

21. ECOLOGY

21.1 Introduction

The proposed Eastern Access Road will encroach upon a mixed area of primarily agricultural land (both active and abandoned) interspersed with developed and disturbed areas.

This Section describes the baseline ecological condition of the area along the proposed alignment of the road, and addresses and evaluates the severity of the potential impact resulted from the proposed Project, based on the latest available engineering information. Appropriate mitigation measures are recommended where appropriate.

21.2 Assessment Methodology

The study methodology adopted in the current Study has been in accordance with the general procedures and requirements as stated in the Annex 16 of the EIA O TM, and is briefly described in this section. Since the Kam Tin Valley comprises a mosaic of village, agricultural and developed areas, and the impact anticipated from the project is mainly related to localised habitat loss, the Study has therefore been focused on the immediate vicinity of the project area. However, sensitive ecological resources within 500m of the project area have also been identified and commented upon where these are of particular relevance to the scale and type of impacts associated with the new road.

21.2.1 Data Collection

Baseline ecological information of the Study Area has been collated through a literature review and ecological field surveys. The literature review included the following EIA reports:

- West Rail;
- Main Drainage Channels for Ngau Tam Mei, Yuen Long and Kam Tin,
- Route 3 (northern section); and
- Kam Tin Road Widening (Phase 1).

In addition, a range of other relevant publications have been reviewed including newsletters and periodicals relating to local ecology such as 'Porcupine!' (published by Department of Ecology and Biodiversity, HKU and Kadoorie Farm and Botanical Garden Corporation - KFBGC), and the Annual Reports of the Hong Kong Bird Watching Society (HKBWS). Field surveys have been subsequently undertaken along the road alignment between January to March 1999 to prepare up-to-date habitat maps of the project area, and to field-check and verify the information extracted from the published literature, thereby bridging any "information gaps" apparent in the published material.

21.2.1.1 Survey Methodology

A Habitat Survey has been conducted to identify and delineate the distribution of different ecological habitats found along the proposed access road making use of the latest available aerial photographs from Lands Department, as well as supplemented by reconnaissance field surveys and the vegetation map prepared by World Wide Fund for Nature Hong Kong (1992). A habitat map (see *Figure 21.3a*) was produced to illustrate the distribution of the habitat within the Study Area.

A stratified sampling approach has been adopted in the ecological survey, during which representative areas of each identified habitat within the Study Area were surveyed on foot. All plant species encountered along the transect were identified and their relative abundance recorded in five nominal scale. Wildlife including mammal, amphibian, reptile and selected invertebrate groups (butterfly and dragonfly) are surveyed along the same vegetation transect, supplemented with active searching in potential habitat for each wildlife group. All bird species and numbers encountered in major habitat types within the Study Area were recorded in field. Schedule of ecological field survey is given in the following:

- Habitat and Flora Survey: 8/2/99
- Wildlife Survey: 28/2/99, 12/3/99
- Avifauna Survey: 26/2/99, 18/3/99

21.2.2 Impact Assessment

With respect to the terrestrial ecological resources identified along the proposed alignment, their ecological values have been established against the evaluation criteria as recommended in the Annex 8 of the EIA O TM, where appropriate. The potential impacts due to the construction of the proposed access road have been assessed following the EIA O TM Annex 16 guidelines and the impacts evaluated based on the criteria in EIA O TM Annex 8.

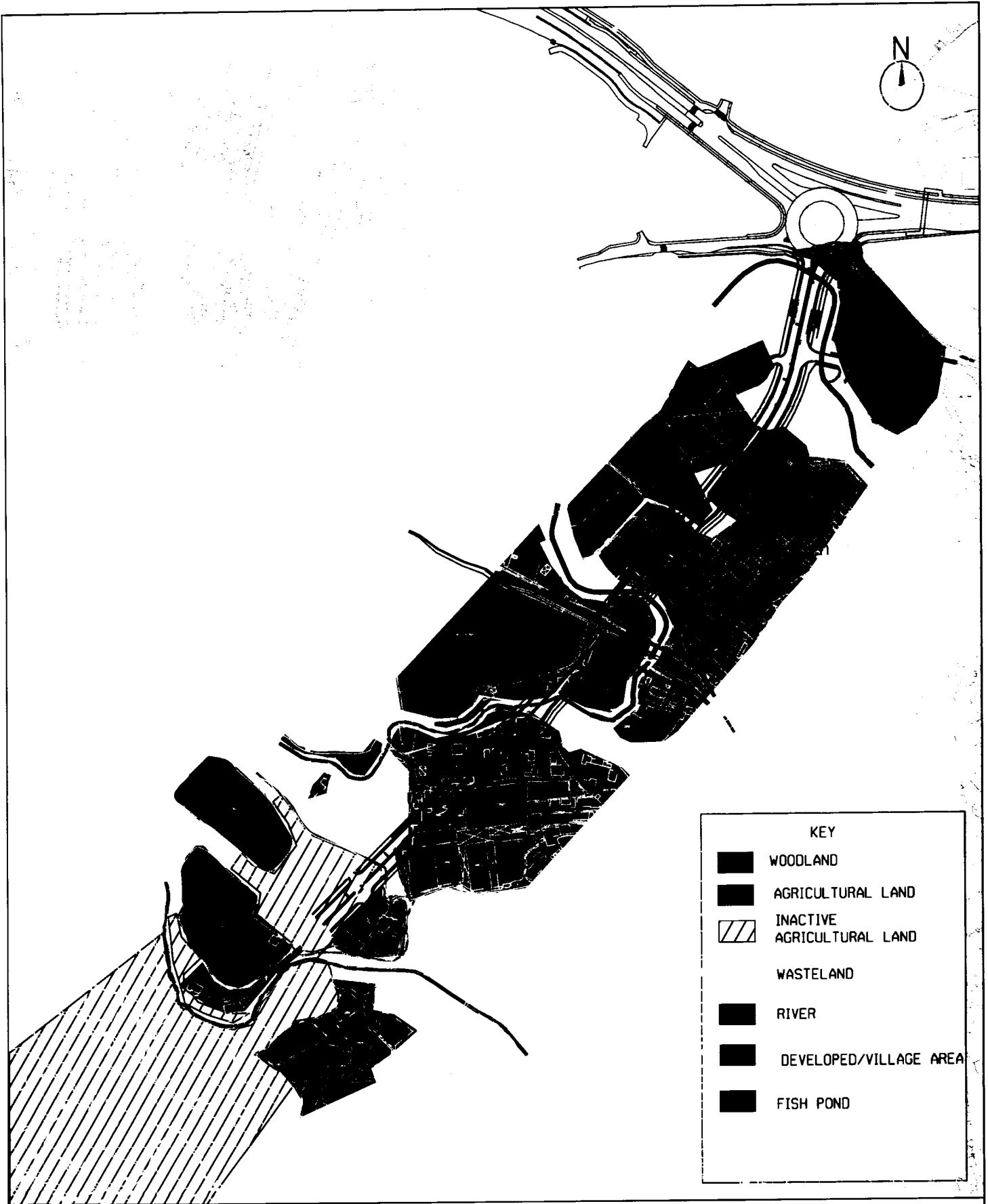
21.3 Baseline Conditions

21.3.1 Habitat

Most of the study area has been developed for village/light industry/open storage uses. The ecological habitats that are present include woodland, agricultural land, wasteland, fishponds and a stream, as described below (see *Figure 21.3a* & *Figure 21.3b*). A list of plant species recorded in the vicinity of the alignment is presented in *Annex J*.

21.3.1.1 Woodland

Several small patches of woodland composed of bamboo, fruit trees and some pioneer tree species were found within the study area, each being structurally simple with an open understorey. The canopy of the woodlands in general range from 5m to 8m in height with *Dimocarpus longan*, *Mangifera indica* and other native tree species such as *Celtis siensis* and *Litsea glutinosa*.



HABITAT MAP OF THE
PROPOSED EASTERN ACCESS ROAD

FIGURE 21.3a

SCALE: 1/4500

enr/hk/c1888/ecology/ecol.dgn



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WOODLAND



STREAM



WET AGRICULTURAL LAND



DRY AGRICULTURAL LAND



WASTELAND



POND



DRAINED POND

FIGURE 21.3b

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HABITAT TYPES WITHIN THE STUDY AREA

Environmental
Resources
Management



being the dominant species. The under-storey of each woodland is quite disturbed, with, in most cases, dumped domestic and construction waste being present. *Ligustrum sinensis*, *Alocasia macrorrhiza* and other weedy plant are the dominant plant species in the woodlands.

21.3.1.2 Agricultural Land

Agricultural land within the study area is mainly found around both ends of the proposed alignment. According to the observations made during the Study period, two types of agricultural land could be categorised with respect to the current management practice, namely active and inactive.

Active agricultural land has been defined as those found cultivated with vegetables and other produce during the survey period. This active agricultural land has been sub-divided into "wet" and "dry" agricultural land with respect to the planting environment. Examples of crops cultivated on the "dry" agricultural land include Egg Plant *Solanum melongena*, Chinese Kale *Brassica alboglabra* and Flowering Chinese Cabbage *Brassica parachinensis*, whereas crops including Water Cress *Rorippa nasturtium-aquaticum*, Water Celery *Oenanthe javanica* and Water Spinach *Ipomoea aquatica* were found planted on the "wet" agricultural land.

Inactive agricultural land has been defined either as those areas with no current vegetation cover but which has been bull-dozed for agricultural use, or those areas with food crops present but having no management of the land and therefore the crops being either left un-harvested or the areas being invaded by weedy plant species. This type of agricultural land is mainly located around the south-west end of the proposed alignment and has already resumed by the West Rail project.

21.3.1.3 Wasteland

Wasteland is defined as those areas which have suffered from severe human disturbance in the past and are now covered with weedy vegetation, mainly the grass species *Panicum maxima*, *Eleusine indica* and *Cynodon dactylon*; the shrub *Lantana camara*, as well as the climbers *Mikania micratha* and *Ipomoea carica*. Occasionally, some tree plant species such as *Macaranga tanarius* and saplings of the *Bridelia tomentosa* are present scattered among the wasteland. Within the Study Area, this habitat is mainly be found around either ends of the alignment and close to areas with intensive human activities. It is believed that some of the wasteland was originated from dry agricultural land and has been abandoned for a long time and is now fully invaded by weed species.

21.3.1.4 Fish Pond

There are two fishponds located within the Study Area and both of them will be resumed by the Kam Tin MDC and the West Rail project respectively. For the one to be resumed by the former project, aquaculture is still practising where the pond bund is open and planted with fruit trees such as *Clausena lansium* and *Citrus sp.* For the fishpond which has already been resumed by West Rail, the pond was found drained and roosted with several little egrets. It should be noted

that these two fishponds are within the known feeding range of the nearby Ho Pui egret in Kam Tin Valley.

21.3.1.5 Stream

The proposed alignment will cut across several sections of the Kam Tin River. According to the observations made during the field surveys, those sections within the study area are grossly polluted and the water is black in colour and polluted with domestic and agricultural wastes. The anaerobic environment of the substrate is unlikely to support any benthic fauna. The riparian vegetation found along the river is mainly grass, and occasionally fringed with a thin stretch of common tree species such as *Celtis sinensis*, *Litsea glutinosa*, and *Macaranga tanarius*.

21.3.2 Animal Wildlife

21.3.2.1 Invertebrates (Dragonflies & Butterflies)

Only a few dragonfly and butterfly species were observed during the field surveys as shown below, and they are all commonly seen on agricultural land on the south-western end of the proposed alignment. Most of the species recorded, as set out below, are common except the butterfly *Heliophorus epicles* which has been categorised as "uncommon" in Hong Kong (Wilson 1997 and Walthew 1997).

- Butterfly: *Delias aglaja*; *Papilio paris*; *Papilio memnon f. alcanor*; *Heliophorus epicles*; *Euploea midamus*; *Ariadne ariadne*; *Pieris rapae*
- Dragonfly: *Orethetrum glaucum*

21.3.2.2 Vertebrates

21.3.2.2.1 Avifauna

In total, 30 bird species were recorded within the study area. The recorded species are listed in Annex K, and include three local but not uncommon winter visitors (Yellow-billed Grosbeak, Pale Thrush, Common Blackbird,) 2 very local or rare winter visitors (Red-breasted Flycatcher, Eurasian Woodcock) and one uncommon resident Plaintive Cuckoo. These six species are mainly found in agricultural land and fishpond areas. The fishponds support the highest number of birds species (19), followed with the active agricultural land next to Ng Ka Tsuen (11 species), and then the inactive agricultural land near the southern end of the proposed alignment (five species).

21.3.2.2.2 Other Vertebrates

Recent literature (Procupine!1999) has addressed the general wildlife use of agricultural land in Hong Kong which includes several rare/uncommon/protected species, however, no direct sighting of vertebrates (mammal, reptile or amphibian) nor signs or evidence of their activities were observed during the field surveys. It is considered that wildlife use (except avifauna) of the

agricultural land within the Study Area would be limited by the close proximity to the nearby populated/disturbed area, especially those located on the north-eastern end of the alignment.

21.3.3 Aquatic Wildlife

No aquatic wildlife was observed within the Kam Tin River, possibly as a result of the poor water quality and unfavourable environs. However, a few birds such as the Magpie Robin, Black Bird and White-breasted Waterhen were observed foraging among shallow areas along the riparian area covered by vegetation.

Within the ditches scattered amongst the "wet" agricultural fields, however, a large quantity of the common mosquito fish and freshwater snails *Viviporous sp.* were found.

21.4 Ecological Significance of the Ecological Resources

Since the area where the inactive agricultural land and fishpond habitats are located (southern end of the proposed alignment) is either within the project or resumption boundaries of the Kam Tin MDC and West Rail projects, and the ecological significance and the impact severity has already been addressed in their corresponding EIA studies, the present evaluation and assessment will focus on the habitat to be affected by the current project only.

Based on the findings presented above, the ecological significance of the areas along the alignment were evaluated against the criteria recommended in the Annex 8 of the EIA O TM as presented in *Table 21.4a*. However, it should be noted that all of the criteria are either non-quantifiable or relative in nature where reference has not been provided in the TM, and therefore the site/habitat concerned has been evaluated in a "local" context where appropriate.

Table 21.4a Ecological Evaluation of the Habitat Found within the Study Area

	Woodland	Active Agricultural Land	Stream	Wasteland
Naturalness	semi-natural	man-made habitat	natural stream	human-induced habitat
Size *	small	small	small	small
Diversity	poor	moderate	poor	poor
Rarity	neither the habitat nor the species are rare	neither the habitat nor the species are rare	neither the habitat nor the species are rare	neither the habitat nor the species are rare
Re-creatability	readily re-created	readily re-created	readily re-created	readily re-created
Fragmentation	fragmented	fragmented	Not fragmented	fragmented
Ecological Linkage	low	moderate	low	low

Ecological Impact Assessment

	Woodland	Active Agricultural Land	Stream	Wasteland
Potential Value	limited by size and close proximity to heavily disturbed area	could be managed for wildlife habitat	limited by poor water quality	low
Nursery/breeding ground	low	low	low	low
Age**	moderate	-	-	young
Abundance/ richness of wildlife	low	low-moderate	low	low

* evaluated according with the size of similar habitat type in Kam Tin Valley

**evaluated according to the succession stage of the habitat assuming natural woodland as climax (old) and grassy-dominated habitat as pioneer (young)

According to the ecological evaluation as presented above, it is considered that the habitats to be affected by the proposed project generally have a low ecological value, except the agricultural land which has a low to moderate value.

21.5 Impact Assessment

21.5.1 Sources of Impact

21.5.1.1 Construction Phase

The proposed EAR will run across an area composed of mainly agricultural land and village/light industrial uses. The anticipated impact resulting from the proposed project will primarily be related to the land-take which will lead to direct/indirect habitat loss and disturbance to wildlife. The identified impacts are summarised below:

- Direct habitat loss as a result of land-take; *Table 21.5a* provides a summary of the areas of land that are predicted to be encroached upon;
- Direct impact to the wildlife associated with the affected habitats for various purposes (feeding, breeding or use as movement corridor) as a result of direct loss of the landtake; and
- Indirect impact to the surrounding habitat as a result of increased human activities, including an increased potential for fire hazard.

Table 21.5 a Habitat encroached by the Eastern Access Road (EAR) (Area in hectare ha)

Habitat	by EAR	by Other West Rail Projects	Total
Woodland	0.27	0.06	0.33
Active Agricultural land	0.18	0.04	0.22
Inactive Agricultural land	0.18	1	1.18
Wasteland	0.45	0.06	0.51
River (include riparian habitat)	0.13	0.11	0.24
Developed/village area	0.93	0	0.93
Fishpond	0	0.06	0.06

21.5.1.2 Operational Phase

Operation phase ecological impact will primarily relate to the permanent loss of ecological habitat, as well as habitat fragmentation and increase of human activities.

21.5.2 Impact Evaluation

Based on the ecological evaluation for the resources to be affected, the significance of the anticipated impacts have been evaluated in accordance with *Table 1 of Annex 8 of the EIA O TM*.

21.5.2.1 Construction Phase

The ecological impact during the construction phase is evaluated below:

- Habitat quality - With the exception of the agricultural land next to Ng Ka Tsuen which was considered to be of moderate quality habitat, all the others habitats that are to be affected by the Eastern Access Road are considered to be ecologically poor
- Species - All wild birds are protected by the Wild Animal Ordinance; no other ecologically important wildlife was observed in any of the habitats within the study area
- Size/Abundance - given that only a small area of active agricultural land (0.18 ha) will be affected by the development, the loss is considered to be insignificant in the local context
- Duration - all the impacts related to habitat loss will be long term and permanent
- Reversibility - The impact related to habitat loss is permanent and irreversible, except for that related to the temporary work areas

- **Magnitude** - The magnitude of the change is considered drastic since the habitat to be affected will be cleared and lost, however, with respect to the size of the affected area, the magnitude is considered to be of a limited scale

With respect to the above points, the overall ecological impact resulting from the proposed project is considered to be limited.

Since the ecological impact resulting from the project is considered limited, and the scale of works in comparison to other nearby projects (such as West Rail) are relatively minor, the potential cumulative impact is considered negligible. It should be noted that the compensation wetlands provided as a result of the West Rail project will not be affected by the EAR works.

21.5.2.2 Operation Phase

Since most of the study area has already been heavily modified by human activities, the identified operation phase ecological impact will therefore have little impact on the existing wildlife, and consequently, the operational impact is considered to be minimal.

21.6 Mitigation Measures

Given that the habitats to be affected by the proposed Project are mainly of poor ecological value and that no adverse ecological impact is anticipated, no mitigation measures are considered necessary.

21.7 Residual Impact

No adverse residual ecological impact is anticipated for the project.

21.8 Conclusion

The proposed Eastern Access Road will encroach into a mosaic of disturbed or artificial habitats generally with low ecological value. Given that the area of ecological habitat to be affected is quite small, no adverse ecological impact is anticipated.