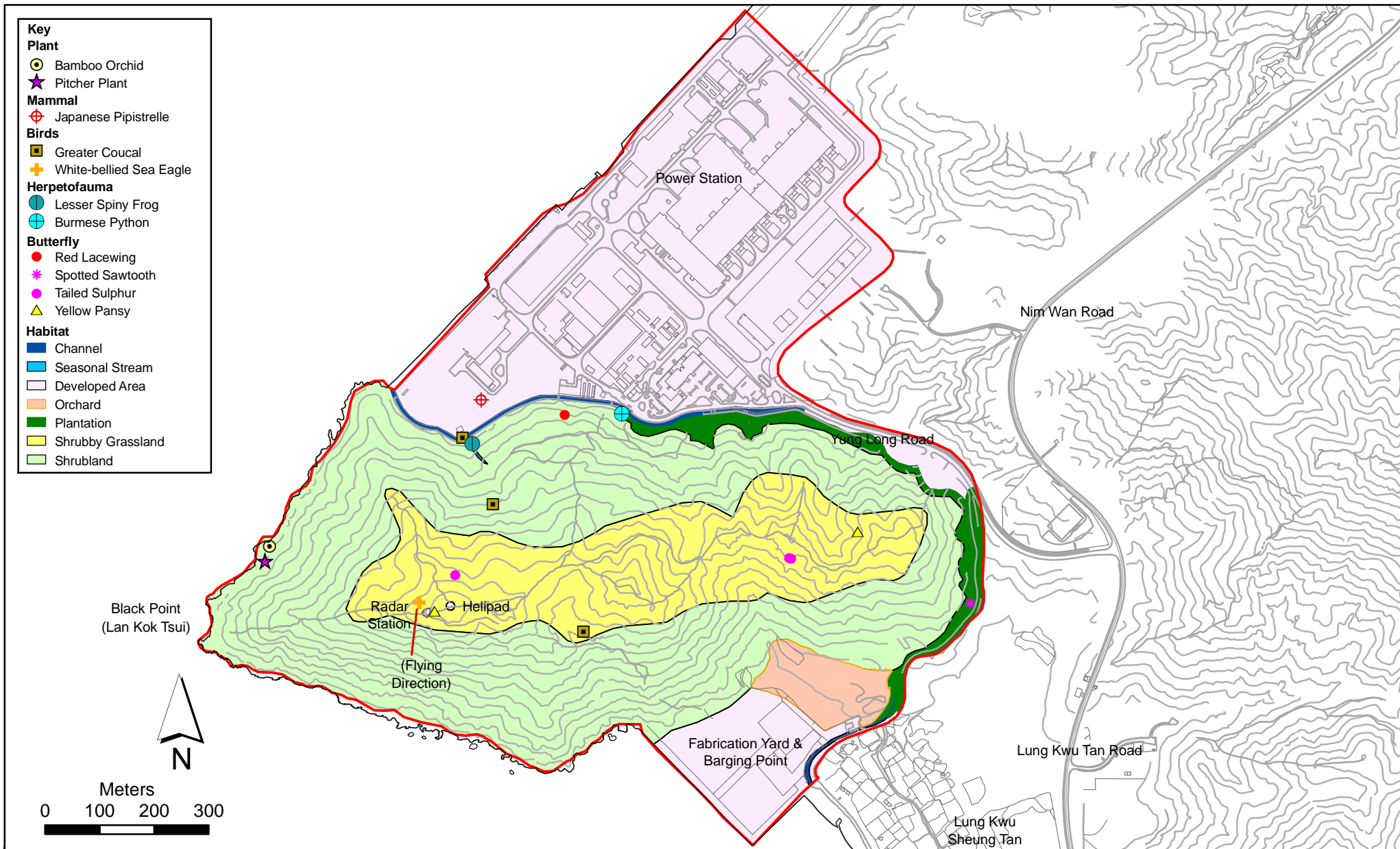


Figure 8.7

Location of Species of Conservation Interest within the Study Area

carnivorous herb that inhabits wet, open places on rocky areas in the Study Area.

The shrubland at the northern and western parts were largely untouched and the floristic diversity and structural complexity were medium. The floristic diversity and structural complexity of the shrubland at the southern part was low to moderate.

Shrubland is one of the most extensive vegetation types, other than grassland and secondary forest, in Hong Kong <sup>(1)</sup>. Shrubland is the dominant habitat within the Study Area, as well as other selected areas in the vicinity (*Table 2b of Annex 8*). The domination by shrubland habitats is due to the harsh environmental conditions such as limited water supply, low water retention capability of the soil, exposure to strong sunlight and exposure to strong winds.

The plant species recorded in the shrubland of Black Point are commonly found elsewhere on Hong Kong hillsides. Shrubland habitats in all selected areas were dominated by native shrubs but the floristic diversity and structural complexity of the habitats is influenced by the extent of human disturbance. In conclusion, the ecological importance of shrubland in Black Point is low to moderate (southern part) or moderate (northern and western parts).

#### Shrubby Grassland

Shrubby grassland refers to the intermediate form of pure grassland and shrubland with grass species comprising over 60% of the vegetation cover with the remainder comprising scattered shrubs <sup>(2)</sup>. Shrubby grassland was found covering the ridges of the headland, in the gully and sheltered areas. Barren rocks were found within the shrubby grassland due to the extensive erosion of the existing granitic rocks. The thin topsoil has resulted from extensive soil erosion and this has restricted the establishment of tall shrub community on the ridges of the headland. Evidence of hill fires was found at the shrubby grassland during the site visits. Photographic records of the shrubby grassland within the Study Area are shown in *Figure 8.8*.

The dominant plant species included several grasses such as *Ischaemum aristatum*, *Digitaria sanguinalis* and *Rhynchelytrum repens* growing to a height of 0.5 to 1.5 meters. Shrub species were scarcely found within this habitat. Twenty five plant species were found in shrubby grassland and neither rare nor protected plant species were recorded. The floristic diversity and structural complexity of the shrubby grassland were low.

Shrubby grassland or shrubland and grassland mosaic were common in most of the coastal areas of North Lantau/West New Territories (Dudgeon and

(1) Dudgeon D and Corlett R 2004. *Op cit.*

(2) Dudgeon D and Corlett R 2004. *Ibid.*

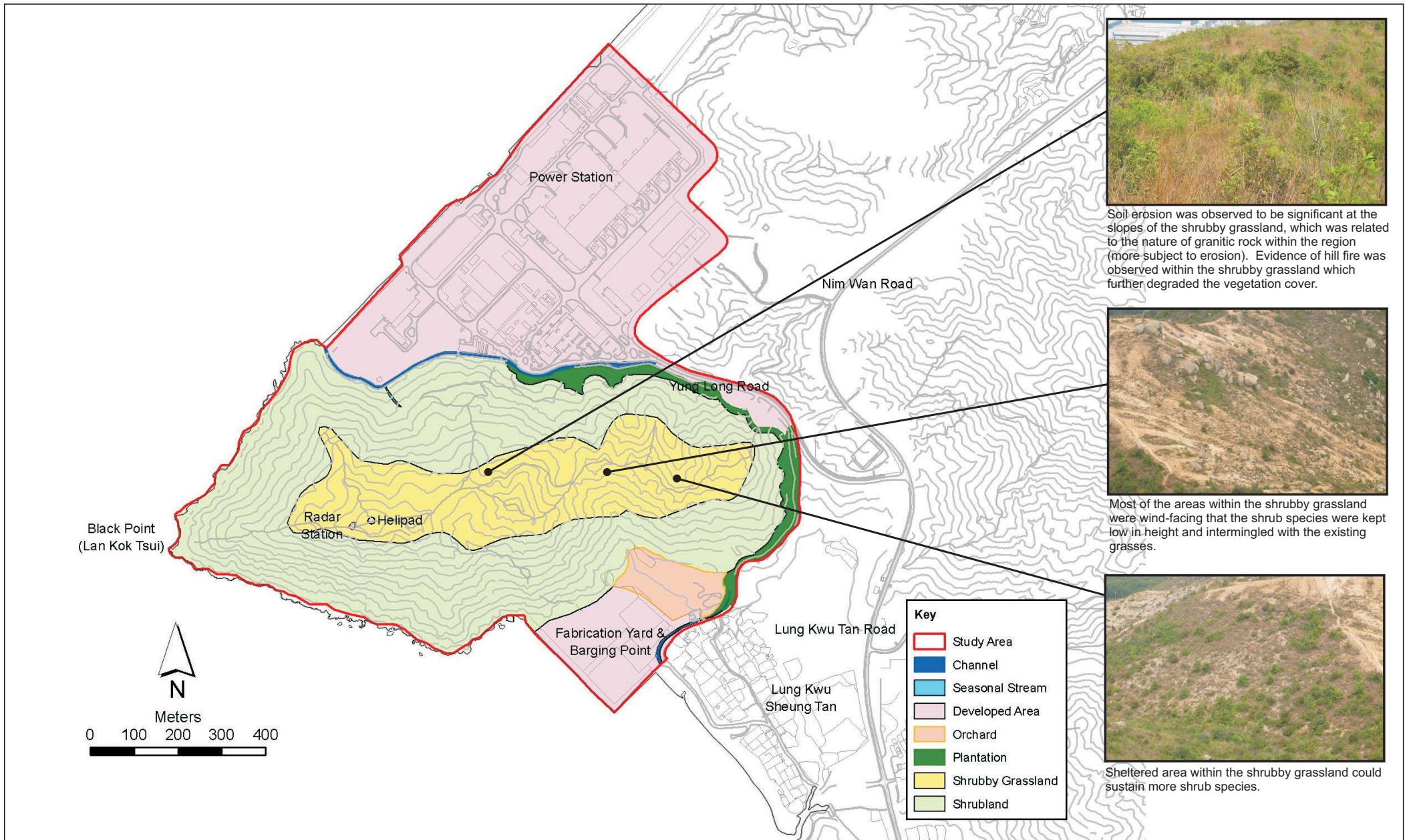


Figure 8.8

Photographic Records of the Shrubby Grassland Habitats



Corelett 2004)<sup>(1)</sup>. The plant species composition of the habitat is simple with limited number of species recorded, i.e., 25 plant species in Black Point, 33 plant species in Siu Ho Wan and 90 plant species in North Lantau. Natural erosion and occurrence of hill fires restricts the further colonisation of shrub species.

Shrubby grassland habitat in Hong Kong is generally regarded as low quality habitat with relatively low floristic diversity and structural complexity. The ecological importance of shrubby grassland at Black Point is therefore considered to be low.

#### Stream/Channel

A natural seasonal stream and two stormwater drainage channels were found within the Study Area. Photographic records of the streams and channels are shown in *Figure 8.9*. The natural seasonal stream was located at the north of the headland running from the middle of the hill towards the power station. A concrete channel was constructed in between the Black Point Power Station and the headland running from Yung Long Road to the sea. Another short channel was located at the southeast of the headland running from the plantation to the barging point and fabrication yard for Shenzhen Western Corridor Project. The riparian vegetation of the natural seasonal stream was integrated with the surrounding shrubland with semi-open canopy, while the plant community of the channels mainly consisted of exotics.

A total of 18 plant species were found along the stream/channel habitat and no rare/protected species were recorded. The substratum of the natural seasonal stream was rocky and limited water flow was recorded during the surveys. Both of the channels were cemented and artificial. The channel in between the power station and headland had limited water flow and the section next to the sea was brackish in nature due to tidal intrusion. The channel in the plantation was dry during the site visits.

A protected snake species, the Burmese Python *Python molurus* was found in the drainage channel next to the Black Point Power Station during the additional ecological survey. The location of Burmese Python is shown in *Figure 8.7*. The floristic diversity and structural complexity of the natural stream are low while those for the channels were negligible.

Permanent natural stream habitat is not present at Black Point because of the steep terrain of the headland. The seasonal stream at Black Point was of a much smaller scale compared with the permanent streams in other areas in the vicinity which show a higher abundance and diversity of aquatic fauna (*Table 2d of Annex 8*). Other than the Lesser Spiny Frog (only one individual recorded during the surveys), which is a recognized species of conservation interest, no aquatic fauna were found in the stream, which indicated low to moderate ecological importance of the seasonal stream found at Black Point.

(1) Dudgeon D and Corlett R 2004. *Ibid.*

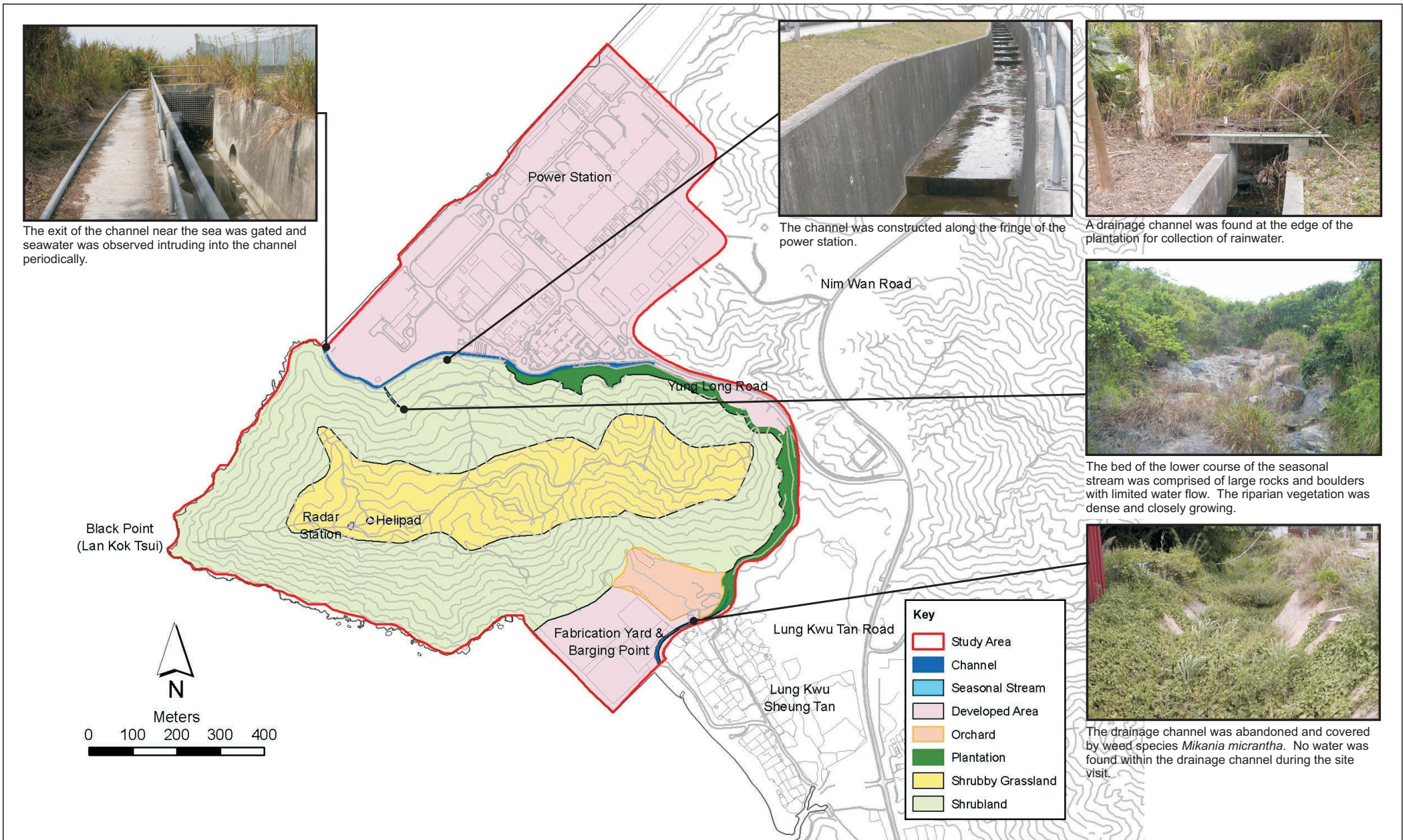


Figure 8.9

Photographic Records of the Stream / Channel Habitats

## Orchard

An orchard lies within the Study Area located next to the barging point and fabrication yard for Shenzhen Western Corridor Project at the southern fringe of the headland. It is fenced and under active management. The orchard was dominated by *Dimocarpus longan* and *Litchi chinensis*. The fruit trees were in good condition and the understorey was well maintained without any vegetation. Photographic records of the orchard are shown in *Figure 8.10*. Six plant species were recorded in this habitat and no rare/protected species were found. The orchard within the Study Area was highly modified and was of low floristic importance.

The orchard is a man made habitat for the cultivation of fruit. The orchards in other areas in the vicinity of Black Point and on North Lantau were also low in floristic diversity and structural complexity (*Table 2e of Annex 8*). In conclusion, the ecological importance of orchard at Black Point was low.

## Developed Area

The developed area was the second largest habitat within the Study Area. This habitat type consisted mainly of the power station, a barging point and fabrication yard for Shenzhen Western Corridor Project, car parks, wasteland and roads. Photographic records of the developed area are shown in *Figure 8.11*. Over 90% of the vegetation recorded within this habitat type was planted for landscaping purposes and was dominated by *Melaleuca leucadendron*, *Schefflera octophylla*, *Duranta repens*, *Cassia surattensis* and *Bauhinia blackeana*. Similar to other developed areas in the vicinity, this habitat was highly developed with limited ecological significance and only seven plant species were found in this habitat, without any rare or protected species recorded (*Table 2f of Annex 8*).

Due to the disturbed nature of the habitat and lack of rare or protected species, the ecological importance of the developed area at Black Point is negligible.

## **Wildlife**

### Birds

There were a total of 51 species of birds recorded within the Study Area during the surveys. Twelve species were recorded only during the dry season and 17 recorded only during the wet season, and 22 species were recorded in both seasons. Thirty one species were recorded at the sampling points during point count surveys and an additional 22 species were recorded outside of the sampling points but within the Study Area (*Tables 3 and 4 of Annex 8*).

The details of the point count bird data are shown in *Table 4 of Annex 8*. Relative abundance and species richness in each type of surveyed habitat, based on the results of the point count method, are presented in *Table 8.4*.

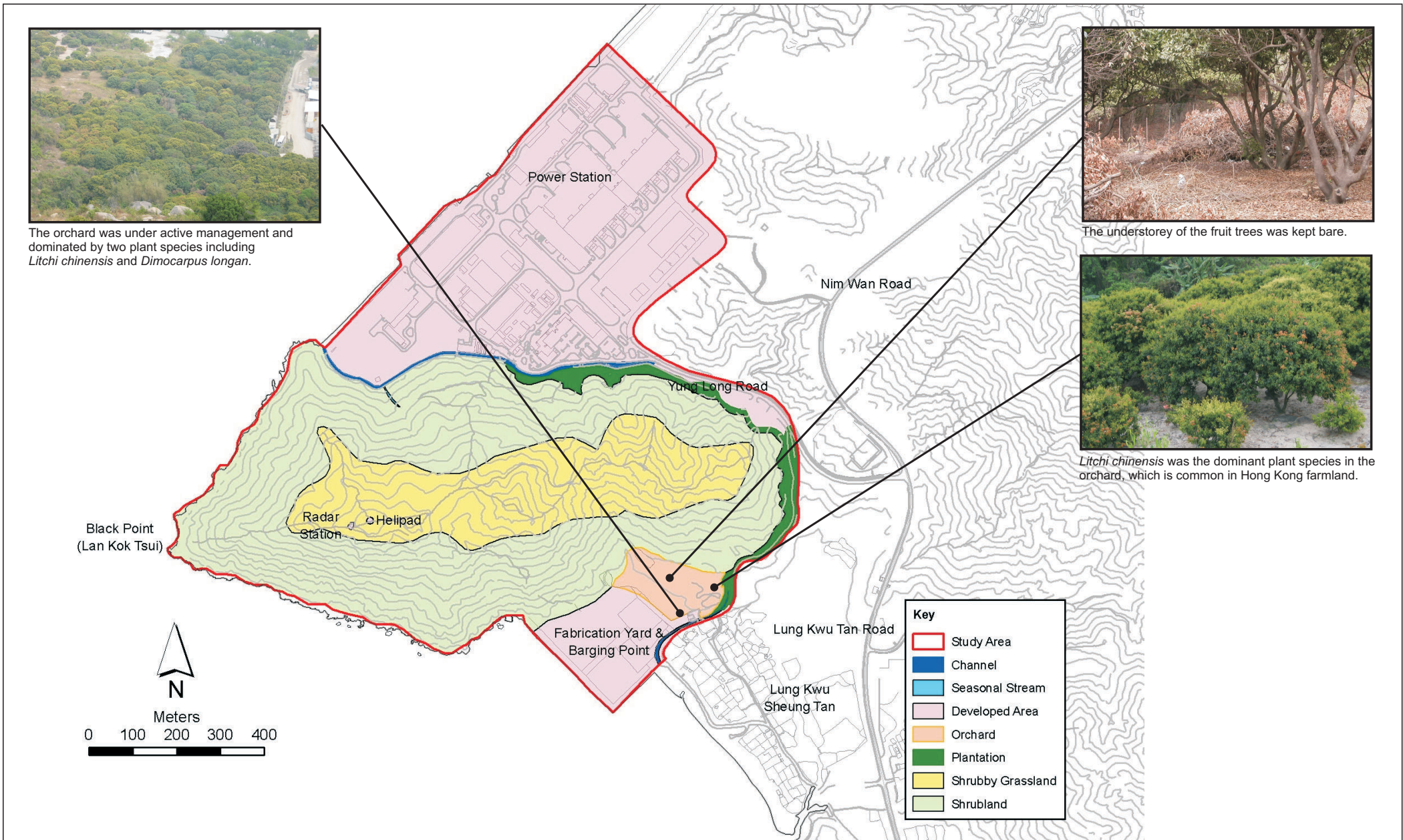
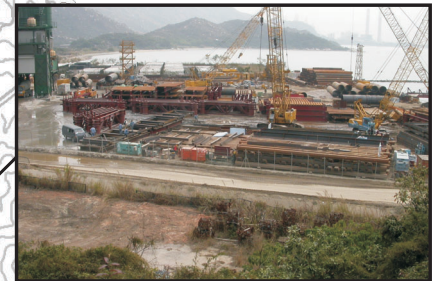


Figure 8.10

Photographic Records of the Orchard Habitat



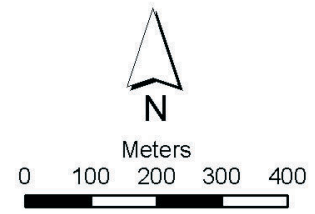
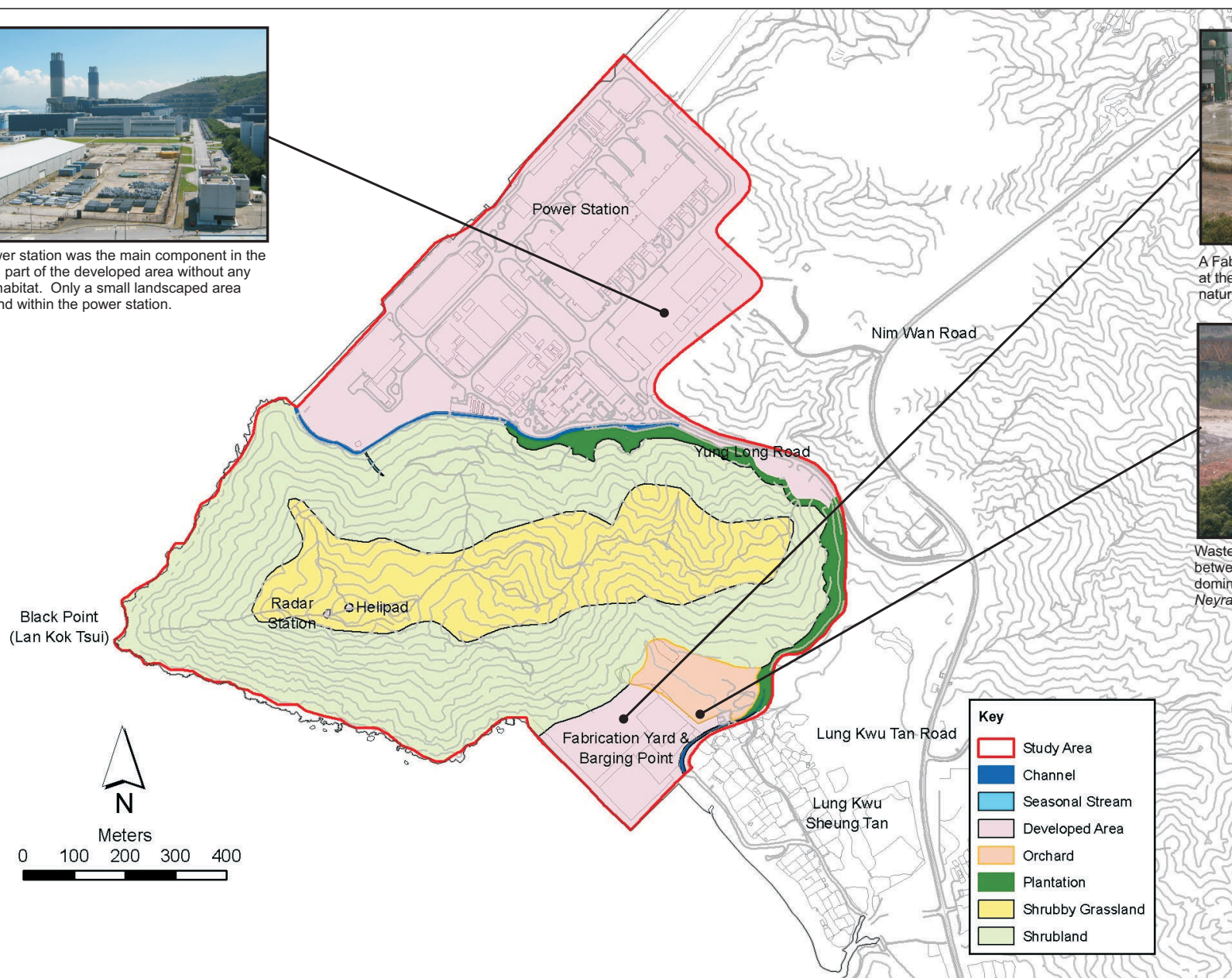
The power station was the main component in the northern part of the developed area without any natural habitat. Only a small landscaped area was found within the power station.



A Fabrication yard & barging point was found at the southern part of the developed area and no natural habitats were found.



Wasteland was found within the developed area in between the orchard and cement plant and dominated by a few grass species including *Neyraudia arundinacea*.



Key	
[Red outline]	Study Area
[Blue line]	Channel
[Light blue line]	Seasonal Stream
[Pink area]	Developed Area
[Orange area]	Orchard
[Green area]	Plantation
[Yellow area]	Shrubby Grassland
[Light green area]	Shrubland

Figure 8.11

Photographic Records of the Developed Areas

The highest mean number of individuals of birds was recorded in orchard, shrubby grassland and shrubland. Plantation recorded the highest total number of bird species.

**Table 8.4** *Abundance and Species Richness of Birds Within the Study Area during the Point Count Surveys*

	Season	P	S	SG	ST	OR	D	Total
Number of sampling points covered an area of ~ 0.28 ha)		4	4	4	4	2	2	20
Number of survey days	Dry	4	4	4	4	4	4	4
	Wet	4	4	4	4	4	4	4
	overall	8	8	8	8	8	8	8
Total number of individuals	Dry	23	44	35	22	12	13	149
	Wet	35	33	49	37	29	8	191
	Overall	58	77	84	59	41	21	340
Mean abundance (birds per hectare per survey day)	Dry	5.10	9.75	7.76	4.88	5.32	5.76	6.60
	Wet	7.76	7.31	10.86	8.20	12.85	3.55	8.46
	Overall	6.41	8.51	9.29	6.52	4.53	4.64	7.52
Total number of species	Dry	7	8	7	7	8	5	24
	Wet	14	6	8	10	7	4	22
	Overall	17	9	9	13	12	7	31
Species Richness (mean no. of species per sampling point)	Dry	0.44	0.50	0.44	0.44	1.00	0.63	0.53
	Wet	0.88	0.38	0.50	0.63	0.88	0.50	0.49
	Overall	1.06	0.56	0.56	0.81	1.50	0.88	0.69

Habitat: P = plantation; S = shrubland, SG = Shrubby grassland, ST = stream/channel, OR = orchard, D = developed area.

Avifauna recorded at Black Point during the surveys showed a limited degree of seasonal variation. Abundance and species richness in the dry season were generally higher than the wet season for developed area and shrubland, while abundance and species richness in the wet season were generally higher for orchard, plantation, stream/channel and shrubby grassland. For total species richness, there were 24 species recorded in the dry season and 22 species in the wet season.

Species recorded in the dry season were mainly residents and winter visitors, with a few passage migrants. Species recorded in the wet season were residents with summer visitors, passage migrants and a few winter visitors. However, some of the residents were only recorded in the wet season. Since the wet season covered the breeding periods of many species, the calls of some residents such as Chinese Francolin and Common Koel increased their detectabilities. Among the recorded species, there were 34 residents, six passage migrants, four summer visitors and 16 winter visitors (*Table 3 of Annex 8*).

Most of the bird species recorded are common and widespread in Hong Kong

(such as Chinese Bulbul *Pycnonotus sinensis*), and generally of low conservation importance (e.g., Crested Myna *Acridotheres cristatellus*). Among the bird species recorded within the Study Area, there were three species of conservation interest; Black Kite *Milvus lineatus*, White-bellied Sea Eagle *Haliaeetus leucogaster* and Greater Coucal *Centropus sinensis*. The locations of the recorded species of conservation interest, except the Black Kite, are shown on *Figure 8.7*.

The Black Kite is a very widespread and common species in Hong Kong and its distribution pattern and density is presented in *Figure 1 of Annex 8*. It is conspicuous in the urban area and over Victoria Harbour all year around. It is more numerous in winter than in summer and the number peaks in December and January <sup>(1)</sup>. Black Kites are found in a wide variety of coastal and inland habitats, including small islands, sea-coasts, intertidal mudflat, fish ponds, reservoirs, landfills and grassy hillsides at all altitudes. The Black Kite is protected in China and listed as a Class 2 Protected Animal of PRC and in *Appendix 2 of CITES*. Black Kites were only recorded soaring during the surveys. The exact locations of the bird cannot therefore be shown in *Figure 8.7*. Black Kites usually forage over a large area and Black Point is considered to be a part of their foraging area.

The Greater Coucal is a *Class 2 Protected Animal* in the PRC <sup>(2)</sup>. However, it occupies many types of habitats in Hong Kong (Carey *et al* 2001), and is a common resident. It is frequently found in grasslands, mangroves, marshes, agricultural lands with scattered trees and bushes, open canopy shrubland, fung shui woods and gardens, and has been noted foraging in refuse. The distribution pattern and density of Greater Coucal in the Hong Kong SAR is presented in *Figure 1 of Annex 8*. It was found perching in the shrubby grassland, shrubland and the stream during the surveys.

The White-bellied Sea Eagle is resident in Guangdong and southern Fujian and occasionally occurs in Jiangsu and Hainan. It is an uncommon resident in Hong Kong in coastal areas and offshore islands, and is listed as a rare species in the China Red Data Book, Class II protected species in PRC and *CITES Appendix II*. White-bellied Sea Eagles are mostly found in rocky coastlines but are also seen over reservoirs and hills close to the sea. The most recent comprehensive studies undertaken by AFCD (Tsim *et al* 2003) <sup>(3)</sup> reported that there were eight breeding sites (Pa Tau Kwu in Lantau Island, Green Island and Wong Ma Kok in Hong Kong Island, Stonecutters Island in Kowloon, Yeung Chau, Tai Ngam Hau, Tsim Chau and Sham Chung in Sai Kung), recorded in Hong Kong (*Figure 2 of Annex 8*). One immature White-bellied Sea-eagle was observed flying above the radar station located on top of the headland during the survey.

(1) Carey, G.J., *et al* (2001). *Op cit*.

(2) Viney, C., Phillipps, K., and Lam, C.Y. (1996): *Birds of Hong Kong and South China*. Government Printer, Hong Kong.

(3) Tsim S T, Lee W H, Cheung C S, Chow K L, Ma Y N and Liu K Y (2003). The population and breeding ecology of white-bellied sea eagles in Hong Kong. *Hong Kong Biodiversity*. Issue 5 August 2003 Page 1-3.

Juveniles of four bird species were recorded within the Study Area (Table 8.5): White Wagtail, Red-whiskered Bulbul, Chinese Bulbul and Oriental Magpie Robin. All are common and widespread bird species in Hong Kong.

Table 8.5 *Juvenile Bird Species Recorded Within the Study Area*

Common Name	Habitat Type Recorded	Observation
White Wagtail	Channel	Juveniles recorded
Red-whiskered Bulbul	Plantation and stream	Juveniles recorded
Chinese Bulbul	Stream, shrubby grassland and shrubland	Juveniles recorded
Oriental Magpie Robin	Channel	Juveniles recorded

Overall, the species diversity of birds at Black Point is moderate, when considering survey effort (including the number of survey days and the duration of the survey period) and the size of the surveyed areas, compared with other areas in the vicinity and north Lantau (Table 5 of Annex 8).

### Invertebrates

#### Butterflies

A total of 37 species of butterfly were recorded in different habitats at Black Point between February and July 2004 including both dry and wet seasons (Tables 6a – 6c of Annex 8) during the point count survey. One additional species, Great Orange Tip *Hebomoia glaucippe*, was recorded between sampling transects and points within the Study Area. Two uncommon (Yellow Pansy *Junonia hierta*, and Tailed Sulphur *Dercas verhuelli*) and two rare species (Spotted Sawtooth *Prioneris thestylis* and Red Lacewing *Cethosia biblis*) were recorded. Food plants of these species are listed in Table 8.6. The locations of these species are shown in Figure 8.7.

Table 8.6 *Butterfly Species of Conservation Concern at Black Point*

Common Name	Species Name	Food Plant	Habitat Found
Yellow Pansy	<i>Junonia hierta</i>	<i>Barleria cristata</i>	Shrubby grassland
Tailed Sulphur	<i>Dercas verhuelli</i>	<i>Dalbergia benthami</i>	Shrubby grassland
Spotted Sawtooth	<i>Prioneris thestylis</i>	Species of Capparaceae	plantation
Red Lacewing	<i>Cethosia biblis</i>	<i>Passiflora cochinchinensis</i>	Shrubland

The Yellow Pansy prefers dry and open vegetated areas <sup>(1)</sup>, and is usually found near their larval food plant the Philippine Violet *Barleria cristata* <sup>(2)</sup>, and has been recorded in Lung Kwu Tan, Wong Lung Hang, Peng Chau, Mount Davis and Kadoorie Farm. The Yellow Pansy was found in the shrubby grassland during the survey.

The Tailed Sulphur inhabits woodland and well-vegetated areas <sup>(3)</sup> and has been recorded in Tai Po Kau, Hok Tau, Shing Mun Reservoir, Fung Yuen and

- (1) Bascombe, M. J., G. Johnston and F. S. Bascombe. (1999). *The Butterflies of Hong Kong*. Academic Press, United Kingdom.  
 (2) Walthew, G. (1997). The status and flight periods of Hong Kong butterflies. *Porcupine!* 16: 34-37.  
 (3) Bascombe, M. J., G. Johnston and F. S. Bascombe. (1999). *Ibid.*



Sam A Tsuen. The Tailed Sulphur was found in shrubby grassland within the Study Area.

Due to the rarity and slow growth rate of their larval food plant the King Snake Creeper *Passiflora cochinchinensis*, the Red Lacewing is rare in Hong Kong <sup>(1)</sup>. The biggest and most stable population of this species is found at Lung Kwu Tan, San Tau, Mount Nicholson, Tong Fuk and Pui O <sup>(2)</sup>. It was found in shrubland during the survey.

The Spotted Sawtooth is usually found in wooded areas <sup>(3)</sup> and has been recorded in Tai Po Kau, Kwun Yam Shan, Shan Liu, Ngau Ngak Shan and Cheung Chau. It was found in the plantation during the survey.

Butterfly abundance in shrubland was considered low to medium, and low in other habitats (Table 8.7). The Species richness of butterfly was considered medium in shrubby grassland and low in other types of habitats. The generally low butterfly abundance and species richness in the whole of the Black Point Study Area was related to the disturbed nature of the habitats (e.g., hill-fires).

**Table 8.7** *Mean Abundance of Butterfly Recorded at Black Point during the Transect/Point Count Surveys*

	Season	Plantation	Shrubland	Shrubby Grassland	Orchard	Stream/Channel	Total
No. of individual per hectare	Dry	2.0	12.1	1.6	6.8	0	22.5
	Wet	8.8	35.5	11.7	11.3	0	67.3
No. of species	Dry	5	7	8	3	0	16
	Wet	16	14	24	8	0	31
No. of uncommon /rare species	Dry	0	0	1	0	0	1
	Wet	1	1	2	0	0	4
	Overall	1	1	2	0	0	4

Both abundance and species richness of butterflies at Black Point were higher in the wet season (Table 8.7). Abundance was three times higher in the wet season than in the dry season. The number of species of butterfly recorded during the wet and dry seasons surveys was 31 and 16 respectively (Tables 6a and 6b of Annex 8).

The number of butterfly species in Black Point was moderate when compared with other areas in consideration of the survey efforts (including the number of survey days and the duration of survey period) (Table 7 of Annex 8). The

(1) Yiu V (2004). *Op cit.*

(2) Yiu V (2004). *Ibid.*

(3) Walthew, G. (1997). *Op cit.*

presence of stream habitats and woodland, which do not feature strongly at Black Point, would sustain more butterfly species by providing suitable habitat.

### Dragonfly

Five species of dragonfly were recorded in different habitats at Black Point between February and July 2004 (Tables 8a and 8b of Annex 8). The diversity of dragonflies in the Study Area at Black Point was low, due to the lack of natural aquatic habitats. All recorded species are common and widespread in Hong Kong (Wilson 2004) <sup>(1)</sup>. The mean abundance and richness of dragonflies recorded within the Study Area are shown in Table 8.8.

**Table 8.8 Mean Abundance of Dragonflies Recorded at Black Point**

	Season	Plantation	Orchard	Shrubland	Shrubby Grassland	Stream/ Channel	Total
No. of individual /ha	Dry	0	1.1	0.9	0	0	2
	Wet	0.2	0	0	2.0	0.8	3
No. of species	Dry	0	1	1	0	0	2
	Wet	1	0	0	2	2	4

Both abundance and species richness of dragonflies in Black Point were higher in the wet season (Table 8.8). Dragonfly abundance and species richness in all sampled habitats in the Study Area was considered very low.

The species diversity of dragonfly at Black Point and the other selected areas is considered to be low (Table 9 of Annex 8).

### Herpetofauna

The diversity of amphibians in the Study Area at Black Point was low, due to the lack of natural aquatic habitats. Amphibian species recorded included the Asian Common Toad *Bufo melanostictus*, Gunther's Frog *Rana guentheri* and Lesser Spiny Frog *Rana exilispinosa*. The Asian Common Toad and Gunther's Frog are common and widespread in Hong Kong <sup>(2)</sup>. The Lesser Spiny Frog is the most common hill stream frog in Hong Kong but is considered threatened in China due to a decline in populations of the species throughout its range (Hunan, Fujian and Guangdong) <sup>(3)</sup>. A Lesser Spiny Frog was found at the seasonal stream during the site visit. It is most frequently seen perching on rocks, beside swift-flowing water or under ledges, as well as by quiet pools. Another species of reptile recorded was the Changeable Lizard *Calotes versicolor*. This species can be found in many types of habitats, and is common and widespread in Hong Kong <sup>(4)</sup>.

(1) Wilson K (2004). Op cit.

(2) Karsen, S. J., Lau, M. W. N. and Bogadek, A. (1998). Op cit.

(3) Karsen, S. J., Lau, M. W. N. and Bogadek, A. (1998). Ibid.

(4) Karsen, S. J., Lau, M. W. N. and Bogadek, A. (1998). Ibid.

A protected snake species the Burmese Python *Python molurus* was recorded within the drainage channel next to the Black Point power station during the additional ecological survey. The Burmese Python can be found in a variety of habitats, preferring well-developed shrubland, woodland and edges of mangrove swamps. It is widely distributed in the territory, including all major islands <sup>(1)</sup>. The locations of the Burmese Python and Lesser Spiny Frog are as shown in *Figure 8.7*.

The species diversity of herpetofauna at Black Point, other areas in the vicinity and north Lantau is considered low, taking into account the survey effort (including the number of survey days and duration of survey period) and the size of surveyed areas (*Table 10 of Annex 8*).

### Mammal

Two species of mammal were recorded, a bat, the Japanese Pipistrelle *Pipistrellus abramus* and the Feral Dog *Canis familiaris*. The Japanese Pipistrelle was observed flying around the lamps inside the power station. Protected by the *Wild Animals Protection Ordinance*, it is widespread and common in Hong Kong <sup>(2)</sup>. The location of Japanese Pipistrelle recorded in the Study Area is shown in *Figure 8.7*. Feral Dogs were found in the shrubland near to the power station, which was considered to have no conservation significance.

The lack of large mammal species at Black Point, is probably due to the poor quality of the habitats and the extent of human disturbance in the area.

### Aquatic Fauna

The seasonal stream was surveyed once in both the wet and dry seasons and only limited water flow in between the boulders was recorded. Other than the Lesser Spiny Frog, no freshwater fish or other stream macro-fauna were recorded. The channel near to the power station has limited water flow and a protected snake species, the Burmese Python *Python molurus*, was recorded in the channel during the additional ecological survey.

### *Current Condition of the Proposed Project Area*

The terrestrial habitats recorded in the Project Area were mainly shrubland (approximately 12.6 ha), with small patches of shrubby grassland (approximately 2.4 ha), drainage channel (approximately 940 m) and developed area (approximately 1.4 ha). The area within the Project Area that would be directly affected by the development comprises 4.9 ha of shrubland, 1 ha of developed area and 135 m of drainage channel (*Figure 8.12*). The remaining area within the Project Area would remain untouched.

(1) Karsen, S. J., Lau, M. W. N. and Bogadek, A. (1998). *Ibid.*

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

The continuous patch of shrubland at the northern and western parts of the Study Area was densely vegetated with native shrubs and climbers. The vegetation was well developed and the canopy species reached a height of 2 to 3 metres. Shrubland was dominated by native plant species including *Celtis sinensis*, *Aporosa dioica*, *Cassytha filiformis*, *Gordonia axillaries*, *Litsea rotundifolia*, *Sterculia lanceolata* and *Caesalpinia vernalis*. Two locally protected plant species, the Pitcher Plant and the Bamboo Orchid, were recorded at the northwest part of the shrubland (Figure 8.7). The shrubland was largely undisturbed and the floristic diversity and structural complexity were medium. The ecological importance of shrubland was considered to be moderate.

## 8.5 EVALUATION OF THE ECOLOGICAL IMPORTANCE OF THE STUDY AREA

In this section the ecological importance of the terrestrial habitats and wildlife identified within the Study Area are evaluated in accordance with the *EIAO TM Annex 8* criteria.

- Naturalness;
- Size;
- Diversity;
- Rarity;
- Re-creatability;
- Ecological Linkage;
- Potential value;
- Nursery Ground;
- Age; and,
- Abundance.

The evaluation is based upon the field survey information presented in *Section 8.4.3* and the literature review presented in *Section 8.4.2*.

### 8.5.1 Habitats

The ecological importance of each habitat type within the Study Area is presented in *Tables 8.9 – 8.14*.

#### *Plantation*

The exotic plantation was found along the fringe of the headland. The dominant species were several exotic plant species, while the undergrowth was occupied by native shrubs and tall grasses. The floristic diversity and structural complexity of the plantation at Black Point were low. In conclusion, the ecological importance of plantation at Black Point is low.

Table 8.9 Ecological Evaluation of Plantation

Criteria	Plantation
Naturalness	Man-made, dominated by a few exotic trees.
Size	The overall size was approximately 2.9 ha, the plantations were scattered within the Study Area as a thin strip beside the headland.
Diversity	Low diversity of plant (18 species) and structural complexity. Low in faunal diversity.
Rarity	Rare butterfly species Spotted Sawtooth was recorded.
Re-creatability	Readily recreatable.
Fragmentation	Fragmented.
Ecological Linkage	Not linked to any ecologically significant area.
Potential Value	Low with exotic plant species.
Nursery/Breeding Ground	No significant nursery or breeding ground recorded during the survey.
Age	Young (10 years old) based on tree size, structure and species composition.
Abundance/Richness of Wildlife	Low for avifauna, butterfly and dragonfly.
<b>Overall Ecological Importance</b>	<b>Low</b>

### *Shrubland*

Shrubland was the dominant habitat at Black Point. The shrublands recorded at the northern and western parts of the headland have higher floristic diversity and structural complexity than those of the shrubland in the southern part. All of the recorded plant species are common or very common in Hong Kong except two locally protected plant species Pitcher Plant and Bamboo Orchid, which were both recorded in the western part of the shrubland. The floristic diversity and the structural complexity of shrubland in the northern and western parts are moderate while those of the shrubland in the southern part were low to moderate. In conclusion, the ecological importance of shrubland in Black Point is low to moderate or moderate.

Table 8.10 Ecological Evaluation of Shrubland

Criteria	Shrubland at Northern and Western Parts	Shrubland at Southern Part
Naturalness	Secondary, semi-natural.	Secondary, semi-natural.
Size	The overall size was approximately 35 ha, the shrubland was a large patch within the Study Area and mainly located at steep terrains and valleys located at the northern and western part of the headland.	The overall size was approximately 11.6 ha, the shrubland was located at the southern part of the headland.
Diversity	Medium diversity of plant (70 species), moderate structural complexity. Low to moderate for faunal diversity.	Medium diversity of plant (< 70 species), low to moderate structural complexity. Low to moderate for faunal diversity.
Rarity	Locally protected plant species Bamboo Orchid and Pitcher Plant were recorded. Faunal species of conservation interest included butterfly species Red Lacewing and bird species Greater Coucal.	Nil.
Re-creatability	Habitat characteristics and species composition are not easy to create. It will take approximately 10- 20 years for the shrubland to be re-created to its existing status.	Habitat characteristics are not easy to recreate. It will take approximately 10 years for the shrubland to be re-created.
Fragmentation	Not fragmented.	Not fragmented.
Ecological Linkage	Not linked to any ecologically significant areas.	Not linked to any ecologically significant areas.
Potential Value	Moderate, may not be able to develop as woodland as limited by strong wind, soil erosion and limited water storage capacity of soil in this coastal area.	Low to moderate, may not be able to develop as woodland as limited by strong wind, soil erosion and limited water storage capacity of soil in this coastal area.
Nursery/Breeding Ground	No significant nursery or breeding ground recorded during the survey.	No significant nursery or breeding ground recorded during the survey.
Age	Young (around 20 years) based on tree size, structure and species composition.	Young (less than 20 years) based on tree size, structure and species composition.
Abundance/Richness of Wildlife	Low to moderate for avifauna and butterfly, low for dragonfly and other wildlife.	Low to moderate for avifauna and butterfly, low for dragonfly and other wildlife.
<b>Overall Ecological Value</b>	<b>Moderate</b>	<b>Low to moderate</b>

*Shrubby Grassland*

Shrubby grassland in Hong Kong is generally regarded as a low quality habitat with relatively low floristic diversity and structural complexity. Shrubby grassland was found along the ridges of the headland and appeared to have experienced frequent fires and soil erosion. All of the plant species are common or very common in Hong Kong. The floristic diversity and the structural complexity of the shrubby grassland are low. The ecological importance of shrubby grassland at Black Point is, therefore, considered to be low.

**Table 8.11** *Ecological Evaluation of Shrubby Grassland*

Criteria	Shrubby Grassland
Naturalness	Semi-natured and disturbed by hill fire and natural erosion.
Size	The overall size was approximately 18.2 ha, large patch located in the middle of the Study Area.
Diversity	Low diversity of plant (25 species) and structural complexity. Low in faunal diversity.
Rarity	Bird species of conservation interest included Black-eared Kite and Greater Coucal. Two uncommon butterfly species, the Tailed Sulphur and Yellow Pansy were recorded.
Re-creatability	Easy to recreate.
Fragmentation	Not fragmented.
Ecological Linkage	Not linked to any identified ecologically significant area.
Potential Value	Low, may not be able to develop as shrubland as limited by frequent hill fires and limited water storage capacity of soil in this coastal area.
Nursery/Breeding Ground	No significant nursery or breeding ground recorded during the survey.
Age	Young (less than 5 years) based on tree size, structure and species composition.
Abundance/Richness of Wildlife	Low.
<b>Overall Ecological Importance</b>	<b>Low</b>

*Natural Seasonal Stream and Drainage Channel*

The natural seasonal stream at Black Point was found within the shrubland opposite to the Black Point Power Station. The riparian vegetation community of the stream was integrated with the surrounding shrubland. The substratum of the stream was rocky but with very limited water flow even during the wet season. An amphibian species of conservation interest, the Lesser Spiny Frog, was found in the stream during the survey.

The drainage channels had very limited water flow and a protected snake species Burmese Python *Python molurus* was recorded during the additional ecological survey. In conclusion, the ecological importance of the stream at

Black Point is low to moderate and the ecological importance of the channels at Black Point is negligible.

**Table 8.12** *Ecological Evaluation of Stream/Channel*

Criteria	Seasonal Stream	Channels
Naturalness	Natural.	Man-made and highly disturbed.
Size	The total length was approximately 60 m.	The total length was approximately 8.2 km.
Diversity	Low for plant and fauna.	Low for plants and fauna.
Rarity	Species of conservation interest include Greater Coucal and Lesser Spiny Frog were recorded.	A protected snake species Burmese Python <i>Python molurus</i> was recorded.
Re-creatability	Stream habitats can be re-created with proper design, such as Tung Chung River. Recreated stream habitats can serve similar ecological function as natural stream but it may take time for the recolonisation of stream fauna.	Readily re-creatable.
Fragmentation	Not applicable.	Not applicable.
Ecological linkage	Not functionally linked to any highly valued habitat in close proximity.	Not functionally linked to any highly valued habitat in close proximity.
Potential value	Low due to the short length and limited water flow.	Low ecological potential.
Nursery/breeding ground	No significant nursery or breeding ground recorded.	No significant nursery or breeding ground recorded.
Age	Not applicable.	Not applicable.
Abundance/ Richness of wildlife	Low.	Low.
<b>Overall Ecological Importance</b>	<b>Low to Moderate</b>	<b>Negligible</b>

### *Orchard*

An orchard under active management was found at the southern fringe of the headland and consisted mainly of fruit plants including Lychee and Longan. The understorey was bare and the floristic diversity and structural complexity of the orchard were low. In conclusion, the ecological value of the orchard was low.



Table 8.13 Ecological Evaluation of Orchard

Criteria	Orchard
Naturalness	Man-made habitat with active management.
Size	The overall size was approximately 1.4 ha.
Diversity	Low for vegetation (total of nine species for the whole area all fruit plants), moderate for bird and low for butterfly, dragonfly and herpetofauna.
Rarity	None recorded.
Re-creatability	Readily re-creatable.
Fragmentation	Not fragmented.
Ecological Linkage	Not functionally linked to any highly valued habitat in close proximity.
Potential Value	Low.
Nursery/Breeding Ground	No significant nursery or breeding ground recorded.
Age	Not applicable.
Abundance/Richness of Wildlife	Low.
<b>Overall Ecological Importance Low</b>	

*Developed Area*

The developed area included the power station, barging point and fabrication yard for Shenzhen Western Corridor Project, car parks, wasteland, radar station and helipad. All of the recorded plant species are common or very common in Hong Kong. The floristic diversity and the structural complexity of developed area were low. In conclusion, the ecological importance of the disturbed area in Black Point is negligible.

Table 8.14 Ecological Evaluation of Developed Areas

Criteria	Developed Areas
Naturalness	Man-made habitat, consisted of power station, barging point and fabrication yard for Shenzhen Western Corridor Project, helipad, radar station, car parks and roads.
Size	The overall size was approximately 43.5 ha.
Diversity	Low.
Rarity	Protected mammal Japanese Pipistrelle was recorded.
Re-creatability	Readily re-creatable.
Fragmentation	Not fragmented
Ecological Linkage	Not functionally linked to any highly valued habitat in close proximity.
Potential Value	Low.
Nursery/Breeding Ground	None.
Age	Not applicable.
Abundance/Richness of Wildlife	Low.
<b>Overall Ecological Importance</b>	<b>Negligible</b>

*Project Area*

The ecological importance of the Project Area is evaluated in accordance with the EIAO-TM Annex 8 criteria (Table 8.15).

The Project Area was approximately 16.4 ha comprising of shrubland (12.6 ha), shrubby grassland (2.4 ha), developed area (1.4 ha) and drainage channel (940 m). The habitat was moderate for vegetation and low for fauna. Two locally protected but common floral species including Pitcher Plant and Bamboo Orchid were recorded within the Project Area whilst none of the fauna species of conservation interest were recorded within the Project Area. In conclusion, the ecological importance of the Project Area is generally low to moderate.

**Table 8.15** *Ecological Evaluation of Project Area <sup>(a)</sup>*

Criteria	Project Area
Naturalness	Disturbed in part, i.e., construction of radar station and helipad within shrubby grassland.
Size	Total: 16.4 ha. Approximately 12.6 ha of shrubland, 2.4 ha of shrubby grassland, 940 m long drainage channel and 1.4 ha of developed area recorded within the Project Area.
Diversity	Moderate for vegetation and low for fauna.
Rarity	Two locally protected but common floral species including Pitcher Plant and Bamboo Orchid. No fauna species of conservation interest were recorded within the Project Area.
Re-creatability	Shrubland and shrubby grassland are re-creatable but would take time (i.e., 10 to 20 years) to reach maturity. Developed areas and drainage channels are readily recreatable.
Fragmentation	Not applicable.
Ecological Linkage	Not functionally linked to any highly valued habitat in close proximity.
Potential Value	Moderate.
Nursery/Breeding Ground	No significant breeding ground recorded.
Age	Young.
Abundance/Richness of Wildlife	Abundance of fauna was low.
<b>Overall Ecological Importance</b>	<b>Moderate for Shrubland</b> <b>Low for Shrubby Grassland</b> <b>Negligible for Developed Area</b> <b>Negligible for Drainage Channel</b>

Note: (a) - Areas stated are approximate and based on the layout prepared for the EIA which precedes the detailed engineering design.

### 8.5.2 *Flora and Fauna of Ecological Interest*

There were a number of floral and faunal species of conservation interest recorded within the Study Area during the surveys:

- Two locally protected plant species, i.e., Pitcher Plant *Nepenthes mirabilis* and Bamboo Orchid *Arundina graminifolia*, were recorded in shrubland at the west of the headland.
- Three bird species of conservation interest, the Black Kite, White-bellied Sea Eagle and Greater Coucal, were recorded within the Study Area. The White-bellied Sea Eagle was flying past the shrubby grassland at a height of about 30 meters above the ground, Black Kites were soaring around the headland and the Greater Coucal were perching in the shrubby grassland during the site visits. None of these bird species were sighted within habitats that would be directly affected by the Project.
- Two uncommon (Yellow Pansy and Tailed Sulphur) and two rare (Spotted Sawtooth and Red Lacewing) butterfly species were recorded within the Study Area. Yellow Pansy and Tailed Sulphur were found in the shrubby grassland, Red Lacewing was found in the shrubland and Spotted Sawtooth was found in the plantation. None of these butterfly species were sighted within habitats to be directly affected by the Project.
- A Lesser Spiny Frog was found in the seasonal stream, which is a habitat that would not be directly affected by the Project. A protected snake species Burmese Python *Python molurus* was recorded in the drainage channel next to the power station area.
- A Japanese Pipistrelle, the most common bat species in Hong Kong, was recorded within the power station area.

The list and evaluation of the floral and faunal species of ecological interest recorded within the Study Area, according to the *EIAO TM*, are given in *Table 8.16*.

Table 8.16 Evaluation of Floral and Faunal Species with Ecological Interest within the Study Area

Species Name	Location	Protection Status	Distribution	Rarity in Hong Kong
<b>Plant</b>				
Pitcher Plant <i>Nepenthes mirabilis</i>	Shrubland at the west of the headland	<i>Forests and Countryside Ordinance (Cap 96); Appendix 2 of CITES</i>	North Lantau and New Territories.	Common
Bamboo Orchid <i>Arundina graminifolia</i> ,	Shrubland at the west of the headland	<i>Forests and Countryside Ordinance (Cap 96)</i>	Grassland and streamside of various locations in Hong Kong	Common
<b>Bird</b>				
Black Kite <i>Milvus lineatus</i>	In various habitats of the Study Area; soaring	<i>Wild Animals Protection Ordinance (Cap 170); Class 2 Protected Animal of PRC; Appendix 2 of CITES</i>	Found in many types of habitat;	Common and widespread in Hong Kong
White-bellied Sea Eagle <i>Haliaeetus leucogaster</i>	Above shrubland; flying passed	<i>Wild Animals Protection Ordinance (Cap 170); Class 2 Protected Animal of PRC; Appendix 2 of CITES</i>	Found in coastal habitats and reservoirs in Hong Kong	Uncommon in Hong Kong
Greater Coucal <i>Centropus sinensis</i>	In various habitats of the Study Area; perching	<i>Wild Animals Protection Ordinance (Cap 170); Class 2 Protected Animal of PRC</i>	Found in many types of habitats in Hong Kong	Common and widespread in Hong Kong; Very rare in China
<b>Butterfly</b>				
Yellow Pansy <i>Junonia hierta</i>	Shrubby grassland	Not protected	Not widespread, found in a few scattered localities	Uncommon in Hong Kong
Tailed Sulphur <i>Dercas verhuelli</i>	Shrubby grassland	Not protected	Fairly widespread	Uncommon in Hong Kong
Spotted Sawtooth <i>Prioneris thestylis</i>	Plantation	Not protected	Not widespread	Rare in Hong Kong, considered of local concern
Red Lacewing <i>Cethosia biblis</i>	Shrubland	Not protected	Not widespread	Rare in Hong Kong
<b>Herpetofauna</b>				
Lesser Spiny Frog <i>Rana exilispinosa</i>	Natural seasonal stream	Not protected	Widespread in swift-flowing hill and mountain streams, particularly those with	Fairly common in Hong Kong, considered potential global concern

**LNG RECEIVING TERMINAL AND ASSOCIATED FACILITIES**

<b>Species Name</b>	<b>Location</b>	<b>Protection Status</b>	<b>Distribution</b>	<b>Rarity in Hong Kong</b>
Burmese Python <i>Python molurus</i>	Channel	<i>Wild Animals Protection Ordinance (Cap 170), Appendix 2 of CITES and Class 1 Protected Animal of PRC</i>	cascading water Found in many types of habitats in Hong Kong	Rare in Hong Kong, considered of local concern
<b>Mammal</b>				
Japanese Pipistrelle <i>Pipistrellus abramus</i>	Developed area	<i>Wild Animals Protection Ordinance (Cap 170)</i>	Widespread	Common in Hong Kong

## 8.6 TERRESTRIAL ECOLOGICAL ASSESSMENT

### 8.6.1 Assessment Methodology

The importance of potentially impacted ecological resources identified within the Study Area was assessed using the approach specified in the *EIAO-TM*. The potential impacts due to the construction and operation of the proposed LNG terminal were then assessed (following the *EIAO-TM Annex 16* guidelines) and the impacts evaluated (based on the criteria in *EIAO-TM Annex 8*).

### 8.6.2 Potential Sources of Impact

The directly affected land area of the LNG terminal, covers the western tip of the headland, is approximately 5.9 ha (impacts to rocky shore is excluded which shall be discussed in detail in *Part 3 Section 9 Marine Section*). The boundary of the Project Area (landside) perimeter will be secured during construction and operation of the terminal for safety and security reasons. The land take is mainly restricted to the shrubland along the coast and most of the upland habitats within the Project Area will not be disturbed. The Project involves excavation and construction of the LNG terminal platform and accommodation of the LNG storage tanks and associated facilities. Potential ecological impacts that may arise during the construction operational phases are detailed below.

#### *Construction Phase*

- Direct habitat and vegetation loss and habitat fragmentation resulting from land take for the construction activities for the LNG terminal and associated facilities;
- Direct habitat and vegetation loss resulting from land take for the construction of a temporary haul road at the fringe of the shrubland, to allow heavy machinery to be mobilised and transported for the slope stabilization works;
- Direct loss of inactive/less mobile/habitat-specific wildlife nesting/inhabiting the affected area;
- Associated potential impacts to wildlife, including restriction of wildlife utilisation (i.e., transit, feeding and roosting), degradation of habitat quality/ ecological function, as a result of temporary and permanent loss, isolation and fragmentation of ecological habitat, and fencing around the Project Area; and,
- Potential impacts to the surrounding habitat and associated wildlife due to physical disturbance of this habitat including noise, blasting, increased human activity or hill fire.

### *Operational Phase*

- Potential impacts to the surrounding natural habitat (mainly the hill at Black Point) and associated wildlife due to increased human activity and disturbance (i.e., noise and light) associated with the operation of the LNG terminal;
- Potential impacts to wildlife, in particular avifauna, during operation of the LNG terminal at Black Point due to the increase in noise, air pollution, lighting, glare and physical barriers; and,
- Potential impacts to the surrounding natural habitat (mainly the hill at Black Point) and associated wildlife due to an accidental fire caused by a LNG spill.

### 8.6.3 *Assessment of Ecological Impacts*

Approximately 5.9 ha of the land area within the Project Area will be directly affected (*Figure 8.12*). The land works including site clearance, excavation and blasting are expected to be completed in 18 months. The major impacts on the terrestrial ecological resources will be direct habitat and vegetation loss.

#### *Construction Phase*

The potential impacts during the construction phase will be:

#### Habitat Loss

- Permanent loss (approximately 4.2 ha) and temporary loss (approximately 0.7 ha) of shrubland due to the construction of the tanks of the LNG terminal including a temporary haul road and slope stabilization (refer to *Figure 8.12*);
- Permanent loss of developed area (approximately 1 ha) due to the construction of the administrative buildings (refer to *Figure 8.12*);
- Permanent loss of a length of drainage channel (approximately 135 m) due to the construction of the LNG terminal platform (refer to *Figure 8.12*);
- Relocation and potential loss of floral species (Pitcher Plant and Bamboo Orchid) of conservation interest; and,
- Potential loss of foraging and feeding areas for the associated wildlife. None of the faunal species of conservation interest were recorded as inhabiting the area to be directly affected by the works.

#### *Habitat fragmentation and Isolation*

Habitat fragmentation and isolation are not expected as the affected habitats are located at the western end of the headland and most of the upland habitats will remain untouched. It should be noted that the areas are generally steep

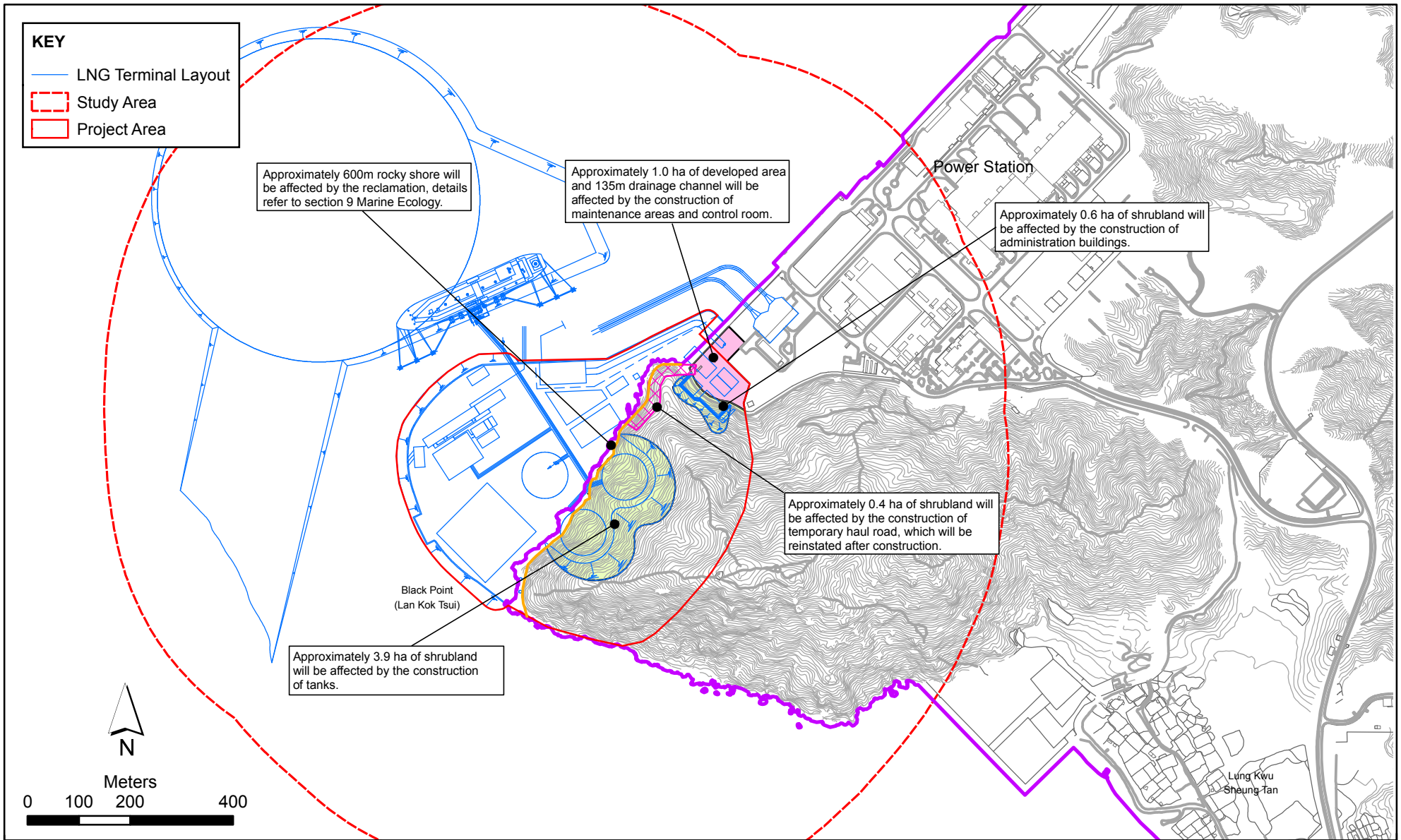


Figure 8.12

Impacts of Development of LNG Terminal on Existing Habitats at Black Point

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Date: 30/09/2006

Environmental  
Resources  
Management





and are expected to be mainly utilized by birds and butterflies, which are less affected by such fragmentation and isolation effects.

#### *Other Impacts*

Secondary impacts to the surrounding habitats (generally of low ecological importance) and associated wildlife may arise from the potential for increased noise impacts, blasting, human activities and disturbance and construction site runoff. These impacts are expected to be low, owing to the temporary nature and relatively small scale of the construction works and given that good construction practice, environmental controls and regular checks on the construction boundaries will be conducted. Impacts are expected to be acceptable.

#### *Operational Phase*

Operational phase impacts to terrestrial ecology may arise from increased human activities in the area resulting in disturbance to the surrounding habitats and associated wildlife, if uncontrolled. Given the generally low level of human activity required to operate the terminal it is not expected that operational phase impacts will occur. Vaporization of LNG will be a potential risk provided that there is an ignition source in the vicinity. In the unlikely event of leakage of LNG, the fire prevention system will be implemented (details are presented in *Part 3 Section 13 Hazard to Life Assessment*), and consequently impacts to the terrestrial ecological resources through the spread of fire will be prevented. The impacts associated with accidental spills of LNG are discussed in *Part 3 Section 13 Hazard to Life Assessment*.

Where possible, structures will utilise appropriate design to complement the surrounding landscape. Materials and finishes will be considered during detailed design. All of the major lighting sources will be pointed inward and downwards to avoid disturbance to birds. Air quality and noise impacts on the birds due to the operation of the terminal are expected to be low and not significant.

#### *Cumulative Impact*

At present, there are no planned projects at Black Point that could create cumulative terrestrial ecological impacts during the construction of the LNG terminal. Therefore, no cumulative impacts will arise.

### **8.6.4**

#### ***Impact Evaluation***

##### *Habitat Loss*

Potential impacts have been evaluated according to *Table 1 of Annex 8 of the EIAO-TM*. *Tables 8.18 to 8.20* present an evaluation of the habitat loss due to the Project.

The permanent and temporary habitat loss of shrubland will be approximately 4.2 ha and 0.7 ha respectively. Two locally protected plant species, the Pitcher Plant and Bamboo Orchid were recorded within the Project Area. No faunal species of conservation interest were recorded as inhabiting the Shrublands within the Project Area. In view of the availability of similar habitat in the vicinity and the mitigation measures, it is considered that impacts to wildlife and habitat are of low to moderate severity and acceptable.

**Table 8.18 Overall Impact Evaluation for Shrubland within the Project Area**

<b>Evaluation Criteria</b>	<b>Shrubland</b>
<i>Habitat quality</i>	The habitat quality is moderate.
<i>Species</i>	Two locally protected plant species Pitcher Plant and Bamboo Orchid were recorded within the Project Area. No faunal species of conservation interest were recorded as inhabiting the Project Area.
<i>Size/Abundance</i>	Area lost permanently and temporarily are approximately 4.2 ha and 0.7 ha respectively.
<i>Duration</i>	The impact will persist during the construction and operational phases for the LNG storage tanks but will be temporary for the haul road as it will be reinstated after completion of construction work.
<i>Reversibility</i>	It is re-creatable but will take time for the habitat to reach maturity.
<i>Magnitude</i>	The scale of the habitat loss is moderate in the context of the surrounding similar habitats.
<b>Overall Impact Conclusion Low to moderate</b>	

Approximately 1.0 ha of developed area will be lost. In view of the low occurrence of wildlife and the negligible ecological importance of the habitat, it is believed that the impact severity of this habitat loss is negligible.

Table 8.19 Overall Impact Evaluation for Developed Area within the Project Area

Evaluation Criteria	Developed Area
Habitat quality	The habitat quality is negligible.
Species	Nil.
Size/Abundance	Area lost permanently is approximately 1.0 ha.
Duration	The impact will persist during the construction and operational phases.
Reversibility	It is readily re-creatable.
Magnitude	The scale of the habitat loss is small in the context of the surrounding similar habitats.
<b>Overall Impact Conclusion Negligible</b>	

Approximately 135 m of drainage channel will be lost. In view of the low occurrence of general wildlife and the negligible ecological importance of the habitat, it is believed that the severity of habitat loss of drainage channel is negligible.

Table 8.20 Overall Impact Evaluation for Drainage Channel within the Project Area

Evaluation Criteria	Drainage Channel
Habitat quality	The habitat quality is negligible.
Species	Nil.
Size/Abundance	Approximately 135 m length will be permanently lost.
Duration	The impact will persist during the construction and operational phases.
Reversibility	It is readily re-creatable.
Magnitude	The scale of the habitat loss is small in the context of the adjacent similar habitats.
<b>Overall Impact Conclusion Negligible</b>	

In conclusion, the direct ecological impact due to the construction of the LNG terminal is expected to be low to moderate, and will not contribute to any cumulative impacts.

Although, the habitat loss due to the Project will reduce the areas of foraging and feeding grounds of wildlife, the potential impacts are expected to be low to moderate owing to the extensive area of unaffected natural habitat (shrubland) available in close proximity to the Project Area. The temporary nature and relatively small scale of the construction works, in combination with regular checks on construction boundaries, render the habitat loss as acceptable. Potential impacts on the two protected plant species, the Pitcher Plant and Bamboo Orchid, will be reduced through transplantation prior to the commencement of the construction works.

*Other Associated Impacts*

**Habitat Fragmentation and Isolation** – Given that the LNG terminal will mainly be located along the coastline, (whereas the shrublands are located on the physically isolated headland) and the scale of the habitat loss is small in the context of the surrounding similar habitats, the potential impacts of habitat fragmentation and isolation are considered to be minimal.

**Other Impacts** – Increased human activities and disturbance due to the Project during construction and operation have the potential to affect the surrounding natural habitats and the associated wildlife. These potential impacts are expected to be low given good construction practice, environmental management controls will be implemented, and that regular checks on construction boundaries will be conducted. Impacts during the operational phase are expected to be acceptable.

## 8.7 SUMMARY OF MITIGATION MEASURES

*Annex 16* of the *EIAO-TM* states that the general policy for mitigation of significant ecological impacts, in order of priority, is:

**Avoidance:** Potential impacts should be avoided to the maximum extent practicable by adopting suitable alternatives;

**Minimisation:** Unavoidable impacts should be minimised by taking appropriate and practicable measures such as constraints on intensity of works operations or timing of works operations; and

**Compensation:** The loss of important species and habitats may be provided for elsewhere as compensation. Enhancement and other conservation measures should always be considered whenever possible.

### 8.7.1 Avoidance

As part of the site selection process for the LNG terminal, a total of 27 sites, have been analysed (see *Part 1 Section 5* of this EIA). Two sites (Black Point and South Soko) were selected for further assessment. Disturbance to terrestrial ecological resources of acknowledged conservation significance has been avoided by screening out the following from consideration:

- Wild Animal Protection Areas;
- Conservation Areas;
- Coastal Protection Areas;
- Registered Sites of Special Scientific Interests (SSSIs); and,
- Country Parks.

The Project Area at Black Point (mainly shrubland), as well as the whole of the Study Area, are not considered to be of high importance to wildlife. None of the terrestrial habitats recorded in the Study Area at Black Point were of high ecological importance, with most of the habitats recorded as moderate to low, and two regarded as negligible in terms of their ecological importance. The impacts from the LNG terminal therefore are expected to be low with the adoption of appropriate construction practices.

### 8.7.2

#### *Minimisation*

The discussion in *Section 8.6* has indicated that the impacts on ecological resources due to the construction and operation of the LNG terminal are generally expected to be low and acceptable. The following measures will be taken to further reduce impacts to terrestrial ecological resources.

#### *Habitat and Wildlife*

- According to the site selection options for the terminal footprint in Black Point (detail please refer to *Part 3 Section 2*), this proposed option involves partially sea reclamation and partially land formation by cutting on the existing headland. It should be noted that this option can make a balance of cut and fill. The disturbance of existing headland shall comprise of 4.9 ha of shrubland only. This is a win-win option to reduce the disturbance through either full sea reclamation (disturbance to marine habitat and mammals) or full excavation of land area (disturbance to terrestrial habitat).
- Structures will utilise appropriate design to complement the surrounding landscape wherever possible. Materials and finishes will be considered during detailed design; and,
- All of the major lighting sources will be pointed inward and downwards to avoid disturbance to birds.

#### *Vegetation Loss*

The Pitcher Plants and Bamboo Orchids (both < 10 individuals) recorded within the Project Area will be transplanted to a similar habitat, i.e., rocky shore with freshwater seepage or near to a small stream, such as the undisturbed rocky shore of Black Point or the seasonal stream recorded within the Study Area. Pitcher Plants have been successfully transplanted in Hong Kong, for example under the Environmental Permit requirements for the construction of the Theme Park at Penny's Bay <sup>(1)</sup> <sup>(2)</sup> <sup>(3)</sup>.

- (1) ERM HK Ltd. 2000. Construction of an International Theme Park in Penny's Bay of North Lantau together with its Essential Associated Infrastructures - Environmental Impact Assessment.
- (2) TAS Joint Venture 2002. Infrastructure for Penny's Bay Development Contract 2 - The Decommissioning of Cheoy Lee Shipyard: Detailed Transplantation Proposal for Restricted/Protected Plant Species.
- (3) ERM HK Ltd. 2002-2004. Infrastructure for Penny's Bay Development, Contract 2: *Monthly Environmental Monitoring and Audit Reports*.

A detailed vegetation survey on the Pitcher Plants and Bamboo Orchids would be conducted within the impacted shrubland and Project Area by a suitably qualified botanist/ ecologist to identify and record the affected individuals prior to the commencement of site clearance works. Feasibility and suitability of transplanting the affected plant species of conservation interest would be carefully studied and suitable receptor sites would be identified. Detailed transplantation proposal providing information of transplantation methodology, recipient site, implementation programme, watering requirement, post-transplanting monitoring and personnel involved shall be submitted to and approved by EPD and AFCD. Transplantation would be undertaken and supervised by a suitably qualified botanist/ horticulturist. After transplantation, monitoring will be undertaken to check the performance and health conditions of the transplanted individuals on a weekly basis in the first month after transplantation and monthly basis for additional eleven months. Remedial actions will be discussed with AFCD in the event of unsuccessful transplantation.

#### *Appropriate Construction Practice*

- Erect fences along the boundary of the works area before the commencement of works to prevent vehicle movements, and encroachment of personnel, onto adjacent areas; and,
- Avoid damage and disturbance to the remaining and surrounding natural habitats.

### 8.7.3

#### *Compensation*

To compensate for the permanent and temporary loss of 4.9 ha of shrubland for the construction of the terminal, haul road and storage tanks on the existing shrubland, at least 0.7 ha of shrubland will be planted at the temporary haul road and newly formed slope within the Project Area to provide shrubland habitat at the temporary haul road. Species used for planting will take reference from the species identified in the surrounding area and/or *Section 8.4*, and be native to Hong Kong and the South China region.

The loss of 4.2 ha tall shrubland habitat will be compensated by enhancement planting at the existing shrubland located to the south of the headland. Six hectare of the existing shrubland, which has relatively lower species diversity and low vegetation coverage, will be enhanced through native tall shrubs planting. Increase of the structural complexity and species diversity would enhance the ecological value of the existing shrubland.

An Enhancement Planting Plan with plant species to be used, their size and detail planting matrix is required to be prepared by qualified ecologist and landscape architect. Planting shrubs should make reference to the plant species recorded in the affected shrubland. Enhancement planting is preferable to minimise the impacts of the existing shrubs with good

conditions. Detailed enhancement planting proposal providing information of planting methodology, recipient site, implementation programme, watering requirement, post-planting monitoring and personnel involved shall be submitted to and approved by EPD and AFCO. Enhancement planting would be supervised by a suitably qualified botanist/ landscape architect prior to the commencement of site clearance works. After enhancement planting, monitoring will be undertaken to check the performance and health conditions of the planted individuals on a monthly basis for 12 months.

## 8.8 *RESIDUAL ENVIRONMENTAL IMPACTS*

The Project will involve the permanent loss of approximately 4.2 ha of shrubland. The affected habitats are considered to be of moderate ecological value. No significant residual impact due to the construction and operation of the LNG terminal is expected in view of reduction of land excavation and disturbance to the existing shrubland (during layout option selection process), extensive similar habitat in the vicinity, and the implementation of the proposed mitigation measures including provision of 0.7 ha of compensatory planting of shrubland, 6 ha of enhancement planting and transplantation of Pitcher Plants and Bamboo Orchids. It should be noted that this option, partially sea reclamation and partially land formation by cutting on the existing headland, can make a balance of cut and fill. This is a win-win option to reduce the disturbance through either full sea reclamation (disturbance to marine habitat and mammals) or full excavation of land area (disturbance to terrestrial habitat).

## 8.9 *ENVIRONMENTAL MONITORING AND AUDIT*

The implementation of the ecological mitigation measures described in *Section 8.7* will be checked as part of the Environmental Monitoring and Audit procedures during the construction period.

## 8.10 *CONCLUSIONS*

The terrestrial ecological resources recorded within the Study Area include plantation, shrubland, shrubby grassland, stream/channel, orchard and developed areas, with their associated wildlife. Of these habitats, shrubland located at the western part of the headland is of moderate ecological importance, shrubland located at the southern part of the headland and the stream are low to moderate in ecological importance, while the remaining habitats are of low or negligible ecological importance.

The impact on natural habitats within the Project Area is considered to be low to moderate, and no adverse residual impact is expected after the implementation of the proposed mitigation measures, comprising appropriate construction practices, reinstatement of affected areas of shrubland (temporary haul road), transplantation of Pitcher Plants and Bamboo Orchids

and compensatory planting of shrubland and enhancement planting will reduce potential disturbance to the surrounding environment. Environmental monitoring and audit measures in the form of regular checks will be undertaken.

During the operation phase of the LNG terminal at Black Point adverse impacts to terrestrial ecological resources are not expected to occur.



Annex 8

## Terrestrial Ecological Resources for Black Point

Table 1 Plant Species Recorded Within the Study Area

Species	Growth Form	Origin	Status	Local Abundance					
				Plantation	Shrubland	Shrubby Grassland	Stream/ Channel	Orchard	Developed Area
<i>Acacia confusa</i>	T	E	VC	A	S		F		F
<i>Ageratum conyzoides</i>	H	N	VC		A				
<i>Albizia lebeck</i>	T	N	C	A			F		
<i>Aporosa dioica</i>	S	N	VC		F		F		
<i>Aquilaria sinensis</i>	T	N	C		O				
<i>Arundina graminifolia</i>	H	E	P		S				
<i>Arundinella setosa</i>	G	N	C			F			
<i>Averrhoa carambola</i>	S	N	C		O				
<i>Bambusa sp.</i>	T	N	C		S		S		
<i>Bauhinia blackeana</i>	T	N	VC	O				S	F
<i>Breynia fruticosa</i>	S	N	VC		F				
<i>Bridelia tomentosa</i>	S	N	VC		F		F		
<i>Caesalpinia vernalis</i>	C	N	C		F				
<i>Callicarpa cathayana</i>	S	N	C		F				
<i>Canthium dicoccum</i>	S	N	C		F				
<i>Carex chinensis</i>	Se	N	C				F		
<i>Cassia surattensis</i>	T	E	VC	F					F
<i>Cassytha filiformis</i>	C	N	VC		A	O			
<i>Casuarina equisetifolia</i>	T	E	VC	O	S				
<i>Celtis sinensis</i>	T	N	C		A				

Species	Growth Form	Origin	Status	Local Abundance					
				Plantation	Shrubland	Shrubby Grassland	Stream/ Channel	Orchard	Developed Area
<i>Cerbera manghas</i>	T	E	C		O				
<i>Cinnamomum camphora</i>	T	N	C		O				
<i>Citrus sinensis</i>	S	E	C					F	
<i>Clausena lansium</i>	S	N	VC					F	
<i>Cocculus orbiculatus</i>	C	N	C		O				
<i>Dalbergia benthami</i>	C	N	C	F	F		O		
<i>Dalbergia millettii</i>	C	N	VC	F	F				
<i>Daphniphyllum calycinum</i>	T	N	C		F				
<i>Desmos cochinchinensis</i>	S	N	VC		F				
<i>Dicranopteris linearis</i>	F	N	VC				O		
<i>Digitaria sanguinalis</i>	G	N	C			A			
<i>Dimocarpus longan</i>	T	N	C					D	
<i>Diospyros morrisiana</i>	S	N	C		O	O			
<i>Duranta repens</i>	S	E	C						F
<i>Embelia laeta</i>	C	N	VC		F	F	O		
<i>Embelia ribes</i>	C	N	C		O	F			
<i>Eurya nitida</i>	S	N	VC		F	F			
<i>Ficus hispida</i>	T	N	VC				O		
<i>Ficus microcarpa</i>	T	N	VC		O				O
<i>Ficus superba</i>	T	N	VC		F				
<i>Garcinia oblongifolia</i>	T	N	C		F				
<i>Glochidion lanceolatum</i>	S	N	C		F				

Species	Growth Form	Origin	Status	Local Abundance					
				Plantation	Shrubland	Shrubby Grassland	Stream/Channel	Orchard	Developed Area
<i>Gnetum montanum</i>	C	N	C		O				
<i>Gordonia axillaris</i>	S	N	C		A	O			
<i>Ilex asprella</i>	S	N	VC		F	O			
<i>Ilex pubescens</i>	S	N	C		F	O			
<i>Ilex rotunda</i>	S	N	VC		O				
<i>Ischaemum aristatum</i>	G	N	VC			A			
<i>Lantana camara</i>	S	E	VC		F	O			
<i>Leucaena leucocephala</i>	S	N	VC		F				
<i>Ligustrum sinensis</i>	S	N	VC		F	O			
<i>Litchi chinensis</i>	T	N	C					D	
<i>Litsea glutinosa</i>	T	N	VC		F	O			
<i>Litsea rotundifolia</i>	S	N	VC		A				
<i>Lophostemon conferta</i>	T	E	VC	F					
<i>Lygodium dichotomum</i>	C	N	VC				F		
<i>Macaranga tanarius</i>	T	N	VC		S			F	
<i>Mallotus paniculatus</i>	T	N	C		O				
<i>Melaleuca leucadendron</i>	T	E	C	A					F
<i>Melastoma candidum</i>	S	N	VC	F	F	O			
<i>Melastoma sanguineum</i>	S	N	VC	F	F	O			
<i>Millettia reticulata</i>	C	N	VC		F				
<i>Miscanthus floridulus</i>	G	N	VC	O	O	O	F		
<i>Miscanthus sinensis</i>	G	N	VC	O	O	F			

Species	Growth Form	Origin	Status	Local Abundance					
				Plantation	Shrubland	Shrubby Grassland	Stream/Channel	Orchard	Developed Area
<i>Morus alba</i>	S	N	C		S				
<i>Nepenthes mirabilis</i>	H	N	P		S				
<i>Neyraudia arundinacea</i>	G	N	VC	F	O	O	F		
<i>Pandanus forceps</i>	S	N	C		O		F		
<i>Pandanus tectorius</i>	S	N	VC		O		F		
<i>Panicum maximum</i>	G	N	C	O		O			
<i>Phoenix hanceana</i>	P	N	C		O				
<i>Phyllanthus emblica</i>	T	N	C		F				
<i>Phyllanthus cochinchinensis</i>	S	N	VC		F	O			
<i>Pluchea indica</i>	H	N	C		S				
<i>Psychotria rubra</i>	S	N	VC		F				
<i>Rapanea neriifolia</i>	S	N	C		O				
<i>Rhaphiolepis indica</i>	S	N	VC		F	O			
<i>Rhodomyrtus tomentosa</i>	S	N	VC	F		O			
<i>Rhus chinensis</i>	S	N	VC		F		O		
<i>Rhus succedanea</i>	S	N	VC	F	F		O		
<i>Rhynchelytrum repens</i>	G	N	VC			F			
<i>Sapium discolor</i>	S	N	C		O				
<i>Schefflera octophylla</i>	S	N	VC	O	F				F
<i>Smilax china</i>	C	N	VC		F				
<i>Sterculia lanceolata</i>	T	N	C		A				
<i>Thespesia populnea</i>	T	N	C		O				

Species	Growth Form	Origin	Status	Local Abundance					
				Plantation	Shrubland	Shrubby Grassland	Stream/Channel	Orchard	Developed Area
<i>Trema orientalis</i>	S	N	VC		F				
<i>Wikstroemia chinensis</i>	S	N	VC		F	O			
<i>Uvaria microcarpa</i>	C	N	C		O				
<i>Zanthoxylum nitidum</i>	S	N	C		O				
<i>Zoysia matrella</i>	G	N	C				O		
<b>Total no. of species</b>				<b>18</b>	<b>70</b>	<b>25</b>	<b>18</b>	<b>6</b>	<b>7</b>

Notes: Code for abundance: A=Abundant; F=Frequent; O=Occasional; S=Scarce; Code for Status: C=Common; VC=Very Common; P=Protected; Code for Plant Form: C=Climber; H=Herb; Se=Sedge; G=Grass; F=Fern; P=Palm; S=Shrub; T=Tree; Code for Origin: N=Native; E=Exotic

Table 2a Plantation Recorded at Black Point in Comparison with Other Areas in the Vicinity and North Lantau

Location <sup>(1)</sup>	Size of the Study Area (ha)	Size and % Coverage of Woodland	Number of Plant Species Record	Floristic Diversity	Structural Complexity	Dominant Plant Species	Number of Species of Ecological/Conservation Interest
<b>Black Point</b>							
Current study	120	Plantation 2.9 ha (2.4%)	18	Low	Low	<i>Acacia confusa</i> , <i>Albizia lebbek</i> , <i>Melaleuca leucadendron</i> , <i>Lophostemon conferta</i> and <i>Cassia surrattensis</i>	Nil
<b>Lung Kwu Chau</b>							
MCAL 2001	39	Only a few stands of exotic trees 0.4 ha (< 1%) <sup>(2)</sup>	3	No information	No information	<i>Acacia confusa</i> , <i>Casuarina equisetifolia</i> and <i>Leucaena leucocephala</i>	Nil
<b>Penny's Bay</b>							
ERM 2000a	514	51 ha (<1%) <sup>(2)</sup>	5	Low	Low	<i>Acacia confusa</i> and <i>Leucaena leucocephala</i>	Nil
<b>North Lantau</b>							
ERM 2000b	2,600	130 ha (< 5%) <sup>(2)</sup>	5	Low	Low	<i>Acacia confusa</i> and <i>Leucaena leucocephala</i>	Nil

Notes: (1) Other areas without the specified habitat are not shown.

MCAL 2001- Mouchel Asia Ltd (2001). *Improvement to Tung Chung Road between Lung Tseng Tau and Cheung Sha*. EIA Report.

ERM 2000a – ERM HK Ltd (2000). *Environmental Impact Assessment of the Construction of an International Theme Park in Penny's Bay of North Lantau and its Essential Associated Infrastructures*, prepared for Civil Engineering Department.

ERM 2000b - ERM – HK Ltd (2000). *Environmental Impact Assessment of the Northshore Lantau Development Feasibility Study*, prepared for Civil Engineering Department.

(2) Area estimated from the habitat map presented in the report.

Table 2b Shrubland Recorded at Black Point in Comparison with Other Areas in the Vicinity and North Lantau

Location <sup>(1)</sup>	Size of the Areas (ha)	Size and % Coverage of Shrubland	Number of Plant Species Record	Floristic Diversity	Structural Complexity	Dominant Plant Species	Number of Species of Ecological/Conservation Interest
<b>Black Point</b>							
Current Study	120	Shrubland 86 ha (72%)	70	Low to moderate or moderate	Low to moderate or moderate	<i>Celtis sinensis</i> , <i>Aporosa dioica</i> , <i>Cassytha filiformis</i> , <i>Gordonia axillaries</i> , <i>Litsea rotundifolia</i> , <i>Sterculia lanceolata</i> and <i>Caesalpinia vernalis</i>	Bamboo Orchid and Pitcher Plant
<b>Lung Kwu Chau</b>							
MCAL 2001	39	Shrubland 2 ha (< 5%) <sup>(2)</sup>	Not provided	Not provided	Not provided	Not provided	Not provided
<b>Nim Wan</b>							
ERM 2000a	27	8.1 ha (30%) <sup>(2)</sup>	13	Low	Low	<i>Rhodomyrtus tomentosa</i> , <i>Baeckea frutescens</i> and <i>Rhaphiolepis indica</i> .	Nil
<b>Siu Ho Wan</b>							
ERM 2000a	110	Shrubland 38.5 ha (35%) <sup>(2)</sup>	53	Moderate	Moderate	<i>Trema orientalis</i> , <i>Mallotus paniculata</i> , <i>Dalbergia hancei</i> and <i>Liquidamber formosana</i>	<i>Pavetta hongkongensis</i>
<b>WENT landfill Extensions</b>							
Scott Wilson 2003	150	Mixed shrubland 90 ha (60%) <sup>(2)</sup>	Not mentioned	Low	Low	Not mentioned	Pitcher Plant
<b>Penny's Bay</b>							
ERM 2000b	514	Tall shrubland 103 ha (20%) <sup>(2)</sup>	53	Low	Low	<i>Cratoxylum cochinchinense</i> , <i>Litsea rotundifolia</i> , <i>Litsea glutinosa</i> , <i>Microcos paniculata</i> and <i>Rhus succedanea</i> .	Nil
<b>North Lantau</b>							
ERM 2000c	2,600	Shrubland 1560 ha (60%) <sup>(2)</sup>	93	Medium	Moderate	<i>Cratoxylum cochinchinense</i> , <i>Litsea rotundifolia</i> , <i>Litsea glutinosa</i> , <i>Schefflera octophylla</i> and <i>Rhus succedanea</i>	7



Notes: (1) Other areas without the specified habitat are not shown.

MCAL 2001- Mouchel Asia Ltd (2001). *Improvement to Tung Chung Road between Lung Tseng Tau and Cheung Sha*. EIA Report.

ERM 2000a- ERM - Hong Kong Ltd (2000a). *Sludge Treatment and Disposal Strategy: Site Specific Feasibility Study of Sludge Management Strategy (SMS) and Sludge Disposal Plan (SDS) – Volume 2 (Annexes)*. Final Report. For the Environmental Protection Department

Scott Wilson 2003-Scott Wilson (Hong Kong) Ltd (2000). *Tai O Sheltered Boat Anchorage Environmental and Drainage Impact Assessment for Civil Engineering Department*. *Environmental Impact Assessment-Final Assessment Report*.

ERM 2000b- ERM – Hong Kong Ltd (2000b). *Environmental Impact Assessment, Construction of an International Theme Park in Penny's Bay of North Lantau and its Essential Associated Infrastructures*. Final EIA Report Annex (Volume 1)

ERM 2000c - ERM – HK Ltd (2000). *Environmental Impact Assessment of the Northshore Lantau Development Feasibility Study*, prepared for Civil Engineering Department.

(2) Area estimated from the habitat map presented in the report.

Table 2c Shrubby Grassland Recorded at Black Point in Comparison with Other Area in the Vicinity and North Lantau

Location <sup>(1)</sup>	Size of the Areas (ha)	Size and % Coverage of Shrubland	Number of Plant Species Record	Floristic Diversity	Structural Complexity	Dominant Plant Species	Number of Species of Ecological/Conservation Interest
<b>Black Point</b>							
Current Study	120	Shrubby grassland 46.6 ha (39%)	25	Low	Low	<i>Ischaemum aristatum</i> , <i>Digitaria sanguinalis</i> and <i>Rhynchelytrum repens</i>	Nil
<b>Lung Kwu Chau</b>							
MCAL 2001	39	Shrubby grassland 35 ha (> 90%) <sup>(2)</sup>	Only 6 representative plant species listed	Low	Low	<i>Rhodomrytus sp.</i> And <i>Gordonia sp.</i>	Nil
<b>Siu Ho Wan</b>							
ERM 2000a	110	Shrubland and grassland mosaic 16.5 ha (15%) <sup>(2)</sup>	33	Low	Low	<i>Arundinella critinum</i> , <i>Miscanthus floridulus</i> , <i>Eremochloa ciliaris</i> and <i>Eulalia contorta</i> .	<i>Rhododendron spp.</i>
<b>WENT Landfill Extensions</b>							
Scott Wilson 2003	150	Approximately 22.5 ha (15%) <sup>(2)</sup>	Not provided	Not provided	Not provided	Not provided	Not provided
<b>Penny's Bay</b>							
ERM 2000b	514	Grassland & shrubland mosaic 359 ha (70%) <sup>(2)</sup>	68	Low to moderate	Low to moderate	<i>Baeckea frutescens</i> , <i>Arundinella setosa</i> , <i>Cymbopogon goeringii</i> , <i>Eulalia quadrinervis</i> , <i>Isachaemum barbartum</i> and the fern <i>Dicranopteris pedata</i>	Nil
<b>North Lantau</b>							
ERM 2000c	2, 600	Shrubland and grassland mosaic 260 ha (10%) <sup>(2)</sup>	90	Low to moderate	Low to moderate	<i>Baeckea frutescens</i> , <i>Arundinella setosa</i> , <i>Cymbopogon goeringii</i> , <i>Eulalia quadrinervis</i> , <i>Isachaemum barbartum</i> and the fern <i>Dicranopteris linearis</i>	Nil

Notes: (1) Other areas without the specified habitat are not shown.

MCAL 2001- Mouchel Asia Ltd (2001). *Improvement to Tung Chung Road between Lung Tseng Tau and Cheung Sha*. EIA Report.

ERM 2000a- ERM - Hong Kong Ltd (2000a). *Sludge Treatment and Disposal Strategy: Site Specific Feasibility Study of Sludge Management Strategy (SMS) and Sludge Disposal Plan (SDS) – Volume 2 (Annexes)*. Final Report. For the Environmental Protection Department

Scott Wilson 2003-Scott Wilson (Hong Kong) Ltd (2000). *Tai O Sheltered Boat Anchorage Environmental and Drainage Impact Assessment for Civil Engineering Department*. *Environmental Impact Assessment-Final Assessment Report*.

ERM 2000b- ERM – Hong Kong Ltd (2000b). *Environmental Impact Assessment, Construction of an International Theme Park in Penny’s Bay of North Lantau and its Essential Associated Infrastructures*. Final EIA Report Annex (Volume 1)

ERM 2000c - ERM – HK Ltd (2000). *Environmental Impact Assessment of the Northshore Lantau Development Feasibility Study*, prepared for Civil Engineering Department.

(2) Area estimated from the habitat map presented in the report.

Table 2d Stream Recorded at Black Point in Comparison with Other Area in the Vicinity and North Lantau

Location <sup>(1)</sup>	Size of the Areas (ha)	Number of Streams and Length (Km)	Seasonal or Permanent	Floristic Diversity	Natural or Artificial	Abundance of Stream Fauna	Number of Species of Ecological/Conservation Interests
<b>Black Point</b>							
Current Study	120	1 stream Length: 0.72 km	Seasonal	Low to moderate	Mostly natural	Nil	1 (Lesser Spiny Frog)
<b>Nim Wan</b>							
ERM 2000a	27	3	Permanent	Low	Natural	Low	Pitcher Plant and <i>Eriocaulon wallichianum</i>
<b>Siu Ho Wan</b>							
ERM 2000a	110	1	Seasonal		Partially artificial	Nil	Nil
<b>WENT Landfill Extensions</b>							
Scott Wilson 2003	150	1 (Tseng Kok stream)	Permanent	Not mentioned	Natural	Moderate	Nil
<b>Penny's Bay</b>							
ERM 2000b	514	4	Permanent	Low	Natural	Low	Nil
<b>North Lantau</b>							
ERM 2000c	2,600	9	Permanent	Moderate	Natural	Low	Nil

Notes: (1) Other areas without the specified habitat are not shown.

ERM 2000a- ERM - Hong Kong Ltd (2000a). *Sludge Treatment and Disposal Strategy: Site Specific Feasibility Study of Sludge Management Strategy (SMS) and Sludge Disposal Plan (SDS) – Volume 2 (Annexes). Final Report.* For the Environmental Protection Department

Scott Wilson 2003-Scott Wilson (Hong Kong) Ltd (2000). *Tai O Sheltered Boat Anchorage Environmental and Drainage Impact Assessment for Civil Engineering Department. Environmental Impact Assessment-Final Assessment Report.*

ERM 2000b- ERM – Hong Kong Ltd (2000b). *Environmental Impact Assessment, Construction of an International Theme Park in Penny's Bay of North Lantau and its Essential Associated Infrastructures. Final EIA Report Annex (Volume 1)*

ERM 2000c - ERM – HK Ltd (2000). *Environmental Impact Assessment of the Northshore Lantau Development Feasibility Study*, prepared for Civil Engineering Department.

Table 2e Orchard Recorded at Black Point in Comparison with Other Areas in the Vicinity and North Lantau

Location <sup>(1)</sup>	Size of the Areas (ha)	Size and % Coverage of Orchard	Number of Plant Species Record	Floristic Diversity	Structural Complexity	Dominant Plant Species	Number of Species of Ecological/Conservation Interest
<b>Black Point</b>							
Current Study	120	Orchard 1.4 ha (1.1%)	6	Low	Low	<i>Dimocarpus longan</i> and <i>Litchi chinensis</i>	Nil
<b>Penny's Bay</b>							
ERM 2000b	514	Orchard 5 ha (< 1%) <sup>(2)</sup>	Not mentioned	Low to moderate	Low to moderate	<i>Dimocarpus longan</i> , <i>Acacia confusa</i> , <i>Albizia lebbek</i> and <i>Clausena lansium</i>	Nil
<b>North Lantau</b>							
ERM 2000c	2,600	Orchard 26 ha (< 1%) <sup>(2)</sup>	42	Low	Low	<i>Acacia confusa</i> and <i>Albizia lebbek</i>	Nil

Notes: (1) Other areas without the specified habitat are not shown.

ERM 2000b- ERM – Hong Kong Ltd (2000b). *Environmental Impact Assessment, Construction of an International Theme Park in Penny's Bay of North Lantau and its Essential Associated Infrastructures. Final EIA Report Annex (Volume 1)*

ERM 2000c - ERM – HK Ltd (2000). *Environmental Impact Assessment of the Northshore Lantau Development Feasibility Study*, prepared for Civil Engineering Department.

(2) Area estimated from the habitat map presented in the report.

Table 2f Developed Area Recorded at Black Point in Comparison with Other Areas in the Vicinity and North Lantau

Location <sup>(1)</sup>	Size of the Areas (ha)	Size and % Coverage of Developed Area	Number of Plant Species Recorded	Components of Disturbed Area	Floristic Diversity	Dominant Plant Species	Number of Plant Species of Ecological/Conservation Interest
<b>Black Point</b>							
Current Study	120	43.6 ha (36.6%)	7	Concrete path, helicopter landsite, pier and abandoned houses.	Low	<i>Araucaria heterophylla</i> and <i>Acalypha wilkesiana</i>	Nil
<b>Lung Kwu Chau</b>							
MCAL 2001	39	2 ha (< 5 %) <sup>(2)</sup>	Not provided	Concrete path, radar station and facilities.	Not provided	Not provided	Not provided
<b>Siu Ho Wan</b>							
ERM 2000a	110	55 ha (50%) <sup>(2)</sup>	Not provided	North Lantau Highway, car service facilities and water treatment plant.	Not provided	Not provided	Not provided

Notes: (1) Other areas without the specified habitat are not shown.

MCAL 2001- Mouchel Asia Ltd (2001). *Improvement to Tung Chung Road between Lung Tseng Tau and Cheung Sha. EIA Report.*

ERM 2000a- ERM - Hong Kong Ltd (2000a). *Sludge Treatment and Disposal Strategy: Site Specific Feasibility Study of Sludge Management Strategy (SMS) and Sludge Disposal Plan (SDS) – Volume 2 (Annexes). Final Report.* For the Environmental Protection Department

(2) Area estimated from the habitat map presented in the report.

Table 3

## Bird Species Recorded Within the Study Area

Common Name	Species Name	Habitat (Dry Season)	Habitat (Wet Season)	Commonness	Status
Barn Swallow	<i>Hirundo rustica</i>	SG, ST	P, SG, ST	CW	SV, PM
Black Drongo	<i>Dicrurus macrocerus</i>		P, SG	CW	SV
Black Kite	<i>Milvus migrans</i>	D, SG, ST	SG, ST	CW	R
Black-collared Starling	<i>Sturnus nigricollis</i>		C, P	CW	R
Black-faced Bunting	<i>Emberiza spodocephala</i>	SG		CW	WV
Blue Rock Thrush	<i>Monticola solitarius</i>	SG		U	R
Blue Whistling Thrush	<i>Myophonus caeruleus</i>		SG	CW	R
Chestnut Bulbul	<i>Hypsipetes castanonotus</i>	P, ST		R	R
Chinese Bulbul	<i>Pycnonotus sinensis</i>	OR, P, ST, SG, ST	OR, P, ST, SG, ST	CW	R
Chinese Bush Warbler	<i>Cettia canturians</i>		ST	U	WV
Chinese Francolin	<i>Francolinus pintadeanus</i>		P	CW	R
Chinese Pond Heron	<i>Ardeola bacchus</i>		(Sea)	CW	R
Common Kingfisher	<i>Alcedo atthis</i>		C	CW	R
Common Koel	<i>Eudynamis scolopacea</i>		P	CW	R
Common Magpie	<i>Pica pica</i>	D, P, SG	D, P	CW	R
Common Sandpiper	<i>Actitis hypoleucos</i>	C, RS		CW	PM, WV
Common Tailorbird	<i>Orthotomus sutorius</i>	OR, P, SG, ST	OR, P, SG	CW	R
Crested Myna	<i>Acridotheres crisatellus</i>	D, SG, ST	D, P, ST	CW	R
Daurian Redstart	<i>Phoenicurus aureus</i>	D, P, SG, ST		U	WV
Domestic Pigeon	<i>Columba livia</i>	D	SG	U	R
Dusky Warbler	<i>Phylloscopus fuscatus</i>	ST		U	WV
Eurasian Tree Sparrow	<i>Passer montanus</i>		D, P	CW	R
Great Tit	<i>Parus major</i>	OR, P, ST	P	CW	R

Common Name	Species Name	Habitat (Dry Season)	Habitat (Wet Season)	Commonness	Status
Greater Coucal	<i>Centropus sinensis</i>	ST	P, SG, ST	CW	R
Grey Wagtail	<i>Motacilla cinerea</i>	C, D, OR, ST	C, D, P	CW	WV
Grey-backed Thrush	<i>Turdus hortulorum</i>	OR, P, SG, ST		U	WV
Grey-capped Greenfinch	<i>Carduelis sinica</i>		ST	R	R
Hair-crested Drongo	<i>Dicrurus hottentottus</i>		OR	U	SV
Indian Cuckoo	<i>Cuculus micropterus</i>		P	U	SV
Japanese White-eye	<i>Zosterops japonicus</i>	D, OR, P, S	P, SG, S	CW	R
Large-billed Crow	<i>Corvus macrorhynchos</i>	D, SG, S	D, S	CW	R
Little Bunting	<i>Emberiza pusilla</i>	SG		U	PM, WV
Little Egret	<i>Egretta garzetta</i>	RS, (Sea)	RS, (Sea)	CW	R
Little Swift	<i>Apus affinis</i>	SG, S	SG, S	CW	R, PM
Long-tailed Shrike	<i>Lanius schach</i>	P, SG, S	P, SG	CW	R
Masked Laughing Thrush	<i>Garrulax perspicillatus</i>	OR, SG, S	OR, P, S, SG, S	CW	R
Olive-backed Pipit	<i>Anthus hodgsoni</i>	C, D, S	OR	CW	WV
Oriental Magpie Robin	<i>Copsychus saularis</i>	C, D, OR, P, S, TS	C, D, OR, P, TS	CW	R
Pallas's Leaf Warbler	<i>Phylloscopus proregulus</i>	P		U	WV
Plumbeous Redstart	<i>Rhyacornis fuliginosus</i>	RS		R	WV
Red Turtle Dove	<i>Streptopelia tranquebarica</i>		SG	R	PM, WV
Red-flanked Bluetail	<i>Tarsiger cyanurus</i>	OR		U	WV
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>	OR, P, S, TS	OR, P, S, SG, TS	CW	R
Richard's Pipit	<i>Anthus richardi</i>	SG		CW	R, PM, WV
Scaly-breasted Munia	<i>Lonchura punctulata</i>		D, TS	U	R
Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>	D, P, TS	P, SG	CW	R
Spotted Dove	<i>Streptopelia chinensis</i>	D, OR, SG, TS	D, OR, P, SG	CW	R



Common Name	Species Name	Habitat (Dry Season)	Habitat (Wet Season)	Commonness	Status
White Wagtail	<i>Motacilla alba</i>	C, D, P, RS, S	C, D, RS, S	CW	WV
White-bellied Sea Eagle	<i>Haliaeetus leucogaster</i>		SG	U	R
White-rumped Munia	<i>Lonchura striata</i>		P	U	R
White-throated Kingfisher	<i>Halcyon smyrnenensis</i>		C, S, SG, TS	CW	R
Yellow-bellied Prinia	<i>Prinia flaviventris</i>	SG, TS	SG, TS	CW	R
Yellow-browed Warbler	<i>Phylloscopus inornatus</i>	P		CW	WV

Habitats: C = channel, D = developed area, OR = orchard, P = plantation, RS = rocky shore, ST = stream, SG = shrubby grassland, S = shrubland.

Commonness & Distribution: CW = common and widespread, U = uncommon and localised, R = rare and localized, VR = very rare.

Status: PM-Passage migrant, R-Resident, SV-Summer visitor, WV-Winter visitor

Commonness and status of birds are reference to C Viney, Karen Philipps and Lam Chiu Ying (1993) *Birds of Hong Kong and South China*.

Table 4 Bird Species Recorded Within the Study Area during Point Count Survey

Common Name	Species Name	Developed Area			Orchard		Plantation			Stream/Channel			Shrubby Grassland			Shrubland			
		Dry	Wet	Overall	Dry	Wet	Overall	Dry	Wet	Overall	Dry	Wet	Overall	Dry	Wet	Overall			
Barn Swallow	<i>Hirundo rustica</i>							2	2				18	12	30	8	6	14	
Black Kite	<i>Milvus migrans</i>		1	1				1	1				5	1	6		1	1	
Chinese Bulbul	<i>Pycnonotus sinensis</i>					6	6	9	3	12	2	14	16	5	17	22	18	16	34
Common Kingfisher	<i>Alcedo atthis</i>										1	1							
Common Magpie	<i>Pica pica</i>	1		1				1	1										
Common Tailorbird	<i>Orthotomus sutorius</i>				2	7	9		1	1									
Crested Myna	<i>Acridotheres cristatellus</i>	4	3	7							1	1							
Daurian Redstart	<i>Phoenicurus auroreus</i>							2	2										
Dusky Warbler	<i>Phylloscopus fuscatus</i>										1	1							
Great Tit	<i>Parus major</i>				1		1		2	2									
Grey Wagtail	<i>Motacilla cinerea</i>				1		1				1	1							
Grey-backed Thrush	<i>Turdus hortulorum</i>				1		1				1	1							
Grey-capped Greenfinch	<i>Carduelis sinica</i>										2	2							
Hair-crested Drongo	<i>Dicrurus hottentottus</i>					2	2												
Japanese White-eye	<i>Zosterops japonicus</i>							2	1	3									
Large-billed Crow	<i>Corvus macrorhynchos</i>	1		1															
Little Bunting	<i>Emberiza pusilla</i>											2		2					
Little Swift	<i>Apus affinis</i>															1	1	2	

Common Name	Species Name	Developed Area			Orchard		Plantation			Stream/Channel			Shrubby Grassland			Shrubland			
		Dry	Wet	Overall	Dry	Wet	Overall	Dry	Wet	Overall	Dry	Wet	Overall	Dry	Wet	Overall			
Long-tailed Shrike	<i>Lanius schach</i>							1	1				1	1	2				
Masked Laughingthrush	<i>Garrulax perspicillatus</i>				4		4	2	2		4	4	2	7	9	2	2	4	
Olive-backed Pipit	<i>Anthus hodgsoni</i>					1	1				2	2							
Oriental Magpie Robin	<i>Copsychus saularis</i>				1	3	4		4	4	1	5	6			2		2	
Pallas' Leaf Warbler	<i>Phylloscopus proregulus</i>							1		1									
Red-flanked Bluetail	<i>Tarsiger cyanurus</i>				1		1												
Red-whiskered Bulbul	<i>Pycnonotus jocosus</i>					3	3	2	9	11	8	4	12	2	7	9	9	7	16
Scaly-breasted Munia	<i>Lonchura punctulata</i>		3	3					4	4									
Sooty-headed Bulbul	<i>Pycnonotus aurigaster</i>							6	1	7				1	1				
Spotted Dove	<i>Streptopelia chinensis</i>	2		2	1	7	8		3	3						3		3	
White Wagtail	<i>Motacilla alba</i>	5	1	6				1		1	8	2	10						
White-throated Kingfisher	<i>Halcyon smyrnensis</i>											2	2						
Yellow-bellied Prinia	<i>Prinia flaviventris</i>													3	3	1		1	
	<b>Total number of species</b>	<b>5</b>	<b>4</b>	<b>7</b>	<b>8</b>	<b>7</b>	<b>12</b>	<b>7</b>	<b>14</b>	<b>17</b>	<b>7</b>	<b>10</b>	<b>13</b>	<b>7</b>	<b>8</b>	<b>9</b>	<b>8</b>	<b>6</b>	<b>9</b>
	<b>Total number of birds</b>	<b>13</b>	<b>8</b>	<b>21</b>	<b>12</b>	<b>29</b>	<b>41</b>	<b>23</b>	<b>35</b>	<b>58</b>	<b>22</b>	<b>37</b>	<b>59</b>	<b>35</b>	<b>49</b>	<b>84</b>	<b>44</b>	<b>33</b>	<b>77</b>

Table 5 Bird Species Recorded at Black Point in Comparison with Other Areas in the Vicinity and North Lantau

Location <sup>(1)</sup>	Size of Study Area (ha)	Habitats Recorded within the Study Area	Survey Effort	Number of Species Record	Total Number of Individuals Recorded	Number of Species of Ecological/Conservation Interest
<b>Black Point</b>						
Current study	120	Plantation, shrubland, shrubby grassland, stream/channel, orchard and developed area.	4 days in dry season and 4 days in wet season (Feb – Jul 2004).	Total: 53 plantation (24), shrubland (23), shrubby grassland (22), stream/channel (7), orchard (13) and developed area (14).	340	Total: 3 (Greater Coucal, White-bellied Sea Eagle and Black Kite) Shrubby grassland (3), shrubland (2), stream (1)
<b>Lung Kwu Chau</b>						
MCAL 2001	39	Backshore vegetation, shrubland grassland mosaic	3 days in dry season and 1 day in wet season (Feb 2001 to Feb 2002)	Total: 19 Habitat not mentioned	Not quantified	Total: 2 Habitat not mentioned
<b>Nim Wan</b>						
ERM 2000a	27	Woodland, shrubland, marsh, intertidal channel, stream and cultural site	1 day in dry season and 1 day in wet season (June 1999 and Jan 2000).	Total: 20 Woodland (17) Intertidal channel (6), marsh (8).	Not quantified	Total: 5 (Black Kite, Chinese Pond Heron, Greater Coucal, Chinese Francolin and Little Egret) Woodland (4), intertidal channel (2), marsh (1).
<b>Siu Ho Wan</b>						
ERM 2000a	110	Grassland, Shrubland, woodland, stream, shore habitat,	Not mentioned	Woodland (4)	Not quantified	Total: 1 (Greater Coucal) Woodland (1)
<b>WENT Landfill Extensions</b>						
Scott Wilson 2003	150	Woodland, shrubland and grassland	Not mentioned	Not mentioned	Not quantified	Total: 2 (Little Grebe and Little Ringed Plover)

Location <sup>(1)</sup>	Size of Study Area (ha)	Habitats Recorded within the Study Area	Survey Effort	Number of Species Record	Total Number of Individuals Recorded	Number of Species of Ecological/Conservation Interest
<b>Penny's Bay</b>						
ERM 2000b	514	Secondary Woodland, plantation, tall shrubland, grass mosaic, stream, wasteland, wetland orchard/village, backshore vegetation, wetland, and abandoned farmland.	5 days in dry season (Jan 1999) and 2 days in wet season (Jul1999).	32	Not quantified	Total: 2 (Black Kite and Sparrowhawk) Tall shrubland (2)
<b>North Lantau</b>						
ERM 1998	2,600	Secondary woodland, plantation, tall shrubland, grass mosaic, stream, wasteland, wetland orchard/village, backshore vegetation, wetland, and abandoned farmland.	5 days in dry season (Jan, Feb, Nov and Dec 1999) and 2 days in wet season (July 1999).	59	Not quantified	Total: 4 (Black Kite, White-bellied Sea Eagle, Woodcock and Sparrowhawk) Tall shrubland (4)

Notes: (1) Other areas without the specified habitat are not shown.

MCAL 2001- Mouchel Asia Ltd (2001). *Improvement to Tung Chung Road between Lung Tseng Tau and Cheung Sha. EIA Report.*

ERM 2000a- ERM - Hong Kong Ltd (2000). *Sludge Treatment and Disposal Strategy: Site Specific Feasibility Study of Sludge Management Strategy (SMS) and Sludge Disposal Plan (SDS) – Volume 2 (Annexes). Final Report.* For the Environmental Protection Department

ERM 2000b-ERM – Hong Kong Ltd (2000). *Environmental Impact Assessment, Construction of an International Theme Park in Penny's Bay of North Lantau and its Essential Associated Infrastructures. Final EIA Report Annex (Volume 1)*

Scott Wilson 2000- Scott Wilson (Hong Kong) Ltd (2000). *Tai O Sheltered Boat Anchorage Environmental and Drainage Impact Assessment for Civil Engineering Department. Environmental Impact Assessment-Final Assessment Report.*

ERM 1998-ERM (1998). *Environmental Impact Assessment of a 1800 MW Gas-Fired Power Station at Lamma Extension: Marine Ecological Assessment – Final Benthic Ecology Survey Report, Final Survey Report,* prepared for the Hong Kong Electric Co Ltd.

Table 6a Butterfly Species Recorded within the Study Area at Black Point

Common Name	Species Name	Habitat Dry Season	Habitat Record in Wet Season	Commonness
Angled Castor	<i>Ariadne ariadne</i>	P		C
Black Prince	<i>Rohana parisatis</i>		SG	C
Blue-spotted Crow	<i>Euploea midamus</i>		SG	VC
Ceylon Blue Tiger	<i>Ideopsis similis</i>		SG	VC
Chestnut Angle	<i>Odontoptilum augulatum</i>		SG	C
Common Black Jezebel	<i>Delias pasithoe</i>	S, SG		VC
Common Bluebottle	<i>Graphium sarpedon</i>	SG	SG, P	VC
Common Five Ring	<i>Ypthima baldus</i>		OR, SG	C
Common Grass Yellow	<i>Eumeces hecabe</i>	P, SG	P, S, SG	VC
Common Gull	<i>Cepora nerissa</i>		P, S, SG	C
Common Mormon	<i>Papilio polytes</i>	P, S	P, S, SG, OR	VC
Common Sailor	<i>Neptis hylas</i>	OR, SG	P, S, SG, OR	VC
Dark-band Bush Brown	<i>Mycalesis mineus</i>		P, S, SG	VC
Great Eggfly	<i>Hypolimnas bolina</i>	OR, SG	S, SG, OR	C
Great Mormon	<i>Papilio memnon</i>		P, S, SG	VC
Great Orange Tip	<i>Hebomoia glaucippe</i>	P	P	C
Indian Cabbage White	<i>Pieris canidia</i>	S	P, S, SG, OR	VC
Indian Fritillary	<i>Argyreus hyperbius</i>		SG	C
Large Faun	<i>Faunis eumeus</i>		P, OR	VC
Lemon Pansy	<i>Junonia lemonias</i>		SG	C
Lime Blue	<i>Chilades lajus</i>	OR	P, S, SG	VC

Common Name	Species Name	Habitat Dry Season	Habitat Record in Wet Season	Commonness
Mapwing	<i>Cyrestis thalamus</i>		P	C
Pale Grass Blue	<i>Zizeeria maha</i>		S, SG, OR	VC
Paris Peacock	<i>Papilio paris</i>		P, SG	VC
Plum Judy	<i>Abisara echerius</i>	S, SG	P, S	VC
Punchinello	<i>Zemeros flegyas</i>	P, S	OR, SG	C
Red Helen	<i>Papilio helenus</i>	S	P, SG	VC
Red Lacewing	<i>Cethosia biblis</i>		S	R
Red Ring Skirt	<i>Hestina assimilis</i>	S		C
Rustic	<i>Cupha erymanthis</i>		S	VC
Spangle	<i>Papilio protenor</i>		S	VC
Spotted Sawtooth	<i>Prioneris thestylis</i>		P	R
Straight Five-ring	<i>Ypthima lisandra</i>	P	P	VC
Tailed Cupid	<i>Everes lacturnus</i>		SG	C
Tailed Jay	<i>Graphium agamemnon</i>	SG		VC
Tailed Sulphur	<i>Dercas verhuelli</i>		SG	UC
Yellow Pansy	<i>Junonia hierta</i>	SG	SG	UC

Notes: Habitat: SG = shrubby grassland, S = shrubland, P = plantation, OR = orchard

Commonness of butterflies is reference to Yiu V (2004). *Field Guide to the butterflies of Hong Kong*.

Table 6b Butterfly Species and Their Abundance Recorded at Black Point in Dry Season

Common Name	Species Name	Habitat				Commonness
		P	OR	S	SG	
Angled Castor	<i>Ariadne ariadne</i>	1				C
Common Black Jezebel	<i>Delias pasithoe</i>			1	2	VC
Common Bluebottle	<i>Graphium sarpedon</i>				2	VC
Common Grass Yellow	<i>Eumeces hecabe</i>	1			2	VC
Common Mormon	<i>Papilio polytes</i>	5		2		VC
Common Sailor	<i>Neptis hylas</i>		1		1	VC
Great Eggfly	<i>Hypolimnas bolina</i>		1		1	C
Indian Cabbage White	<i>Pieris canidia</i>			1		VC
Lime Blue	<i>Chilades lajus</i>		4			VC
Plum Judy	<i>Abisara echerius</i>			1	1	VC
Punchinello	<i>Zemeros flegyas</i>	1		7		C
Red Helen	<i>Papilio helenus</i>			1		VC
Red Ring Skirt	<i>Hestina assimilis</i>			1		C
Straight Five-ring	<i>Ypthima lisandra</i>	1				VC
Tailed Jay	<i>Graphium agamemnon</i>				1	VC
Yellow Pansy	<i>Junonia hierta</i>				1	UC
<b>Total butterflies</b>		<b>9</b>	<b>6</b>	<b>14</b>	<b>11</b>	
<b>Total species</b>		<b>5</b>	<b>3</b>	<b>7</b>	<b>8</b>	

Notes: Habitat: SG = shrubby grassland, S = shrubland, P = plantation, OR = orchard. No butterfly was recorded in stream/channel. Commonness: VC = very common, C = common, UC = uncommon, R =rare. Commonness of butterflies is reference to Yiu V (2004). *Field Guide to the butterflies of Hong Kong*.



Table 6c Butterfly Species and Their Abundance Recorded at Black Point in Wet Season

Common Name	Species Name	Habitat				Commonness
		P	OR	S	SG	
Black Prince	<i>Rohana parisatis</i>				2	C
Blue-spotted Crow	<i>Euploea midamus</i>				1	VC
Ceylon Blue Tiger	<i>Ideopsis similis</i>				1	VC
Chestnut Angle	<i>Odontoptilum augulatum</i>				1	C
Common Bluebottle	<i>Graphium sarpedon</i>	2			13	VC
Common Five Ring	<i>Ypthima baldus</i>		2		1	C
Common Grass Yellow	<i>Eumeces hecabe</i>	8		9	6	VC
Common Gull	<i>Cepora nerissa</i>	2		1	1	C
Common Mormon	<i>Papilio polytes</i>	4	1	5	7	VC
Common Sailor	<i>Neptis hylas</i>	1	1	1	3	VC
Dark-band Bush Brown	<i>Mycalesis mineus</i>	1		1	3	VC
Great Eggfly	<i>Hypolimnas bolina</i>		1	1	1	C
Great Mormon	<i>Papilio memnon</i>	3		2	1	VC
Indian Cabbage White	<i>Pieris canidia</i>	2	2	7	7	VC
Large Faun	<i>Faunis eumeus</i>	1	1			VC
Lemon Pansy	<i>Junonia lemonias</i>				1	C
Lime Blue	<i>Chilades lajus</i>	2		5	10	VC
Mapwing	<i>Cyrestis thalamus</i>	1				C
Pale Grass Blue	<i>Zizeeria maha</i>		1	3	2	VC
Paris Peacock	<i>Papilio paris</i>	4			8	VC
Plum Judy	<i>Abisara echerius</i>	5		1		VC

Common Name	Species Name	Habitat				Commonness
		P	OR	S	SG	
Punchinello	<i>Zemeros flegyas</i>		1		4	C
Red Helen	<i>Papilio helenus</i>	1			2	VC
Red Lacewing	<i>Cethosia biblis</i>			1		R
Rustic	<i>Cupha erymanthis</i>			1		VC
Spangle	<i>Papilio protenor</i>			3		VC
Spotted Sawtooth	<i>Prioneris thestylis</i>	1				R
Straight Five-ring	<i>Ypthima lisandra</i>	1				VC
Tailed Cupid	<i>Everes lacturnus</i>				1	C
Tailed Sulphur	<i>Dercas verhuelli</i>				3	UC
Yellow Pansy	<i>Junonia hierta</i>				1	UC
<b>Total butterflies</b>		<b>39</b>	<b>10</b>	<b>41</b>	<b>80</b>	
<b>Total species</b>		<b>16</b>	<b>8</b>	<b>14</b>	<b>23</b>	

Habitat: SG = shrubby grassland, S = shrubland, P = plantation, OR = orchard

No butterfly was recorded in channel. Commonness: VC = very common, C = common, UC = uncommon, R = rare. Commonness of butterflies is reference to Yiu V (2004). *Field Guide to the butterflies of Hong Kong*.

Table 7 Butterfly Species Recorded at Black Point in Comparison with Other Areas and North Lantau

Location <sup>(1)</sup>	Size of Study Area (ha)	Habitats Recorded within the Study Area	Survey Efforts	Number of Species Recorded	Total Number of Individuals Recorded	Number of Species of Ecological/Conservation Interests
<b>Black Point</b>						
Current study	120	Plantation, shrubland, shrubby grassland, orchard, stream/channel and developed area.	4 days during dry season (Feb – Mar 04) and 4 days during wet season (Apr – July 04).	Total: 37 Plantation (12), shrubland (12), shrubby grassland (29), Orchard (11).	210	Total: 4 (Yellow Pansy, Red Lacewing, Tailed Sulphur and Spotted Sawtooth) Shrubland (1), shrubby grassland (2), plantation (1).
<b>Lung Kwu Chau</b>						
MCAL 2001	39	Backshore vegetation, shrubland and grassland mosaic	1 day during dry season (Feb 2001) and 1 day during wet season (Aug 2001).	Nil	Nil	Nil
<b>Penny's Bay</b>						
ERM 2000b	514	Secondary woodland, tall shrubland, shrubland and grassland mosaic, plantation, abandoned farmland, orchard/village, stream and wasteland.	2 days in wet season (June 1999)	34	Not quantified	Nil
<b>North Lantau</b>						
ERM 2000c	2,600	Secondary woodland, tall shrubland, shrubland and grassland mosaic, plantation, abandoned farmland, orchard/village, stream and wasteland.	2 days in wet season (June 1999).	69	Not quantified	Nil

Notes: (1) Other areas without the specified habitat are not shown in the table.

MCAL 2001- Mouchel Asia Ltd (2001). *Improvement to Tung Chung Road between Lung Tseng Tau and Cheung Sha*. EIA Report.

ERM 2000b-ERM – Hong Kong Ltd (2000). *Environmental Impact Assessment, Construction of an International Theme Park in Penny's Bay of North Lantau and its Essential Associated Infrastructures*. Final EIA Report Annex (Volume 1).

ERM 2000c - ERM – HK Ltd (2000). *Environmental Impact Assessment of the Northshore Lantau Development Feasibility Study*.

**Table 8a** *Dragonfly Species and Their Abundance Recorded at Black Point in Dry Season*

Common Name	Species Name	Habitat					Commonness
		P	OR	S	C	SG	
Saddlebag Glider	<i>Tramea virginia</i>		1				C
Wandering Glider	<i>Pantala flavescens</i>			1			A
<b>Total dragonflies</b>		<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	
<b>Total species</b>		<b>0</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	

Habitat: SG = shrubby grassland, S = shrubland, P = plantation, OR = orchard, C = channel  
Commonness: A = abundant, C = common. Commonness of butterflies is reference to Yiu V (2004). *Field Guide to the butterflies of Hong Kong*.

**Table 8b** *Dragonfly Species and Their Abundance Recorded at Black Point in Wet Season*

Common Name	Species Name	Habitat					Commonness
		P	OR	S	C	SG	
Blue Percher	<i>Diplacodes trivialis</i>					1	A
Lesser Emperor	<i>Anax parthenope</i>				1		C
Orange-tailed Midget	<i>Ceragrion auranticum</i>					1	A
Wandering Glider	<i>Pantala flavescens</i>	1			2	12	A
<b>Total dragonflies</b>		<b>1</b>	<b>0</b>	<b>0</b>	<b>3</b>	<b>14</b>	
<b>Total species</b>		<b>1</b>	<b>0</b>	<b>0</b>	<b>2</b>	<b>3</b>	

Habitat: SG = shrubby grassland, S = shrubland, P = plantation, OR = orchard, C = channel.  
Commonness: A = abundant, C = common. Commonness of butterflies is reference to Yiu V (2004). *Field Guide to the butterflies of Hong Kong*.

Table 9 Dragonfly Species Recorded at Black Point in Comparison with Other Areas in the Vicinity and North Lantau

Location <sup>(1)</sup>	Size of Study Area (ha)	Habitats Recorded within the Study Area	Survey Effort	Number of Species Recorded	Total Number of Individuals Recorded	Number of Species of Ecological/Conservation Interest
<b>Black Point</b>						
Current study	120	Plantation, shrubland, shrubby grassland, stream/channel, orchard and developed area.	4 days in wet season (Feb – Mar 2004) and 4 days in dry season (Apr – Jul 2004) with one night survey in June 2004.	Total: 5 Orchard (1), and shrubland (1) plantation (1), stream/channel (2) and shrubby grassland (3).	19	Nil
<b>Lung Kwu Chau</b>						
MCAL 2001	39	Backshore vegetation, shrubland and grassland mosaic	1 day during dry season (Feb 2001) and 1 day during wet season (Aug 2001).	Nil	Nil	Nil
<b>Penny's Bay</b>						
ERM 2000b	514	Secondary woodland, tall shrubland, shrubland and grassland mosaic, plantation, abandoned farmland, orchard/village, stream and wasteland.	2 days in wet season (June 1999)	9	Not quantified	Nil
<b>North Lantau</b>						
ERM 2000c	2,600	Secondary woodland, tall shrubland, shrubland and grassland mosaic, plantation, abandoned farmland, orchard/village, stream and wasteland.	2 days in wet season (June 1999).	24	Not quantified	Nil

Notes: (1) Other areas without the specified habitat are not shown.

MCAL 2001- Mouchel Asia Ltd (2001). *Improvement to Tung Chung Road between Lung Tseng Tau and Cheung Sha. EIA Report.*

ERM 2000b-ERM – Hong Kong Ltd (2000). *Environmental Impact Assessment, Construction of an International Theme Park in Penny's Bay of North Lantau and its Essential Associated Infrastructures. Final EIA Report Annex (Volume 1).*

ERM 2000c - ERM – HK Ltd (2000). *Environmental Impact Assessment of the Northshore Lantau Development Feasibility Study*

Table 10 Herpetofauna Species Recorded at Black Point in Comparison with Other Areas in the Vicinity and North Lantau

Location <sup>(1)</sup>	Size of Study Area (ha)	Habitats Recorded within the Study Area	Survey Effort	Number of Species Recorded	Total Number of Individuals Recorded	Number of Species of Ecological/Conservation Interest
<b>Black Point</b>						
Current study	120	Plantation, shrubland, shrubby grassland, stream/channel, orchard and developed areas	4 survey days in wet season (Feb – Mar 2004 and 4 survey days in dry season (April – Jul 2004) and one night survey in June 2004.	Total: 5 3 amphibian species 2 reptile species	Not quantified.	Total: 2 (Lesser Spiny Frog and Burmese Python) Stream/channel (2).
<b>Lung Kwu Chau</b>						
MCAL 2001	39	Backshore vegetation, shrubland and grassland mosaic	1 day during dry season (Feb 2001) and 1 day during wet season (Aug 2001).	Nil	Nil	Nil
<b>Penny's Bay</b>						
ERM 2000b	514	Secondary woodland, tall shrubland, shrubland and grassland mosaic, plantation, abandoned farmland, orchard/village, stream and wasteland.	2 days in wet season (June 1999)	Total: 3	Not quantified	Nil
<b>North Lantau</b>						
ERM 2000c	2,600	Secondary woodland, tall shrubland, shrubland and grassland mosaic, plantation, abandoned farmland, orchard/village, stream and wasteland.	6 days in dry season (Feb, Nov and Dec 1999) and 2 days in wet season (May 1999).	Total: 7	Not quantified	Nil

Notes: (1) Other areas without the specified habitat are not shown.

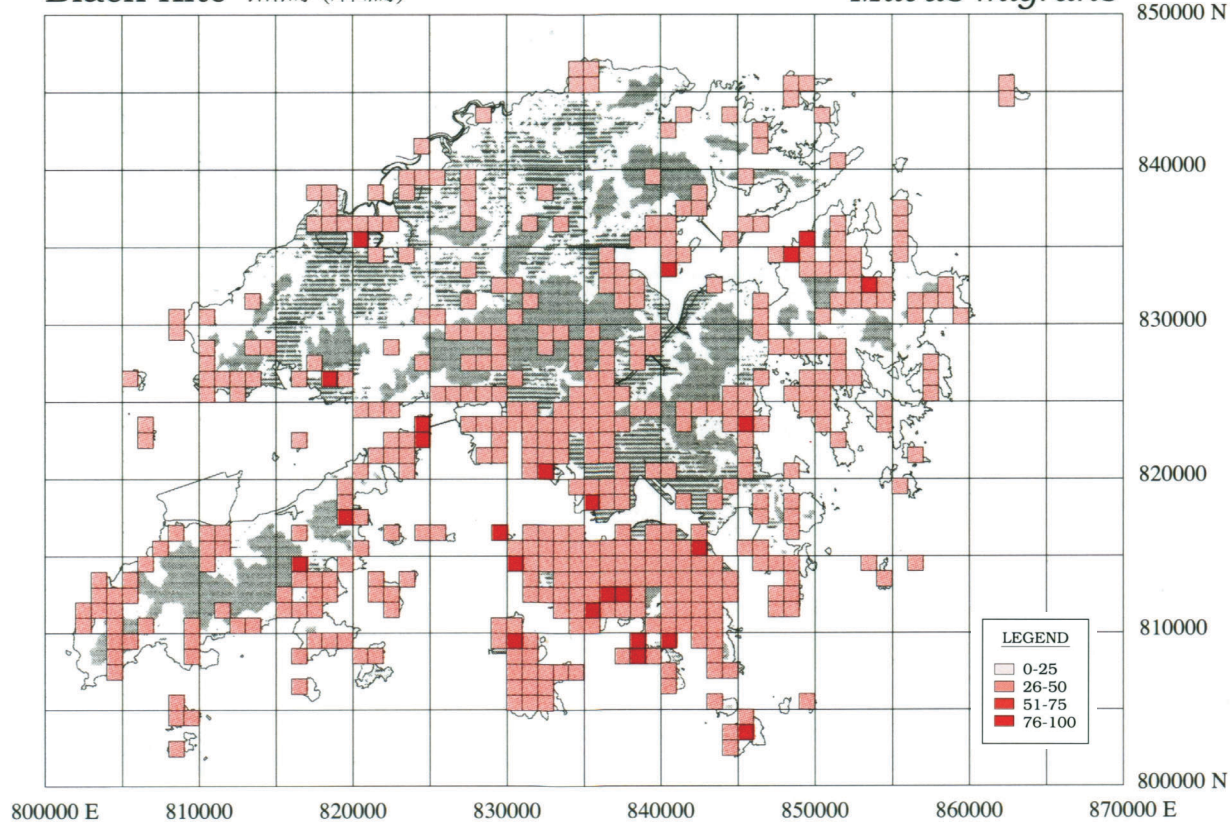
MCAL 2001- Mouchel Asia Ltd (2001). *Improvement to Tung Chung Road between Lung Tseng Tau and Cheung Sha. EIA Report.*

ERM 2000b-ERM – Hong Kong Ltd (2000). *Environmental Impact Assessment, Construction of an International Theme Park in Penny's Bay of North Lantau and its Essential Associated Infrastructures. Final EIA Report Annex (Volume 1).*

ERM 2000c - ERM – HK Ltd (2000). *Environmental Impact Assessment of the Northshore Lantau Development Feasibility Study*

Black Kite 黑鳶 (麻鷹)

*Milvus migrans*



Greater Coucal 褐翅鴉鵂

*Centropus sinensis*

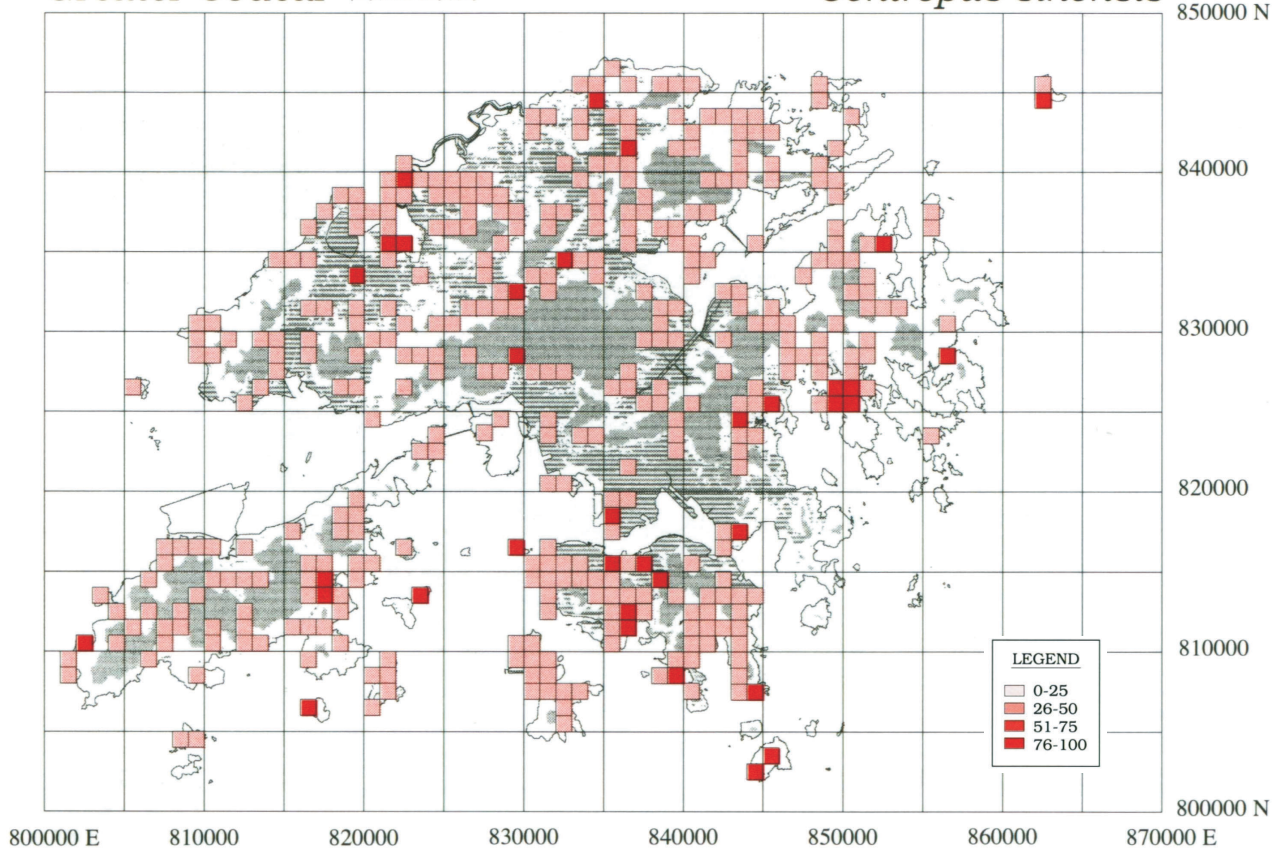


Figure 1

Distribution Pattern and Density of Black Kite and Greater Coucal  
in Hong Kong  
(Information extracted from Carey *et al* 2001)

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Environmental  
Resources  
Management



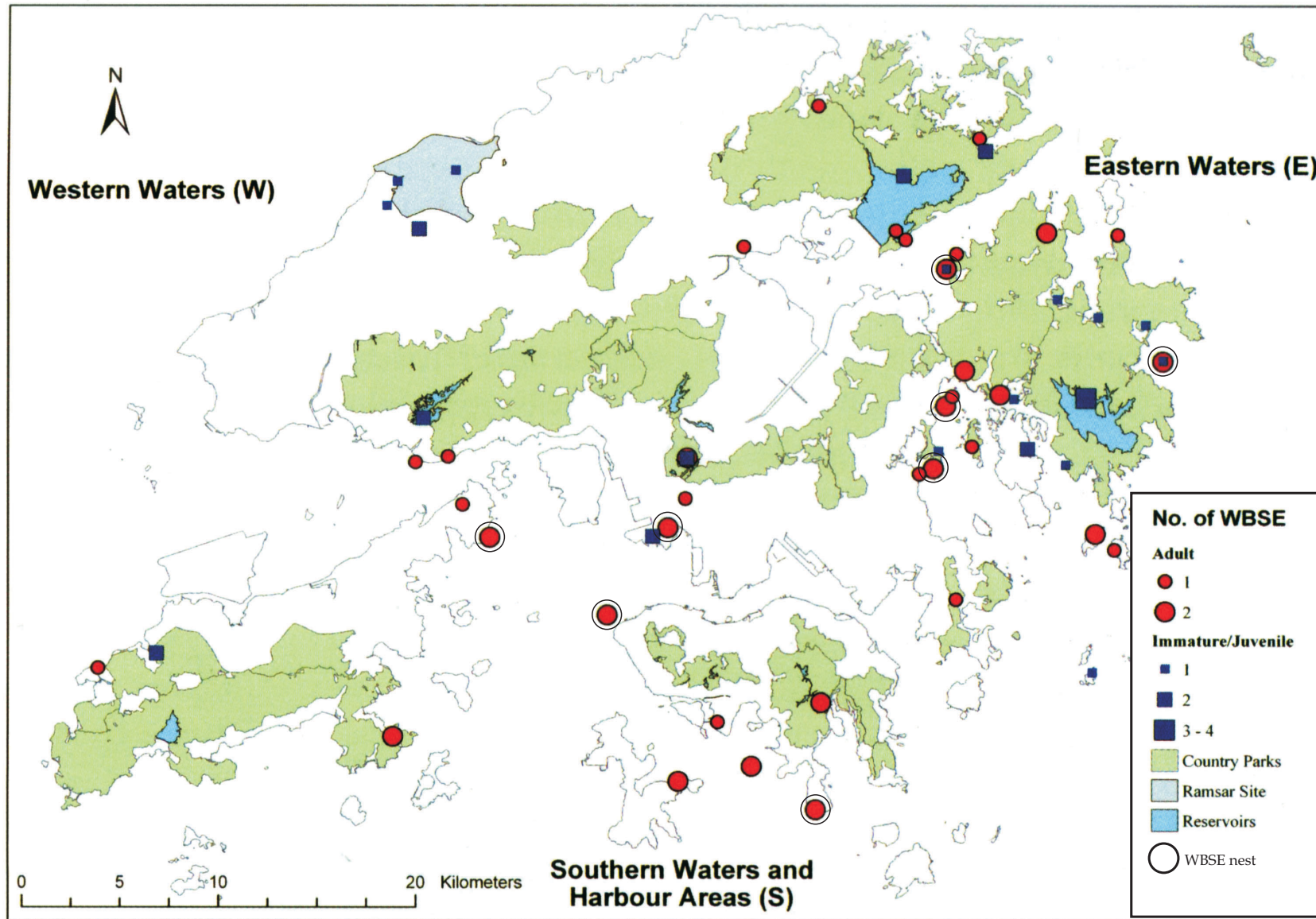


Figure 2

Location of the Nest, Distribution Pattern and Density of White-bellied Sea Eagle in Hong Kong  
(Information extracted from Tsim *et al* 2003)