

5 Ecological Impact

5.1 Introduction

This section presents the ecological impacts of the construction and operation of the Project, which covers the construction of Stabling Sidings at Hung Hom Freight Yard (HHS), Diamond Hill Station (DIH) and Kai Tak Station (KAT), and the modification of Hung Hom Station (HUH).

Baseline ecological conditions presented in this section are derived from literature reviews and ecological field surveys conducted for the Project Site and areas within 500m of the proposed development (the Study Area). The ecological importance of species and habitats within the Study Area have been identified and assessed. Any potential ecological impacts were identified with the scale and severity of their impacts evaluated. Mitigation proposals have been recommended, where appropriate. Requirements for environmental monitoring and audit have also been discussed.

The ecological impact assessment has been conducted in accordance with the requirements of Annexes 8 and 16 of the TM-EIAO and Clause 3.4.7 of the EIA Study Brief.

5.2 Environmental Legislation, Standards and Guidelines

The relevant legislation and associated guidelines related to ecological assessment include:

- Forests and Countryside Ordinance (Cap. 96) and its subsidiary legislation, the Forestry Regulations;
- Wild Animals Protection Ordinance (Cap. 170);
- Country Parks Ordinance (Cap. 208) and its subsidiary legislation;
- Marine Parks Ordinance (Cap. 476);
- Environmental Impact Assessment Ordinance (Cap. 499) and the associated TM, and;
- Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) and its subsidiary legislation.

This assessment also makes reference to the following guidelines and standards:

- Hong Kong Planning Standards and Guidelines (HKPSG) Chapter 10, "Conservation";
- PELB Technical Circular 1/97 / Works Branch Technical Circular 4/97, "Guidelines for Implementing the Policy on Off-site Ecological Mitigation Measures";
- EIAO Guidance Note No. 6/2010 - Some Observations on Ecological Assessment from the Environmental Impact Assessment Ordinance Perspective;
- EIAO Guidance Note No. 7/2010 – Ecological Baseline Survey for Ecological Assessment;
- EIAO Guidance Note No. 10/2010 – Methodologies for Terrestrial and Freshwater Ecological Baseline Surveys; and
- EIAO Guidance Note No. 11/2010 – Methodologies for Marine Ecological Baseline Surveys.

Other international conventions and guidelines that are relevant to this study include the following:

- Convention on International Trade in Endangered Species of Wild Fauna and Flora ("CITES"). This Convention regulates international trade in animal and plant species considered to be at risk from such trade. Their trade is subject to permits or certificates of origin. Hong Kong's obligations under this Convention are enforced via the Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586).

- IUCN - The World Conservation Union maintains, through its Species Survival Commission, a "Redlist" of globally threatened species of wild plants and animals (see <http://www.iucnredlist.org/static/introduction>).
- United Nations Convention on Biological Diversity. This convention requires parties to regulate or manage biological resources important for the conservation of biological diversity whether within or outside protected areas, with a view to ensuring their conservation and sustainable use. It also requires parties to promote the protection of ecosystems, natural habitats and the maintenance of viable populations of species in natural surroundings. The People's Republic of China (PRC) ratified the Convention on Biological Diversity on 5th January 1993. The HKSAR Government has stated that it is "committed to meeting the environmental objectives" of the Convention (PELB1996).

5.3 Survey Methodology

5.3.1 Background

Ecological surveys have been conducted between February 2009 and June 2009 at Hung Hom, Kai Tak and Diamond Hill to cover both the wet and dry seasons. Additional surveys conducted for former Tai Hom Village in December 2008 and November 2009 are also included. With reference to the EIAO Guidance Notes No. 7/2010 & 10/2010, surveys were conducted for habitats, vegetation, mammals, birds, herpetofauna, dragonflies and butterflies. Verification visits were also conducted in September and October 2010 to determine that ecological conditions of the surveyed areas had not changed.

5.3.2 Survey Areas

All the above-ground works sites at HHS, HUH, KAT, DIH and its associated alignment and facilities were surveyed and ground-truthed during both dry and wet seasons.

5.3.2.1 Hung Hom, Kai Tak and Diamond Hill Flora and Fauna Assessment Surveys

Desk-top studies including literature reviews, analysis of aerial photographs and maps were undertaken for a provisional assessment of the sites characteristics and ecological value. This suggested that the sites are of lower or limited ecological value, which would not result in major ecological constraints in these areas. Nevertheless, Flora and Fauna Assessment Surveys were conducted for the above-ground works to identify any significant ecological sensitive receivers that could not be accounted for during desk-top studies. The above-ground works sites are located in highly disturbed urban locations. The faunal aspect of each survey covered the major faunal groups i.e. mammals, birds, herpetofauna, butterflies and dragonflies. Species of conservation interest present were identified and highlighted. The surveys were conducted during both dry and wet seasons. Should any particular species group or habitats of conservation interest be identified at the above-ground works sites, additional surveys would be designed to target these areas. The survey schedules for the above-ground works sites at Hung Hom, Kai Tak and Diamond Hill are shown in the **Table 5.1** below. Additional surveys have also been conducted at former Tai Hom Village in December 2008 and November 2009.

Table 5.1: Survey schedule for above-ground works sites for the Project

Sites ^[2]	Type of survey	Dry Season		Wet Season		Dry Season	
		Dec 08	Mar 09	Apr 09	May 09	June 09	Nov 09
Above-ground sites for Hung Hom and Kai Tak (Figures 5.1.1 to 5.1.4)	Flora and Fauna Surveys		✓			✓	
Diamond Hill ^[1] (Figure 5.1.5)	Review of Tree Survey Flora and Fauna Surveys	✓	✓	✓		✓	✓
	Night time survey			✓			

Notes:

[1] Additional flora and fauna surveys have been conducted in December 2008 and November 2009 for Diamond Hill area.

[2] Verification visits have been conducted to all above-ground works sites in September and October 2010 to confirm habitats and ecological status of each area was the same, compared with surveys conducted between February and June 2009.

5.3.3 Species of Conservation Importance

The assessment of whether species are considered to be of conservation importance was based upon criteria provided by BirdLife International (2001 and web updates), IUCN Species Survival Commission (2009) and Fellowes *et al.* (2002) and if any species are protected by local or regional legislation.

5.4 Study Area

5.4.1 Concurrent Projects in the vicinity

The possible potential concurrent projects in the vicinity of the Project are identified as follows:

- Shatin to Central Link – Tai Wai to Hung Kom Section (SCL (TAW-HUH));
- Shatin to Central Link – Mong Kok East to Hung Hom Section (SCL (MKK – HUH));
- Shatin to Central Link – Hung Hom to Admiralty Section (SCL (HUH – ADM));
- Central Kowloon Route (CKR);
- Widening of Gascoigne Road;
- Kai Tak Development (KTD);
- Kwun Tong Line Extension (KTE);
- HKPU Student Hostel (Phase 3) Development at Ex-Valley Road Site;
- Ex-San Po Kong Flatted Factory; and
- Tsz Wan Shan Pedestrian Link.

Detailed descriptions of the above infrastructural developments are discussed in **Section 1.6**. The ecological implications of each of these projects are separately considered. The interaction between these projects and the Project site proposal are also assessed, where possible.

Cumulative Impact

The combination of the above infrastructural developments will not have a significant ecological impact of the largely urban area of Kowloon in which most of these projects are located.

SCL (TAW-HUH): Under SCL (TAW-HUH), in the vicinity of the Project Site, the proposed works at Hung Hom and Kai Tak will be in urban locations while the proposed works at Diamond Hill will be built underground, the impacts to ecology are anticipated to be minimal.

SCL (MKK - HUH): Much of the realignment work of the project will be in urban locations and will be built underground and the impacts to ecology are anticipated to be minimal. No ecological impacts are anticipated during operation of the proposed HHS.

SCL (HUH – ADM): Much of the realignment work of the project will be in urban locations and will be built underground and the impacts to ecology are anticipated to be minimal. No ecological impacts are anticipated during operation of the proposed railway.

CKR and Widening of Gascoigne Road: The projects are not inside any recognized site of conservation importance. They do not encroach on or affect important habitats and there are unlikely to be any species of conservation importance present. Ecological impacts during construction and operation will therefore be minimal.

KTD: The existing surrounding area is highly urbanised, supporting a dense population and industrial activities. For the Project site, it is a disused airport and is currently a deserted flat/open area with many temporary uses including construction/stockpiling sites and open car parks. There is little vegetation present, comprising amenity planting or grassed areas. The quality of both fresh and marine water bodies is poor as a result of sewage and industrial pollution at present. The habitats in general are of low ecological value.

KTE: The project will be constructed in a well-developed urban environment and hence adverse ecological impacts are not anticipated. No ecological impacts are anticipated during railway operation.

HKPU Student Hostel (Phase 3) Development at Ex-Valley Road Site and Ex-San Po Kong Flatted Factory: The projects will be constructed in a well-developed urban environment and hence adverse ecological impacts are not anticipated. No ecological impacts are anticipated during operation.

5.4.2 Avoidance of Sites of Conservation Importance

A review has been conducted to identify any sites of conservation importance and results indicate that there are no sites of conservation importance within the Study Area. As such there will be no direct or indirect ecological impacts to site of conservation importance.

5.5 Description of Environment

5.5.1 Project Site and Study Area

The criteria and guidelines for evaluating and assessing ecological impacts as stated in Annexes 8 and 16 of the Technical Memorandum on Environmental Impact Assessment Process (TM-EIAO) have been followed. The Project will avoid and minimize impacts on ecologically sensitive areas, and identify and quantify as far as possible the potential ecological impact to the natural environment; from the construction and operation of the project.

The Project occupies three parcels of land located at Hung Hom, Kai Tak and Diamond Hill. Principal land uses within the Project Site are habitats with limited value such as urban and residential land, plantation, and grassland.

The Study Area (SA), as stipulated in the EIA Study Brief, covers a 500m distance from the Project site boundary (i.e. boundary of the works sites). **Figure 5.1.1 to Figure 5.1.5** show these habitat plans, works sites boundaries and study areas for HHS, HUH, KAT and DIH. **Appendices 5.1 – 5.3** present the flora and fauna data recorded during the surveys. **Appendix 5.4** presents the photographs of representative habitats taken within the Study Area during the surveys.

5.5.2 Prevailing Ecological Conditions in the vicinity

5.5.2.1 Hung Hom, Kai Tak and Diamond Hill

The majority of the Study Area (including the Project Site) is urban/ residential habitat, as presented in **Table 5.2**.

Table 5.2: Habitats present within the Study Area at Hung Hom, Kai Tak and Diamond Hill

Habitats	Above-ground Works Sites at Hung Hom	Hung Hom 500m Study Area	Above-ground Works Sites at Kai Tak	Above-ground Works Sites at Diamond Hill	Kai Tak And Diamond Hill 500m Study Area*
Channelised Watercourse	-	-	0.44	-	2.56
Grassland	-	0.27	-	1.35 (of which 0.27 ha is footprint of DIH**)	2.70
Plantation	-	9.68	-	1.62 (of which 0.46 ha is footprint of DIH**)	23.86
Open Water (Victoria Harbour)	-	37.88	-	-	-
Urban/ Residential Area	17.77 (of which 0.69 ha is footprint of HUH and 6.35 ha is footprint of HHS)	157.49	20.43 (of which 1.18 ha is footprint of KAT & refuge sidings**)	1.88 (of which 0.12 ha is footprint of DIH**)	278.64
Total	17.77	205.32	20.87	4.85	307.76

*n.b. Since the 500m Study Area for above-ground works at Kai Tak and Diamond Hill overlaps, habitat size of each habitat type is therefore combined.

**These facilities will be underground.

Hung Hom

Habitats and Vegetation

This is an existing station and only developed habitats are present at this site, with vegetation restricted to ornamental planters present around the station forecourt, and of no ecological value. Habitat map of the site is shown in **Figures 5.1.1 and Figure 5.1.2**.

Fauna

Fauna recorded from this site was limited to three common bird species (**Appendix 5.2**). Species of other faunal groups were not recorded during the surveys. No species of conservation concern were observed at this site.

Kai Tak

Habitats and Vegetation

This site is a mixture of construction ground with sparse vegetation cover (see **Appendix 5.1**). Habitat maps of KAT are shown in **Figures 5.1.3 and 5.1.4**.

All surveyed trees are very common in the urban area with 14 species recorded including exotic species *Leucaena leucocephala*, *Bombax ceiba* and *Casuarina equisetifolia* and native species *Macaranga tanarius*, *Ficus microcarpa* and *Celtis sinensis*.

Fauna

Thirteen bird species were recorded from the vicinity of the proposed Kai Tak Station (**Appendix 5.2**). Two of these species are of conservation concern. Little Egret is listed as being of Potential Regional Concern and Local Concern with respect to restrictedness in breeding (Fellowes et al. 2002); however this species is frequently seen in Victoria Harbour. Little Ringed Plover *Charadrius dubius* is considered to be of Local Concern on account of its restrictedness in breeding (Fellowes et al. 2002). Sparsely vegetated wasteground such as the urban/ residential area habitat at Kai Tak, with low human disturbance could potentially provide suitable breeding requirements for this species.

Other faunal species were restricted to a single butterfly species and single dragonfly species (**Appendix 5.3**); neither is of conservation concern and are common and widespread in Hong Kong.

Diamond Hill

Habitats and Vegetation

The Project Site at Diamond Hill is a highly urbanized area with some ornamental planting. Adjacent to the Project Site, the area is currently used as operational MTRC Station, with negligible ecological value.

Majority of the proposed works at DIH will be undertaken at the former Tai Hom Village, which is currently surrounded by infrastructure and urban/ residential areas. The former village and airbase comprises a variety of habitat types and land-uses including plantation, grassland, channelised watercourse, hard-standing, built structures and car parking. A large area in the middle of the site is currently used as a car park. Plantation and grassland habitats dominate within this area. This plantation is dominated by common native species such as *Ficus microcarpa*, *Broussonetia papyrifera* and *Macaranga tanarius*, and exotic species such as *Acacia confusa*, *Bombax ceiba*, *Dimocarpus longan* and *Leucaena leucocephala*. This plantation supports a common floristic community and moderate diversity of plants which are commonly planted or naturally established. Its understorey composition is limited and is largely dominated by herbaceous vegetation such as *Alocasia odora* and *Bidens alba*. Grassland within the proposed works sites at DIH is dominated by herbaceous vegetation such as *Bidens alba*, *Imperata koenigii*, *Panicum maximum* and *Bothriochloa ischaemum*. Isolated trees and shrubs such as *Ficus hispida*, *Macaranga tanarius* and *Bombax ceiba* also occur within the grassland. Both habitats are currently fenced and limited human disturbance is anticipated. The channelised watercourse is lined by common tree species such as *Leucaena leucocephala* and *Macaranga tanarius*. The urban/ residential habitat includes a car park and paved road which are heavily used by vehicles and pedestrians. Vegetation recorded from the car park and roads is limited. Plant species list recorded during the surveys is presented in **Appendix 5.1**. Habitat map for the site is shown in **Figure 5.1.5**.

The tree surveys identified that some plantation trees will be affected at the former Tai Hom Village. The surveyed trees include fruit trees, ornamental trees or naturally established tree species (including *Acacia confusa*, *Albizia lebbbeck*, *Bauhinia* spp., *Bombax ceiba*, *Carica papaya*, *Dimocarpus longan*, *Ficus hispida*, *Ficus microcarpa* and *Macaranga tanarius*). These mature tree individuals provide a dense and closed canopy (see **Sections 6.7**) which could potentially provide habitat for urban birds.

In addition, some larger specimens of trees, *Ficus microcarpa*, which are not registered as the Old and Valuable Trees by LCSD (LCSD 2009), are present within the proposed works sites at DIH (see **Section 6.7**). These trees do offer some limited foraging opportunities to local wildlife, however given the context of their location in the urban setting and the surrounding habitat types, largely urban and developed land; overall there is very little ecological value to these specimens.

No wild rare or restricted range trees were identified in the current tree survey, but some *Ailanthus fordii* were identified in the amenity areas at the junction of Lung Cheung Road

and Po Kong Village Road (see **Section 6.6**). This species is regarded as rare species and protected under the Forestry Regulations (Cap. 96A). The identified individuals are likely to have been planted for ornamental purposes.

Fauna

A group of 7 Short-nosed Fruit Bats was observed in a “tent” roost in a Chinese Fan Palm to the southwest of the site close to Choi Hung Road, outside of the Project Site. Whilst this Fruit Bat species is considered to be a widespread species in Hong Kong, and frequently observed in such Chinese Fan Palm roost in urban parks (Shek 2006), all bats are protected under WAPO.

All other species observed, including a total of 26 bird species and four butterfly species, are considered to be common and widespread. One bird species was considered to be of Conservation Interest according to Fellowes *et al.* (2002); a flock of 24 Red-billed Starlings were seen during dry season surveys; this species is considered to be of Global Concern. This species is an abundant winter visitor, usually recorded from the Deep Bay area with occasional parties of birds recorded from other locations in Hong Kong (Carey *et al.* 2001). A full list of species observed at Diamond Hill is presented in **Appendix 5**.

5.5.3 Habitat Evaluations

5.5.3.1 Watercourses

Channelised watercourses

Within the Study Area, channelised watercourse passes through the proposed works sites of KAT but is outside the works sites of DIH. Based on the above observations and the criteria set in Annex 8 of TM-EIAO, ecological value of these channelised watercourse areas are detailed below.

Table 5.3: Ecological evaluation of Channelised Watercourses

Criteria	Channelised Watercourses
Naturalness	Man made.
Size	2.56 ha in Study Area. 0.44 ha in above-ground works sites at Kai Tak.
Diversity	Low.
Rarity	Not known.
Re-creatability	Readily re-creatable.
Fragmentation	Not fragmented.
Ecological linkage	No significant ecological linkages
Potential Value	Low.
Nursery/ breeding ground	No significant nursery or breeding ground known.
Age	Not known.
Abundance/ richness of wildlife	Not known.
Ecological Importance	Low

5.5.3.2 Grassland

Grassland is found within the former Tai Hom Village at Diamond Hill. Based on previously described observations and the criteria set in Annex 8 of TM-EIAO, ecological values of the grassland areas are listed below.

Table 5.4: Ecological evaluation of Grassland

Criteria	Grassland
Naturalness	Semi-natural habitat.
Size	2.97 ha in Study Area. 1.35 ha in above-ground works sites at Diamond Hill.
Diversity	Low diversity of vegetation and fauna

Criteria	Grassland
Rarity	Very common habitat in Hong Kong
Re-creatability	Readily re-creatable.
Fragmentation	Highly fragmented in Urban/Residential Areas.
Ecological linkage	No significant ecological linkages
Potential Value	Scope of succession to shrubby grassland if fire is prevented and seed sources are available.
Nursery/ breeding ground	None observed.
Age	Not known.
Abundance/ richness of wildlife	Low abundance and diversity of resident species.
Ecological Value	Low

5.5.3.3 Plantation

The roadside plantations within the Study Area are predominantly monotypic stands of non-native species such as *Eucalyptus citriodora*, *Acacia auriculiformis* and *Acacia confusa*. These areas are often subject to moderate or high levels of human disturbance and have a very poorly developed vegetative understorey.

The plantation at the DIH works sites derives originally from landscape planting around the former Tai Hom Village and following the abandonment of the village, plantation species have not been maintained and a number of self-sown trees have also become established. This plantation is dominated by common native species such as *Ficus microcarpa*, *Broussonetia papyrifera* and *Macaranga tanarius*, and exotic species such as *Acacia confusa*, *Bombax ceiba*, *Dimocarpus longan* and *Leucaena leucocephala*. This plantation supports a common floristic community and a moderate diversity of plants which are commonly planted or naturally established. The surveyed trees largely include fruit trees, ornamental trees or naturally established tree species. The large specimens of *Ficus microcarpa* offer limited ecological opportunities to local wildlife, given their location in the urban environment.

Based on the above observations and the criteria set in Annex 8 of TM-EIAO, ecological values of these plantation areas are detailed below.

Table 5.5: Ecological evaluation of plantation

Criteria	Plantation
Naturalness	Anthropogenic habitat with a high proportion of exotic species. Plantation at DIH works sites has been planted with some self-sown specimens following abandonment of former Tai Hom Village.
Size	33.54 ha in Study Area. 1.62 ha in above-ground works sites at Diamond Hill.
Diversity	Very low plant species diversity and structural complexity for most exotic plantation stands on the engineering slopes, along roads and in parks. For DIH construction, the plantation supports a common floristic community and moderate diversity of plants which are commonly planted or naturally established.
Rarity	A common habitat in Hong Kong.
Re-creatability	Readily re-creatable.
Fragmentation	Highly fragmented in Urban/Residential Areas.
Ecological linkage	No significant ecological linkages
Potential value	Limited potential due to disturbance and high proportion of exotic species.

Criteria	Plantation
Nursery/ breeding ground	No significant nursery or breeding ground.
Age	Variable. Though large specimens of trees, which are not registered as the Old and Valuable Trees by LCSD (LCSD 2009), are present in the proposed DIH works sites.
Abundance/ Richness of wildlife	Low abundance and diversity of wildlife mostly comprising widespread and disturbance-tolerant species.
Ecological value	Low

5.5.3.4 Urban/ residential Areas

Within the Study Area, urban areas include many residential buildings, stockyards, open storage of containers and roads. These habitats are all subject to high levels of human disturbance. Some vegetation occurs in the low-density village areas; however this is of poor quality and of limited ecological importance. Based on the above observations and the criteria set in Annex 8 of TM-EIAO, ecological values of these urban/residential areas are detailed below.

Table 5.6: Ecological evaluation of urban/ residential area.

Criteria	Urban/ Residential Areas
Naturalness	Anthropogenic habitat.
Size	Urban/Residential Areas is the dominant habitat within the Study Area.
Diversity	Low habitat diversity.
Rarity	A very common habitat in Hong Kong.
Re-creatability	Readily re-creatable.
Fragmentation	Not fragmented.
Ecological linkage	No significant linkages with habitats of ecological significance.
Potential value	Enhancement potential of Urban/Residential Areas is limited.
Nursery/ breeding ground	Little Ringed Plover displaying during early 2009 suggests breeding at the former Kai Tak Airport.
Age	Age variable.
Abundance/ Richness of wildlife	Low diversity and abundance of wildlife.
Ecological value	Low

5.5.3.5 Summary of habitats present and ecological value

Table 5.7: Summary of habitats and their ecological value within Study Areas for Above-ground Works Sites for the Project.

Habitat	Ecological Value
Channelised Watercourse	Low
Grassland	Low
Plantation	Low
Urban/ Residential Area	Low

5.5.3.6 Summary of Faunal and Floral Species of Conservation Interest within Study Area

Table 5.8: Fauna and Flora Species of Conservation Interest recorded within the Study Area for Hung Hom, Kai Tak and Diamond Hill (only includes species of conservation interest or classified as rare, endangered or protected species).

Species/Group	Species of Conservation Interest (Fellowes <i>et al.</i> 2002)	Protection/ China Red Data Book	Locations/ Habitats Recorded in Study Area	Rarity/HK Status
Mammals				
Short-nosed Fruit Bat <i>Cynopterus sphinx</i>	-	All bats are protected under WAPO.	Roosting in Chinese Fan Palms at former Tai Hom Village, but is outside Project Site. No young observed, but this is likely to be a breeding group.	Wide distribution in Hong Kong (Shek 2006)
Birds (all birds are protected under WAPO) (as of Carey <i>et al.</i> 2001)				
Little Egret <i>Egretta garzetta</i> ^w	PRC (RC)	-	Channelised Watercourse at Kai Tak	Abundant resident
Little Ringed Plover <i>Charadrius dubius</i>	-	-	Wasteground within Urban/ Residential Area in KAT site	Locally common winter visitor and passage migrant, scarce breeding species.

*www.sepa.gov.cn 2008

^w = denotes wetland dependent bird species

PRC = Potential Regional Concern; RC=Regional Concern; LC = Local Concern, as of Fellowes *et al.* (2002). Those in parenthesis indicate that the assessment is on the basis of restrictedness in breeding and/or roosting rather than general occurrence.

WAPO = Wild Animals Protection Ordinance Cap. 170; AP = Animals and Plants (Protection of Endangered Species) Ordinance

5.6 Prediction and Evaluation of Impacts

5.6.1 Introduction

This section identifies and assesses the direct and indirect, primary and secondary, on-site and off-site impacts likely to be caused by the proposed Project Site during the construction and operational phases. It also addresses the cumulative impacts of the proposed development together with other projects in the area.

5.6.2 Impact Evaluation Criteria

The significance of ecological impacts has been evaluated based primarily on the criteria set out in Table 1 of Annex 8 of the Technical Memorandum:

- Habitat quality;
- Species affected;
- Size/abundance of habitats affected;
- Duration of impacts;
- Reversibility of impacts; and
- Magnitude of environmental changes.

This assessment is based on the layout plan as shown in **Figure 1.1**. Estimates of habitat loss and identification of areas to be affected by development have been calculated as accurately as possible.

5.6.3 Construction Phase Potential Impacts

5.6.3.1 Hung Hom, Kai Tak and Diamond Hill

Direct Impacts — Habitat loss

Construction works at HHS and HUH - Construction Methodology

All the proposed works for HHS and HUH are at-grade works and most of these works would be constructed within the footprint of the existing railway facilities of low ecological value. No ecological impacts are anticipated.

Construction works at KAT- Construction Methodology

All the above-ground works sites and underground tunnel section for the construction works at KAT are highly disturbed areas of low ecological value. Open cut construction method will be adopted for both station and underground refuge siding.

Construction works at DIH - Construction Methodology

Whilst cut-and-cover method will be adopted for DIH construction, the underground approach tunnel sections connecting to DIH will be constructed by tunnel boring method. For the above-ground works, site clearance and tree transplanting/felling works will first be undertaken. Construction of the diaphragm wall (D-wall) cofferdam will then commence followed by excavation in phases. The station will be built within the D-wall cofferdam. All the above-ground works sites at DIH are highly disturbed areas of low ecological value.

Habitat loss

The total area of the Project Site for the above-ground works at Hung Hom, Kai Tak and Diamond Hill is 43.49 ha. All the above-ground works are to be built or improved on areas that are highly disturbed and of low ecological value, on account of their locations within the urban and built environment. **Table 5.9** shows the areas of habitat to be lost and the ecological value as described in **Section 5.5.4**

Table 5.9: Table showing predicted habitat loss (due to above-ground works sites) for the HHS and construction works at HUH, KAT and DIH

Habitats	Hung Hom	Kai Tak	Diamond Hill	Total Area of Habitat Loss (ha)	Ecological value
Channelised Watercourse	-	0.44	-	0.44	Low
Grassland	-	-	1.35 (of which 0.27 ha is footprint of DIH*)	1.35	Low
Plantation	-	-	1.62 (of which 0.46 ha is footprint of DIH*)	1.62	Low
Urban/ Residential Area	17.77 (of which 0.69 ha is footprint of HUH and 6.35 ha is footprint of	20.43 (of which 1.18 ha is footprint of KAT & refuge sidings*)	1.88 (of which 0.12 ha is footprint of DIH*)	40.08	Low

Habitats	Hung Hom	Kai Tak	Diamond Hill	Total Area of Habitat Loss (ha)	Ecological value
	HHS)				
Total	17.77	20.87	4.85	43.49	

*These facilities will be underground.

Direct Impacts - Tree Felling

Some trees will require felling or transplantation with a total area of plantation proposed to be affected of 1.62 ha for the construction works at DIH and KAT. Some trees are also required to be removed for the modification works at HUH.

One roost of Short-nosed Fruit Bat has already been identified during ecological surveys at former Tai Hom Village, yet this is outside of the proposed DIH works sites. Direct loss of Chinese Fan Palm would reduce the roosting opportunities for this widespread species regularly encountered in the urban environment. However, it is expected that the identified individuals will be retained and there will be no direct loss of Chinese Fan Palm due to the Project. Overall, the impact of the loss of individuals of Chinese Fan Palm would be negligible to roosting Fruit Bats, due to their widespread planting in urban parks and green areas.

Whilst most trees will be of little ecological significance, some with potential for roosting bats (those of suitable size which display fissures, holes or cracks) should be considered to potentially be of higher ecological value. Should these trees contain bat roosts, felling of these will lead to permanent loss of breeding and/ or roosting sites.

Indirect Impacts - Disturbance

Indirect impacts through construction activities will cause local disturbances to habitats and wildlife. Excess noise, vibrations, dust and increased human activity may all contribute to increased disturbance during construction and operation phases. Given that many sites are within already highly disturbed anthropogenic habitats, most species recorded are generally considered to be either tolerant to a certain amount of human disturbance and they are mobile enough that they can safely relocate to other similar, adjacent habitats during the temporary works.

Indirect Impacts – Construction Site Run-off

Channelised watercourses were observed within the Study Area at KAT and DIH. Construction site run-off may indirectly impact on the water quality of these habitats with an increase in localised suspended solids, and subsequently affect the associated wildlife. Site runoff will be properly controlled and discharged under ProPECC PN1/94. Potential ecological impact associated with construction site run-off is therefore minor and not significant.

5.6.4 Operational Phase Potential Impacts

Indirect Impacts – Disturbance

No direct operational phase impacts are anticipated. There may, however, be indirect impacts by way of increased disturbance to wildlife from an increase in human activity in the vicinity of these new facilities, though these are currently situated in areas of high human disturbance and in areas of low ecological value. These areas are already inhabited by species tolerant of human disturbance and it is anticipated any impacts of increased disturbance will be negligible.

5.6.5 Evaluation of impacts

Impact Evaluation Criteria

The significance of ecological impacts has been evaluated based primarily on the criteria set out in Table 1 of Annex 8 of the Technical Memorandum:

- Habitat quality;
- Species affected;
- Size/abundance of habitats affected;
- Duration of impacts;
- Reversibility of impacts; and
- Magnitude of environmental changes.

5.6.5.1 Areas along Temporary Works Areas

Following the criteria shown in Annex 8 in the EIAO-TM, habitats within the Study Area which are to be directly impacted by the above-ground structure and works sites of the Project are evaluated and presented in the following **Tables 5.11 to 5.14**.

Table 5.11: Direct ecological impacts to Channelised Watercourse without mitigation measures

Criteria	Channelised Watercourse
Habitat Quality	Channelised watercourse at Kai Tak of Low Ecological value because of nature of channel (concrete-lined), pollution and low ecological linkage to other wetland habitats.
Species	Low numbers of a single species of wetland-dependent bird (Little Egret) recorded foraging in part of the channelised watercourse.
Size/Abundance	A small area of 0.44 ha would be affected.
Duration	Loss of habitat would be permanent. Impacts to water quality would be short term and temporary.
Reversibility	Impacts by way of habitat loss would be permanent. Impacts to water quality would be temporary.
Magnitude	Low.
Overall Impact Severity	Overall impact of this habitat loss would be of Low Significance.

Table 5.12: Direct ecological impacts to Grassland without mitigation measures

Criteria	Grassland
Habitat Quality	Grassland at former Tai Hom Village of Low ecological value.
Species	Low diversity of flora and fauna species.
Size/Abundance	An area of 1.35 ha would be affected.
Duration	Loss of habitat would be permanent.
Reversibility	Impacts by way of habitat loss would be permanent.
Magnitude	Low.
Overall Impact Severity	Overall impact of this habitat loss would be of Low Significance.

Table 5.13. Direct ecological impacts to Plantation without mitigation measures

Criteria	Impacts to Plantation – Former Tai Hom Village for the construction of DIH
Habitat Quality	Habitat comprises mostly of non-native tree species of low ecological value.
Species	Very few species recorded from this habitat other than those birds species commonly associated with urban areas. A Short-nosed Fruit Bat roost was identified within a Chinese Fan Palm but is outside the Project site.

Criteria	Impacts to Plantation – Former Tai Hom Village for the construction of DIH
Size/Abundance	An area of 1.62 ha scattered plantation would be lost and trees will be affected during construction phase.
Duration	Habitat loss would be permanent though transplanting of trees will occur where possible.
Reversibility	Habitat could easily be replaced by replanting, although planting of native trees would be more appropriate.
Magnitude	Loss of a small area of a habitat which is common in the Study Area (and elsewhere in Hong Kong) would have an impact of low magnitude. However, if bats are roosting in fissures or holes in larger specimens of affected trees, impact will be higher.
Overall Impact Severity	The area to be lost is very small, especially in comparison to the total in the Study Area and elsewhere in Hong Kong, and species diversity is very low, therefore habitat loss considered to be of Low Ecological Significance .

Table 5.14: Direct ecological impacts to Urban/ Residential Area without mitigation measures

Criteria	Impacts to Urban/ Residential Area
Habitat Quality	Habitat of low ecological value.
Species	Very few species recorded in this habitat. Little Ringed Plover displaying breeding behaviour at Kai Tak site.
Size/Abundance	An area of 40.08 ha Urban/Residential Area would be lost.
Duration	Habitat loss would be permanent. Human disturbance would be permanent.
Reversibility	Loss of habitat would be permanent. Human disturbance would be permanent.
Magnitude	Loss of a small area of a habitat which is common in the Study Area (and elsewhere in Hong Kong) would have an impact of low magnitude.
Overall Impact Severity	The area to be lost is very small, especially in comparison to the total in the Study Area and elsewhere in Hong Kong, and species diversity is very low, therefore habitat loss considered to be of Very Low Ecological Significance .

5.6.6 Cumulative Impacts of Habitat Loss/Fragmentation

5.6.6.1 Cumulative Impacts

The Study Area covers a portion of the Kowloon where several major development projects have been completed or are in various stages of implementation. Included in these projects are several other rail projects and extensive redevelopment of the former Kai Tak Airport, all located in highly urban areas subject to high levels of disturbance. Given the scale and integration with existing infrastructure, it is considered that the additional impacts of the Project will have a negligible effect overall on the cumulative impacts of development across the Study Area.

5.6.6.2 Fragmentation

Given that all the above-ground works sites of the Project are of low ecological value and are mainly urban and residential areas, it is not considered that the Project will impose any significant cumulative fragmentation impact on habitats in the area.

5.6.7 Impacts to Species of Conservation Importance

5.6.7.1 Hung Hom, Kai Tak and Diamond Hill

The following sections describe the impact severity for each species of conservation importance found within the immediate vicinity of the Project Site.

Table 5.15: Potential ecological impacts to Species of Conservation Importance within the Project Site without mitigation measures

Species/Group	Locations/ Habitats Recorded in Study Area	Rarity/ HK Status	Impact	Severity of impact without mitigation
Mammals				
Short-nosed Fruit Bat <i>Cynopterus sphinx</i>	Roosting in Chinese Fan Palms at former Tai Hom Village, but is outside of Project Site. No young observed, but this is likely to be a breeding group.	Wide distribution in Hong Kong (Shek 2006)	Outside of Project Site – no direct impacts.	Not Applicable.
Birds (all birds are protected under WAPO)				
Little Ringed Plover <i>Charadrius dubius</i>	Wasteground within Urban/ Residential Area in KAT site	Locally common winter visitor and passage migrant, scarce breeding species.	Potential loss of breeding ground due to landtake for KAT construction. However, the loss is relatively small considered the large amount of similar habitat available within the Study Area.	Low.

Mammals

One protected mammal species, Short-nosed Fruit Bat, was found in the Chinese Fan Palm at former Tai Hom Village in the vicinity of proposed works sites at DIH.

Table 5.16: Potential ecological impacts to mammalian species of conservation importance without mitigation measures

Criteria	Ecological Impacts to Short-nosed Fruit Bat
Habitat Quality	The species uses a wide diversity of habitats in Hong Kong, and much of the wider Study Area provides potential habitat. It shows a preference for roosting in Chinese Fan Palm, a typical ornamental tree planted in many urban locations.
Species	Short-nosed Fruit Bat is protected species under WAPO.
Size/Abundance	Seven individuals seen in a tent roost at former Tai Hom Village, which is located outside of Project Site.
Duration	Human disturbance would be permanent.
Reversibility	Human disturbance would be permanent.
Magnitude	Disturbance to a species which is common in the urban environment in Hong Kong would have an impact of very low magnitude.
Overall Impact Severity	Chinese Fan Palm is common within the urban areas of Hong Kong and it is considered that the bat roost could be easily relocated to other palms in the nearby area and therefore impacts are considered to be of Very Low Ecological Significance .

Birds

Little Ringed Plover, a bird species of conservation importance (as of Fellowes *et al.* 2002), was recorded within the footprint of above-ground works for the KAT site at the former Kai Tak Airport.

Table 5.17: Potential Ecological Impacts to birds of conservation importance without mitigation measures

Criteria	Ecological Impacts to Little Ringed Plover
Habitat Quality	Low. This species shows a preference for low vegetated areas including various area of colonizing ground.
Species	Little Ringed Plover species is listed by Fellowes <i>et al.</i> (2002) as a species of Local Concern on account of its restrictedness in breeding and/or roosting.
Size/Abundance	Individuals recorded on Kai Tak wasteground within the urban/ residential habitat. Although the number of individuals recorded is small, this is a localised breeding species in Hong Kong.
Duration	Loss of habitat would be permanent.
Reversibility	Permanent, irreversible habitat loss.
Magnitude	The Study Area contains a large amount of habitat similar to that in which the birds were recorded. The impact from the loss of Urban/Residential Area is therefore considered to be of low magnitude.
Overall Impact Severity	Loss of habitat for a breeding population may be significant for this species, but large amounts of similar habitat are present in Hong Kong and the loss of wasteground is not considered to be important. The impact is therefore considered to be of Low Ecological Significance .

5.6.7.2 Summary of Impacts

Table 5.18: Summary table of potential construction and operational impacts

Activity	Receiver	Potential Impacts	Nature of Impacts	Potential Severity	Mitigation Required
Construction Phase					
Habitat Loss (Project Site)	Habitats affected will include 0.44 ha of channelised watercourse, 1.35 ha grassland, 1.62 ha plantation and 40.08 ha urban/ residential area.	Loss of flora within the affected habitats. Change in fauna distribution, activity, and loss of breeding/ roosting site.	Permanent, irreversible.	Minor in terms of ecological impact.	No.
Tree Felling	Plantation trees will be affected (transplanted or felled).	Removal of non-native plantation trees.	Permanent, large scale.	Generally low in terms of ecological impact.	No. As ecological impact due to tree loss is considered not significant, no ecological mitigation is required though some compensatory planting and tree transplanting is required (see Section 6 on landscape and visual aspect).
Water Quality	Habitats (channelised watercourse) and associated fauna.	Construction site run-off to the affected habitat.	Temporary, reversible, small scale.	Minor.	Yes.
Disturbance	Fauna.	Changes in local distribution and activity.	Temporary, reversible, small scale.	Minor.	No.

Activity	Receiver	Potential Impacts	Nature of Impacts	Potential Severity	Mitigation Required
Construction Phase					
Operational Phase					
Disturbance	Flora and Fauna.	Changes in local distribution and activity.	Temporary, reversible, small scale.	Minor.	No.

5.7 Mitigation Measures

5.7.1 Mitigation Measures at Hung Hom, Kai Tak and Diamond Hill

Where potential ecological impacts are considered to be of moderate or high significance, mitigation measures are required to reduce these impacts to acceptable levels. In accordance with the EIAO, these measures follow the principles of avoidance, minimization and compensation (in that order of preference).

During the Project, both construction and operational phases, areas of low ecological value have been targeted as areas of development to avoid any impacts on ecologically sensitive areas.

5.7.1.1 Habitat Loss

A total of 1.62 ha of plantation will be lost to the construction of DIH. This habitat is considered to be of low ecological value and no specific mitigation measures are proposed for ecological purposes. The landscape and visual mitigation measures details for tree felling are discussed in **Section 6.9** and are further discussed in the **Section 5.7.1.2**.

All the above-ground works sites at HHS, HUH and KAT are located either on previously developed land or are extensions to existing structures. It is considered that these areas are of low ecological value and, as such, no mitigation other than good site practice is required.

In addition site compounds or materials and equipment storage yards for the construction phase should utilize any areas of existing hard standing to further reduce habitat loss.

5.7.1.2 Tree Felling

Recommendations have been made following the review of the tree surveys to either retain or transplant trees with ecological value or potential at several of these sites.

There still will be a certain amount of felling required for the construction of DIH, and to a less extent for the construction of HUH and KAT. Many of the trees affected are landscape species, often introduced exotic species, with little ecological value, and have been planted for aesthetic appeal. The ecological impacts arising from the loss of these trees are not considered to be significant, however some compensation planting and transplanting of trees will be required only for mitigating landscape and visual impacts (See **Section 6** on the landscape and visual aspects).

At the proposed DIH works sites within the former Tai Hom Village, trees will be affected either by transplantation, felling or removal. Four relatively large specimen trees of *Ficus microcarpa* and *Ficus subpisocarpa*, along with other smaller trees, with low amenity value and/ or low survival rate after transplantation, will be felled. Tree transplantation implementation and suitable receptor site will be selected for optimum vegetation growth and establishment. Location for compensation planting will be finalized after the agreement and approval from the relevant government department at a later stage. The landscape and visual mitigation measure details are discussed in **Section 6.9**.

Provision of suitable species of native trees and shrubs in the landscape planting and around the boundaries of former Tai Hom Village will provide additional foraging habitat for urban bird and bat species; inclusion of fruiting species (for example Chinese Fan Palm *Livistona chinensis*, *Melia azederach*, *Celtis sinensis* and *Ficus microcarpa*) in this mix

would ensure that foraging habitat is available throughout the year. This will provide additional benefits for other frugivorous species present in the area.

Tree compensation will be made according to ETWB TCW No. 3/2006 as far as practicable. This will be further addressed with relevant government departments and discussed in a later stage. However, the location of reception sites for the remaining trees shall be finalized after the agreement and approval from the relevant government department in the later stage.

5.7.1.3 Indirect Impacts - Disturbance

Indirect impacts through construction activities will cause local disturbance to habitats and wildlife. Excess noise, vibration, dust and increased human activity may all contribute to increased disturbance during construction and operation phases. Given that many sites are within already highly disturbed anthropogenic habitats, most species recorded are generally considered to be either tolerant to a certain amount of human disturbance or they are mobile enough that they can safely relocate to other similar habitats during the temporary works.

5.7.1.4 Indirect Impacts – Water Quality

Construction site run-off may indirectly impact on the water quality of the channelized watercourses at KAT and the associated fauna. Given any site run-off will be properly controlled and discharged under ProPECC PN 1/94 Construction Site Drainage and its impact would be of minor significance.

5.7.2 Residual Impacts

5.7.2.1 Terrestrial Ecological Residual Impacts

With the implementation of mitigation measures of construction and operational phases described earlier, residual ecological impacts resulting from the proposed works would largely be limited to the loss of relatively low ecological value habitats. For the Project, these would include 0.44ha channelised watercourse, 1.35ha grassland, 1.62ha plantation and 40.08ha urban/residential area. Other impacts resulting from the construction and operation of the Project are considered to be minor and acceptable once mitigation measures are implemented. Residual impacts on terrestrial ecology caused from the Project are therefore considered as very minor and acceptable.

Table 5.19: Total habitat loss for Project Sites

Habitats	Hung Hom	Kat Tak	Diamond Hill	Total Area of Habitat Loss (ha)	Ecological value
Channelised Watercourse	-	0.44	-	0.44	Low
Grassland	-	-	1.35 (of which 0.27 ha is footprint of DIH*)	1.35	Low
Plantation	-	-	1.62 (of which 0.46 ha is footprint of DIH*)	1.62	Low
Urban/ Residential Area	17.77 (of which 0.69 ha is footprint of HUH and 6.35 ha is footprint of HHS)	20.43 (of which 1.18 ha is footprint of KAT & refuge sidings*)	1.88 (of which 0.12 ha is footprint of DIH*)	40.08	Low
Total	17.77	20.87	4.85	43.49	

Key: - = not recorded in this Project Site/Work Area; * = These facilities will be underground.

5.8 Summary

The Project has avoided impacts on recognized sites of conservation importance (e.g. SSSIs and Country Parks), and other ecological sensitive areas. Literature reviews of existing information with supplement findings from recent field surveys identified that most of the terrestrial within the Study Area are generally of low ecological value.

Terrestrial habitats within the Study Areas are largely Urban/ Residential Areas with high disturbance and low ecological value. Habitats affected will include 0.44 ha of channelised watercourse, 1.35 ha grassland, 1.62 ha plantation and 40.08 ha urban/residential area.

Some plantation trees will be affected at these above-ground works sites. The affected trees are mostly non-native plantation species with little ecological value. Nevertheless, compensatory planting and tree transplantation are required for landscape and visual amenity reasons.

Direct and indirect ecological impacts arising from the Project during the construction and operational phase have been identified and evaluated. Most impacts are considered to be of low significance. Other indirect impacts arising from the Project would be temporary and considered as negligible in nature.

5.9 References

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