Habitat mapping

10.2.2.2 Habitats were mapped and updated using 1999 government aerial photos. **Drawing No. 22936/EN/002** shows the habitat map for the study area of South East Kowloon Development (SEKD). Urban habitat classification follows the earlier study (Maunsell 1998). Due to the highly disturbed nature and low ecological value of the vegetation recorded on site, general vegetation surveys were not performed. Findings from literature review are sufficient to describe the flora of the study area. However, field surveys were performed on 13 April, 2000 to search for individuals of a previously recorded orchid species, *Eulophia sinensis*, which flowers in April, on grass habitats along the runway. Sampling points followed those for avifauna point counts (**Drawing No. 22936/EN/042**), with 2 points at the NAKTA area and 3 points along the runway. Orchid surveys covered an area of 20m radius at each of the 5 points. A total area of 6280 m^2 was sampled.

Avifauna

10.2.2.3 Five bird count points were laid out at locations where access was permitted (**Drawing No. 22936/EN/042**). Two points were located on the NAKTA area and three points on the runway. Sampling was carried out at all points on 23, 24, 25 February, 20, 22, 23 March, and 11, 12, 13 April 2000. Sampling started within 30 minutes of sunrise and continued until 1000 hrs on each sampling day. Ten minutes were spent counting birds at each point. All birds heard or seen within 50m from the points were counted and identified to species. Birds observed between points were recorded separately. Ornithological nomenclature in this report follows Viney *et al*. (1994).

10.2.2.4 Within the proposed reclamation area, it was observed that artificial coastlines and coastal roosts (e.g., breakwater) in the Kai Tak Approach Channel and Kwun Tong Typhoon Shelter were roosting sites for birds. Total number of birds seen at these areas were counted by species and recorded (**Drawing No. 22936/EN/042**) separately on each survey date. Surveys were performed on 23, 24, 25 February, 20, 22, 23 March, and 11, 12, 13 April 2000.

Other fauna

10.2.2.5 All non-avian fauna with potential conservation significance (e.g. mammals, reptiles and amphibians, butterflies and dragonflies) recorded incidental to bird sampling were counted and identified to species.

10.3 Description of the Environment

10.3.1 *Aquatic Ecology*

Nullahs

10.3.1.1 Kai Tak Nullah collects storm water from San Po Kong, Diamond Hill, Tsz Wan Shan, Wong Tai Sin, Wang Tau Hom, Lok Fu and Kowloon City and discharges into the Kai Tak Approach Channel. Since the completion of the Tolo Harbour Effluent Export Scheme in 1995, this nullah has also been receiving treated effluent from Sha Tin and Tai Po. In 1998, five out of the six monitoring stations established by EPD for the water quality in the nullah recorded the Water Quality Index (WQI) as “bad”. Only the sixth station which is the most upstream among all the stations recorded “fair” WQI. During the field surveys for the present study, no flora and fauna were recorded in the section of nullah within the study area. Recently, a population of Tilapia was reported in the upper part of the nullah, outside the boundary of the study area (article in "The Sun" dated 17/11/2000). Tilapia, however, was a high pollutant tolerant

species and could be found abundant in some seriously polluted water bodies, such as Shing Mun River and Kam Tin River. Potentially threatening other local aquatic fauna in Hong Kong, this introduced species has little conservation value.

Intertidal habitat

10.3.1.2 The existing artificial coastline in the study area is made of concrete or large granite rocks. Although fouling organisms were regarded as common on artificial seawalls and wharf piles (Morton & Morton 1983), due to the polluted nature of the water combined with the homogenous nature of the concrete seawalls , the vertical concrete seawalls in the study area is not a favourable habitat for intertidal organisms. No intertidal fauna was observed on vertical concrete seawalls during the present study.

10.3.1.3 Rubble-mount seawall usually provides more hiding place for intertidal organisms and thus is regarded as of higher ecological value when compared with vertical concrete seawall. In the present study, however, the rubble-mount artificial coastline, as shown by previous records (Maunsell 1998) and field observations during the present study, supported only limited life including Isopod and grapsid crabs, and hence was of limited ecological value.

10.3.1.4 The closest natural coast of considerable length within the Assessment Area is located in Green Island. Natural coastline on Green Island was surveyed in the Green Island Development Study (TDD 1998). The intertidal community there was found being typical of a semi-exposed shore. Abundant limpets and snail *Monodonta labio* were found, while encrusting algae were common in the low intertidal zone.

Soft bottom benthos

10.3.1.5 Shin & Thompson (1982) studied benthic grab samples collected from 200 stations throughout Hong Kong waters. Data of these stations, however, was not treated separately, but pooled with other stations with similar species composition. Thompson & Shin (1983) performed a further study which concentrated on the Victoria Harbour area and also related the spatial pattern of benthic infauna to sewage pollution. This report details the benthic conditions inside Victoria Harbour. Its focus is on infauna assemblages and substratum and organic nutrients. The study area for that study is adjacent to the SEKD New Development Area and inside the present assessment area. Another benthic sampling was conducted in 1995 (Cai *et al*. 1997) with the purpose of determining changes in infauna since the Thompson & Shin study. This report contains detailed background information on benthic ecology. Its focus is on temporal and spatial changes of benthic communities in Victoria Harbour. Sediment samples were also collected at three stations off the Central waterfront during November 1995 (ERM 1997) as part of the surveys for Central Reclamation Phase III Studies.

10.3.1.6 The SEKD area lies on the central northern coastline of Victoria Harbour. It is located in the central transitional zone of Hong Kong waters, between the estuarine western and oceanic eastern waters (Morton 1990).

10.3.1.7 Water quality monitoring in the Western Buffer, Victoria Harbour and the Eastern Buffer Water Control Zones in 1998, the most recent year for which published results are available, showed all areas to be characterised by fairly high turbidity, inorganic nutrients and sewage bacteria (EPD 1999b). Total phosphorus, orthophosphate and faecal coliforms have all shown long-term increasing trends in the Eastern Buffer (*ibid.*). These increases were most likely due to increasing intensity of human development and habitation in, and the commissioning of new sewage outfalls at Tseung Kwan O (1987) and Shau Kei Wan (1992) (*ibid.*).

10.3.1.8 Receiving 1.3 million m^3 of effluent each day (EPD 1999b), Victoria Harbour is among the worst water control zone in terms of marine water quality. In the past ten years, an increasing trend in *E. coli* in Victoria Harbour and its adjoining regions has been detected (EPD 1999b).

The Tolo Harbour Effluent Export Scheme, as part of the Tolo Harbour Action Plan, has been diverting treated sewage effluent the Tai Po and Sha Tin Sewage Treatment Works to Victoria Harbour (EPD 1999a). This scheme has successfully reduced nutrient pollution load in Tolo Harbour, but has brought additional loads to Victoria harbour.

10.3.1.9 The three major marine components of the SEKD area, i.e. Kowloon Bay, Kwun Tong Typhoon Shelter and KTAC, are among the areas with poorest water quality within Victoria Harbour. Victoria Harbour itself is a tidal channel, wider at the western end and narrower at the eastern end. The highest current speed, up to 1.1 m/s occurs at Lei Yue Mun. The SEKD area is located inside an embayment, away from the major tidal currents of the harbour. Tidal flushing is further limited by the breakwaters of To Kwa Wan Sheltered Anchorage in Kowloon Bay and of Kwun Tong Typhoon Shelter. These make the marine components of the SEKD area, in particular the KTAC, a relatively confined water body with a limited capacity for water dispersion.

10.3.1.10 On the other hand, the SEKD area is subject to high levels of pollution, notably sewage effluent and industrial discharges via illegal expedient connections. Extensive land reclamation was carried out in the past to increase the land use in South East Kowloon. The population of South East Kowloon is high. Different types of industrial activities that sprang up in Hong Kong in the 1970s and 1980s can be found in this area. The waterbodies of Kowloon Bay and outside Kwun Tong have been heavily polluted with domestic and industrial waste. The nearby To Kwa Wan and Kwun Tong Outfalls are two of the 12 sewage outfalls discharging into the harbour. All these factors contribute to the low water quality and sediment quality inside the SEKD area.

10.3.1.11 Water quality in Kwun Tong Typhoon Shelter has generally been the lowest among all typhoon shelters monitored in Hong Kong. In 1998, the lowest dissolved oxygen level and the highest *E. coli* level were found in Kwun Tong Typhoon Shelter (EPD 1999b). Together with Rambler Channel Typhoon Shelter, (EPD 1999b), it was also found to have the highest heavy metal level in sediments.

10.3.1.12 A total of 206 individuals belonging to 2 species were found in the 18 grab samples. The occurrence and abundance of organisms found within the samples from the 6 sites are shown in **Table 10.1**. Three out of the six sampling stations, i.e. Stations D, E & F in KTAC and the Kwun Tong Typhoon Shelter, showed no living organism. Stations A & B produced only one species, while only two species were recorded at Station C. The polychaete *Capitella capitata* was the dominant component, accounting for over 99% of all specimens. The only other fauna collected was one juvenile ocypodid crab *Macrophthalmus* sp.

10.3.1.13 Only at Station C, where the number of species exceeded one, could the diversity index *H*' and Evenness *J* be calculated; both were 0.049.

Table 10.1 Results of the Grab Benthic Survey of the present study in the SEKD New Development Area and from an previous benthic infauna study (Cai *et al.* 1997).

Taxon	Sampling Stations (The present study)						Sampling Stations (Cai et al. 1997)							
	A	B	C	D	E	F	VS1	VS2	VS3	VS4	VS5	VS6	VM8	WM2
Polychaete, *Capitella capitata*	15	73	117	0	0	0	-	-	-	-	-	-	-	-
Crab, *Macrophthalmus* sp.	0	0	1	0	0	0	-	-	-	-	-	-	-	-
Total No.	15	73	118	0	0	0	-	-	-	-	-	-	-	-
Density	50	243.3	393.3	\	\	\	115	255	315	405	150	965	70	95
Biomass	0.16	0.51	2.05	\	\	\	25.3	0.65	35.05	1.95	2.40	20.25	1.20	1.80
Spp. No.	1	1	2	\	\	\	9	2	12	2	7	11	6	10
Diversity *H*'	0	0	0.049	\	\	\	2.539	0.139	2.742	0.096	2.075	2.369	2.299	2.458
Evenness *J*	\	\	0.049	\	\	\	0.891	0.139	0.765	0.096	0.739	0.685	0.889	0.740

10.3.1.14 All grab samples from the three sampling stations in KTAC and Kwun Tong Typhoon Shelter (Station D, E & F) were abiotic. This showed that the marine environment in the area was in poorer condition than that in the Kowloon Bay area.

10.3.1.15 Shin & Thompson (1982) studied the benthic communities at 200 different stations in Hong Kong waters and categorised those stations into 5 groups with similar characteristics. Stations in the middle of Victoria Harbour were classed as Group 3. The Group 3 stations are dominated by polychaetes (78.7%) with no other group of organisms significantly present. The mean species diversity index H' of Group 3 was 3.19 (3.41 for pooled data), while mean evenness J was 0.80 (0.60 for pooled data). The results of the study indicated that benthic spatial distribution was affected by sediment distribution and salinity changes rather than pollution. Although the ecological effects of pollution upon benthos, as indicated by the study, were minimal in the central parts of the harbour, the enclosed waters of some abiotic areas in Victoria Harbour, especially in typhoon shelters, received large local inputs of sewage.

10.3.1.16 In a follow-on study in 1979 (Thompson & Shin 1983), the effect of sewage on spatial distribution of benthic infauna was further studied. All stations were located within the assessment area of the present study, and some stations were very close to the sampling locations of the present survey. Stations 3, 60, and 55 fell within the reclamation area, and station 54 within the SEKD New Development Area. Stations 2 and 59 were close to Station A in the present survey. No benthos was collected in the 4 typhoon shelters, including the Kwun Tong Typhoon Shelter. Very fine sediments and high content of organic carbon were found in the four typhoon shelters and also at Hung Hom and Kwun Tong.

10.3.1.17 A more recent study on marine benthos in 1995 assessed on temporal and spatial changes of benthic communities in Victoria Harbour since the study of Thompson & Shin (Cai *et al.* 1997). The eight sampling sites followed some of the EPD's marine water and marine sediment sampling stations across Victoria Harbour (**Drawing No. 22936/EN/256**). Two of them, VS2 and VS4, were at sheltered locations and fell into the SEKD New Development Area of the present study, while the other six sampling sites from Cai *et al*.'s study (1997) covered the major part of the marine traffic channel inside Victoria Harbour, from Lei Yue Mun to west of Green Island. Mean species diversity index H' of the stations of that study was 1.802, ranging from 0.096 to 2.742.

10.3.1.18 It was reported that benthic organisms recorded in Victoria Harbour near Kai Tak Airport (VS2 and VS4), where no more than 3 species of benthos recorded, were dominated by the polychaete *Capitella capitata*, which accounted for 98% and 99% of specimens recorded. The biomass and density were also very low at both stations. The species diversity index *H*' at Station VS2 was 0.139 in March 1995 and 0.931 in August 1995, while at Station VS4 *H*' was 0.096 in March 1995. The polychaete *Capitella capitata* is a species highly tolerant of organic pollution, commonly found in areas seriously polluted by organic pollutants, and usually dominant in such communities. Dominance of polychaetes in benthic communities is a common feature of organic pollution. In particular, the abundance of *Capitella* and the simple structure of the benthic communities reflect the severe degree of organic pollution. The organic carbon content in the vicinity of VS2 and VS4 was about 2% in the Thompson & Shin study (reviewed by Cai *et al.* 1997). It evidenced the area has been seriously polluted since the end of 70s.

10.3.1.19 The other six sites had at least 6 species of benthos recorded and higher *H*' values. The two eastern harbour sites had the highest H', while the western and central harbour sites were in between. It was concluded that the substrate conditions and the hydrological conditions determined the infaunal community structure. VS2 and VS4 were located inside sheltered bays. The exchange rate with the outside waters is limited. Pollutants accumulate, and result in high organic carbon content. Number of species of benthic communities was therefore very low, which was dominated by the high pollutant-tolerant *Capitella*. VS5, VS6, VM8 and WM2 were located at the central part and western part of the Harbour. They were moderately

polluted. This could be attributed to the more fluent flow aided by tidal current. VS1 and VS3, despite its close distance to VS2 and VS4, had the most diverse benthic community among the eight sites. It is because VS1 and VS3 were located at the eastern end of the harbour. Received the strongest tidal action among all sites, the substrate there was coarser and contained little organic carbon and less than 20% silt. The result of that study demonstrated the effect of hydrological conditions on the benthic communities.

10.3.1.20 At a later time in 1995, as part of the surveys for Central Reclamation Phase III Studies, sediment samples were collected at three stations off the Central waterfront (ERM 1997). The sediment samples were malodorous and anoxic. No live benthos were found. It was concluded that it might be a result of lone term sewage discharge into the area.

10.3.1.21 The only species diversity index H' measured by the present study (H' at Station C = 0.049) was much lower than those reported by Shin & Thompson (1982), but was close to those reported for VS2 and VS4 from Cai *et al.* (1997). The domination of one species indicates high pollution and stress levels.

10.3.1.22 The low abundance and diversity of benthos encountered in the present survey was expected. The sampling locations have some of the worst water quality in Victoria Harbour. The whole area is inside an embayment. Sewage input together with poor circulation have made the Kwun Tong Typhoon Shelter abiotic from the past 20 years (Thompson & Shin 1983), and earned the lowest water quality and sediment quality among the 14 typhoon shelters monitored by EPD (EPD 1999b). Stations D, E and F in the present survey were still abiotic as expected. The species diversity index H' could not be calculated for these stations. Stations A and B recorded only one species, so H' was also not applicable at this station. The extremely low density of infauna found was consistent with the results of the three previous studies.

10.3.1.23 The marked similarity in the diversity index H' between Cai *et al.*(1997) and the present study may reflect the environmental conditions in Victoria Harbour over the last few years. Although the present survey is a one-time survey and provides no information on temporal changes on benthic communities in the area, the data are in line with two-season survey results from Cai *et al. (ibid.)*, and can be taken as further evidence of the low species diversity in the benthic communities Victoria Harbour.

10.3.1.24 The nature of the substratum has been found to be the most important single factor affecting the organisation of sub-tidal communities (Ong Che & Morton 1991). Marine sediment particle size inside the project area was very small, with the majority containing over 60% silt and clay (Thompson & Shin 1983). Sediment from sewage input could affect the sea bed conditions of the adjacent area. Comparing Cai *et al.*'s (1997) data with those collected during the present survey, in terms of the occurrence of benthic species, the number of species present in the present survey (2) was similar to those from sampling stations closer to the present study stations (2-3).

10.3.1.25 Marine habitats in the SEKD New Development Area are highly disturbed due to sewage discharge as well as previous reclamation works and marine traffic. These disturbances are expected to continue in future.

Corals

10.3.1.26 There are no designated sites of marine conservation interest located in the vicinity of the new development area or inside the assessment area for marine ecology. Inside the Victoria Harbour WCZ, some soft corals and gorgonians were found in Green Island and Little Green Island during the Green Island Development Study (TDD, 1998). Some black corals (*Anthipathes* sp.), protected by CITES and Cap. 187, were also found in Green Island.

10.3.1.27 Established coral communities of any size are regarded as important habitat type in Hong Kong as defined in Annex 8 EIAO-TM. Among the corals, however, hard corals are more vulnerable than soft corals. Soft corals and gorgonians do not contain zooxanthellae and do not require light penetration for photosynthesis. They are more widely distributed in Hong Kong and could be found in areas of higher turbidity such as south Tsing Yi, where sea pens and gorgonians were recorded during a trawl survey for epibenthic community (ERM, 1995).

10.3.1.28 At the southeastern end of the Western Buffer WCZ, five sites were surveyed during an extensive dive survey in Hong Kong waters (Binnie, 1995). Ap Lei Chau, Magazine Island, south Telegraph Bay and north Telegraph Bay were all assigned a low conservation value in terms of the abundance and diversity of hard corals and soft corals. However, rich soft corals and sea fans were found at Pak Kok. Hard corals were also recorded in medium abundance. No sites were surveyed inside the Victoria Harbour and Eastern Buffer WCZs by the Binnie's study (1995).

Cetaceans

10.3.1.29 The southeast limit of the distribution range of Indo-Pacific Hump-backed Dolphin falls into the western end of Western Buffer WCZ. There were 14 sightings of dolphins inside Western Buffer WCZ between 1995 to 1998 (Jefferson 1998). Majority of these sightings were recorded in the coastal water of Lantau Island. Only one sighting was made between Lantau and Tsing Yi and another one between Kau Yee Chau and Hong Kong Island.

Others

10.3.1.30 Consideration of other nektonic components of the marine communities within the Assessment Area is given in the chapter on Fisheries Impact Assessment.

10.3.2 *Terrestrial Ecology*

10.3.2.1 The existing environment for terrestrial ecology is described based on literature review and field surveys for the present study.

Habitats and Vegetation

10.3.2.2 Terrestrial habitats found within the SEKD study area, which covered the entire NAKTA area plus the runway and the new reclamation areas, include urbanised, amenity planting/park, grass (planted), and shrubland. The area of each habitat type is given in **Table 10.2**. No plant species protected under local regulations or known to be rare/endangered was recorded.

Table 10.2 Habitat Types in SEKD Study Area

Habitat Type	Area within 500m SEKD study boundary (ha)	Percentage (%)	Area within SEKD New Development Area (ha)	Percentage (%)
Urbanised	796.0	55.8	288.9	47.1
Grass (planted)	39.8	2.8	36.2	5.9
Marine Waters	574.7	40.3	288.1	47.0
Amenity Planting	12.6	0.9	-	-
Shrubland	2.9	0.2	-	-
Total	1426.0	100	613.2	100

10.3.2.3 Terrestrial parts of the SEKD study area are entirely altered by, or made by human effort (**Drawing No. 22936/EN/004**). Such habitats, when located within urban areas, are typically poor in wildlife abundance and species diversity. Within the SEKD study area, all of the terrestrial study area was classified as 'high density urban' according to 1:50000 Hong Kong

Vegetation map (WWF 1993). The earlier study (Maunsell 1998) further classified the 'high density urban' area into 'high density urban', 'grass (planted)', 'amenity planting', quarry face', 'artificial coastline' and 'original coastline remnants'. Among these man-made habitats, only high density urban, grass (planted) and artificial coastline are found within SEKD.

10.3.2.4 A total of 796 ha of area is classified as "Urbanised" in the SEKD study area, which includes densely populated areas and its associated roads and highways and the Kai Tak Nullah in NAKTA. This habitat covers over half of the SEKD study area. The ecological value of this habitat is minimal due to its highly disturbed nature.

10.3.2.5 Grass (planted) had a total area of 39.8 ha within the SEKD study area. It was mainly located along the runway and at the NAKTA area and received regular cutting until recently (Melville 1980, and field observation for this study). Some of these grassy areas were also under or subject to lease. Melville (1980) recorded 40 plant species at Kai Tak Airport (**Table 10.3**), most of which were recorded on grassland. Most of the species recorded are ruderals, common and widespread in the SAR. One orchid species protected under Forestry Regulations (Cap.96), *Eulophia sinensis*, was recorded (*ibid*.). Although the exact location of this species was not mentioned in the report, this species is a terrestrial orchid that grows on 'open, grassy slopes' (Walden and Hu undated) and flourishes in very poor soil (Baretto and Young Saye 1980). Therefore, it is likely that it was recorded on the planted grass area. The conservation status of this species is not known, but it is likely that it is relatively common among the orchid species due to the commonness of its habitat. During the survey performed in April for this study, this orchid species was not seen. The absence of this species may be caused by its opportunistic characteristics, and/or shading of tall grasses not mowed after closing of the Kai Tai Airport.

Table 10.3 Plant Species Recorded at Kai Tak Airport (Melville 1980)

FAMILY	SPECIES
Mimosaceae	*Mimosa pudica*
Papilionaceae	*Alysicarpus vaginalis ,Desmodium heterocarpon, Desmodium triflorum,, Phaseolus sp., Zornia diphylla*
Malvaceae	*Urena lobata*
Euphorbiaceae	*Euphorbia hirta var. typica, Ricinus communis*
Oleaceae	*Catharanthus roseus (Vinca rosea)*
Rubiaceae	*Hedyotis auricularia (Oldenlandia auricidaria)*
Verbenaceae	*Lantana camara*
Portulacaceae	*Portulaca grandiflora*
Polygonaceae	*Rumex maritimus*
Amaranthaceae	*Alternanthera nudiflora, Gomphrena celosioides*
Compositae	*Ageratum houstonianum, Eclipta prostrata, Erigeron floribundus,, Spilanthes acemella, Tridax procumbens, Veronia cinerea*
Scrophulariaceae	*Bacopa monnieri, Scoparia dulcis*
Orchidaceae	*Eulophia sinensis**
Cyperaceae	*Cyperus polystachyos , Fimbristylis spathacea*
Gramineae	*Bothriochloa intermedia, Chloris barbata, Chrysopogon aciculatus, Cynodon dactylon, Eragrostis atrovirens, Eragrostis zeylanica, Imperata cylindrica, Neyraudia reynaudiana, Panicum repens, Paspalum conjugatum, Paspalum scrobiculatum, Rhynchelytrum repens, Sporobolus fertilis*

*protected under Forestry Regulations (Cap 96).

10.3.2.6 Amenity planting (12.6 ha) was mainly located on roadsides or in parks and mostly included exotic tree species, e.g. *Casuarina equisetifolia, Acacia confusa* (Maunsell 1998). These areas were of low ecological value (*ibid*.).

10.3.2.7 Small patches of shrubland (2.9 ha) were identified at the southeast fringe of the 500m SEKD study boundary. These vegetation are remnants remained on the quarry face of Cha Kwo Ling Kaolin Mine Site. The shrubland habitat will not be affected by this project, but is within the development boundary of a proposed housing development project at Cha Kwo Ling currently subject to an EIA. Therefore, this habitat will not be furthered studied or evaluated.

Avifauna

10.3.2.8 Avifauna at Kai Tak Airport were studied intensively between February 1974 and December 1979 by the Kai Tak Birdstrike Research Unit (BRU) of the Agriculture and Fisheries Department (Melville 1979, 1980). A total of 136 species were recorded (*ibid*.). Two additional species – Night Heron *Nycticorax nycticorax* and Japanese Yellow Bunting *Emberiza sulphurata* - were reported by members of the Hong Kong Bird Watching Society between 1980 and 1997 (Carey 1994, 1998).

10.3.2.9 Despite the high species richness reported, Kai Tak Airport was of little importance as foraging habitats for birds due to the scarcity of food (Melville 1980). Most species recorded at the airport were grounded by bad weather or exhaustion, and departed as soon as they could (*ibid*.). Only eight species (6% of total recorded) were present throughout the year. Also, due to high disturbance and low / limited vegetation cover, Kai Tak Airport was not important breeding habitat for birds. Only 3 species were recorded breeding between February 1974 and December 1979 (*ibid*.).

10.3.2.10 While all wild birds are protected under the Wild Animal Protection Ordinance (Cap. 170), not all species are of equal conservation interest. Bird species of conservation interest recorded by Melville (1980) were Little Whimbrel *Numenius minutus*, Oriental Plover *Charadrius veredus*, and Oriental Skylark *Alauda gulgula.* The latter species bred inside the airport. Both Little Whimbrel and Oriental Plover are locally rare (Viney *et al*. 1994); only a few records of the two species were made in Hong Kong away from the Kai Tak Airport (Chalmers 1986, Viney *et al*. 1994). Little Whimbrel is a Class II Protected Animal in the PRC (Hua and Yin 1993). However, Little Whimbrel has not been recorded at Kai Tak since 1990 (Picken 1991, Carey 1992-1996a, 1998, Carey and Tai 1999). Oriental Plovers were recorded at Kai Tak in the 1990's, though not during every migration (*ibid*.). Oriental Skylark has only been recorded breeding in two sites in Hong Kong: Kai Tak and Tin Shui Wai (Carey 1994). Oriental Skylark, however, has not been recorded at Kai Tak since 1987 (Picken 1988-1991, Carey 1992-1996a, 1998, Carey and Tai 1999).

10.3.2.11 The NAKTA area is a highly developed area surrounded by urbanized area on the north and west. Short grass areas and trees planted along the edge of the apron were the only vegetation cover. Short grass areas provide some foraging habitats for birds and planted trees provide roosting habitats for birds. Due to the proximity to human disturbance and limited canopy cover, these trees are not important nesting habitats for birds.

10.3.2.12 Fourteen species were recorded at the points in the NAKTA area during the field surveys between February and April 2000 (**Table 10.4**). Five additional species were recorded between points (**Table 10.5**). No sign of breeding (e.g., nests) was observed during the field surveys.

Table 10.4 Abundance of Bird Species Recorded in the NAKTA Area

Common Name	Scientific Name	23/2	24/2	25/2	20/3	22/3	23/3	11/4	12/4	13/4	Status	Abundance
Fantail Snipe*	*Gallinago gallinago*			1					1		PM WV	C/U
Spotted Dove	*Streptopelia chinensis*		1	1							R	CW
Common Kingfisher*	*Alcedo atthis*			1							R	CW
Barn Swallow	*Hirundo rustica*			2					4		SV PM	CW
Richard's Pipit	*Anthus richardi*	1	1	1	3	1	7	3	2	1	R PM WV	CW
White Wagtail	*Motacilla alba*		1	2							WV	CW
Crested Bulbul	*Pycnonotus jocosus*								2		R	CW
Chinese Bulbul	*Pycnonotus sinensis*			1					1	1	R	CW
Fantail Warbler*	*Cisticola juncidis*		3	1	6	3	1		1	3	R WV	C/U
Plain Prinia*	*Prinia inornata*	1		1							R	C/U
Common Tailorbird	*Orthotomus sutorius*				1						R	CW
Black-necked Starling	*Sturnus nigricollis*	2									R	CW
Crested Myna	*Acridotheres cristatellus*			2							R	CW
Tree Sparrow	*Passer montanus*								15	5	R	CW
No. of birds		4	6	12	10	4	8	3	25	10		
No. of species		3	4	9	3	2	2	1	6	4		

"*" = species found in/near wetland habitats.
Status: R = resident, PM = passage migrant, SV = summer visitor, WV = winter visitor.
Abundance: CW = common and widespread, C/U = local but not uncommon.

Table 10.5 Additional Bird Species Recorded Between Points in the NAKTA Area

Common Name	Scientific Name	23/2	24/2	25/2	20/3	22/3	23/3	11/4	12/4	13/4	Status	Abundance
Kestrel	*Falco tinnunculus*						1	1		1	WV	C/U
Siberian Stonechat*	*Saxicola maura*			1		1	1		1		WV	C/U
Common Myna	*Acridotheres tristis*					2	2			1	I	R
Magpie	*Pica pica*			1		1		3			R	CW
Spotted Munia	*Lonchura punctulata*				1						R	C/U
No. of birds		0	0	2	1	4	4	4	1	2		
No. of species		0	0	2	1	3	3	2	1	2		

"*" = species found in/near wetland habitats.
Status: R = resident, WV = winter visitor, I = introduced species.
Abundance: CW = common and widespread, C/U = local but not uncommon R = very local or rare.

10.3.2.13 Common and widespread species (e.g., Tree Sparrow *Passer montanus*) constituted 74.1% of total birds and 78.5% of total species (observations at points) (**Table 10.4**). These species are disturbance tolerant and can be found in many types of habitats, including urban areas or urban parks.

10.3.2.14 Richard's Pipit *Anthus richardi* (24.4% of total birds, observations at points), Tree Sparrow (24.4%) and Fantail Warbler *Cisticola juncidis* (22%) were the three most abundant species in the north apron, with similar degree of dominance. The former two can be found in many types of habitats (Viney *et al*. 1994). Fantail Warblers are usually found in grassy habitats near water (*ibid*.). The damp short grass areas are similar to the favoured habitats of this species, and also other birds usually found near water (e.g., Siberian Stonechats *Saxicola maura* and Plain Prinia *Prinia inornata*) (Chalmers 1986, Viney *et al*. 1994) (**Tables 10.4** and

10.5). These species are usually absent in urban areas, but are commonly found in marshy areas in the northern New Territories and Deep Bay area (*ibid*.).

10.3.2.15 Kestrel *Falco tinnunculus* was the only species of conservation importance among those recorded in the NAKTA area. This species is a Class II Protected Animal of the PRC (Hua and Yin 1993) and listed in Appendix II of CITES (Xu 1995). This species is widespread in Hong Kong and favours open country (Viney *et al*. 1994).

10.3.2.16 Nine species of birds were observed roosting or foraging on the artificial coastline and coastal buildings (e.g., breakwater) in the Kai Tak Approach Channel and the Kwun Tong Typhoon Shelter (**Table 10.6**). All except the White Wagtail *Motacilla alba* and Crested Myna *Acridotheres cristatellus* were wading birds. White Wagtails and Crested Mynas can be found in many types of habitats, including urban areas (Viney *et al*. 1994). All the ardeid species except the Intermediate Egret *Mesophoyx intermedia* are common and abundant in the northern New Territories and the Deep Bay area (Viney *et al*. 1994). Intermediate Egret is a rare species and most records come from the Deep Bay area (*ibid*.).

Table 10.6 Abundance of Bird Species Recorded at KTAC and Kwun Tong Typhoon Shelter

Common Name	Scientific Name	23/2	24/2	25/2	20/3	22/3	23/3	11/4	12/4	13/4	Status	Abundance
Chinese Pond Heron	*Ardeola bacchus*		1			2			1	3	R	CW
Cattle Egret	*Bubulcus ibis*							2	4		R	CW
Little Egret	*Egretta garzetta*	20	33	22	9	10	25	36	79	75	R	CW
Intermediate Egret	*Mesophoyx intermedia*								5	2	NBV	R
Great Egret	*Casmerodius albus*	3	2		1	4	1		2	2	R	C/U
Grey Heron	*Ardea cinerea*	2			5	3	1	1			R	C/U
Common Sandpiper	*Actitis hypoleucos*				3	2		2	3	1	PM WV	CW
White Wagtail	*Motacilla alba*								2	1	WV	CW
Crested Myna	*Acridotheres cristatellus*		3	12					4		R	CW
No. of birds		25	36	34	18	21	27	41	100	84		
No. of species		3	3	2	4	5	3	4	8	6		

Status: R = resident, PM = passage migrant, NBV = non-breeding visitor, WV = winter visitor.
Abundance: CW = common and widespread, C/U = local but not uncommon, R = very local or rare.

10.3.2.17 Little Egret *Egretta garzetta* was the most numerous species (80.1% of total birds). The highest count was 79 birds (**Table 10.6**), 5.1% of the average peak winter counts in Hong Kong during the 1990's (1478 birds) (Carey and Young 1999). Ardeids were feeding on refuse from sewer outfalls. Due to the poor water quality, the Kai Tak Approach Channel and the Kwun Tong Typhoon Shelter are not considered to be important foraging habitats for wading birds.

10.3.2.18 The runway is manmade and the only vegetation cover was grass. Fourteen species were recorded at the points in the runway during the field surveys between February and April 2000 (**Table 10.7**). Ten additional species were recorded between points (**Table 10.8**). No sign of breeding (e.g., nests) was observed during the field surveys.

Table 10.7 Abundance of Bird Species Recorded on the Runway of Kai Tak Airport

Common Name	Scientific Name	23/2	24/2	25/2	20/3	22/3	23/3	11/4	12/4	13/4	Status	Abundance
Japanese Quail	*Coturnix japonica*			4			1				PM WV	R
Little Ringed Plover*	*Charadrius dubius*				1						R	C/U
Oriental Plover*	*Charadrius veredus*				1						PM	R
Barn Swallow	*Hirundo rustica*	1					2				SV PM	CW
Richard's Pipit	*Anthus richardi*	5	3	2	6	3	5	2	2	4	R PM WV	CW
Olive-backed Pipit	*Anthus hodgsoni*				1						WV	CW
Yellow Wagtail*	*Motacilla flava*		1								PM WV	C/U
White Wagtail	*Motacilla alba*	1				1					WV	CW
Magpie Robin	*Copsychus saularis*				1						R	CW
Siberian Stonechat*	*Saxicola maura*				1				1	1	WV	C/U
Fantail Warbler*	*Cisticola juncidis*	6	3	10		1	7	1	5	7	R WV	C/U
Plain Prinia*	*Prinia inornata*	1									R	C/U
Dusky Warbler	*Phylloscopus fuscatus*								1		WV	C/U
Crested Myna	*Acridotheres cristatellus*	8							2		R	CW
No. of birds		22	7	16	11	5	15	3	11	12		
No. of species		6	3	3	6	3	4	2	5	3		

"*"= species found in/near wetland habitats
Status: R = resident, PM = passage migrant, SV = summer visitor, WV = winter visitor.
Abundance: CW = common and widespread, C/U =local but not uncommon, R = very local or rare.

Table 10.8 Additional Bird Species Recorded between Points on the Runway of Kai Tak Airport

Common Name	Scientific Name	23/2	24/2	25/2	20/3	22/3	23/3	11/4	12/4	13/4	Status	Abundance
Black-eared Kite	*Milvus lineatus*	35	24	12	7	7	8	24	7	9	R	CW
Kestrel	*Falco tinnunculus*	1	1	1			1	1		1	WV	C/U
Spotted Dove	*Streptopelia chinensis*					1		2	1		R	CW
Red-throated Pipit	*Anthus cervinus*					3					PM WV	C/U
Crested Bulbul	*Pycnonotus jocosus*					2					R	CW
Chinese Bulbul	*Pycnonotus sinensis*			2					2	1	R	CW
Created Myna	*Acridotheres cristatellus*					1				5	R	CW
Magpie	*Pica pica*			1		1		3			R	CW
Jungle Crow	*Corvus macrorhynchus*								2		R	CW
Collared Crow	*Corvus torquatus*								1	1	R	C/U
No. of birds		36	25	16	7	15	9	28	13	17		
No. of species		2	2	4	1	6	2	4	5	5		

Status: R = resident, PM = passage migrant, WV = winter visitor.
Abundance: CW = common and widespread, C/U = local but not uncommon.

10.3.2.19 Common and widespread species (e.g., Crested Myna) constituted 49% of total birds and 42.9% of total species (observations at points) (**Table 10.7**). These species are disturbance tolerant and can be found in many types of habitats, including urban areas or urban parks. The bird community of the runway was dominated by Fantail Warblers (39.2% of total birds). The

damp short grass areas are similar to the favoured habitats of this species, and also other birds usually found near water (e.g., Siberian Stonechats *Saxicola maura* and Plain Prinia *Prinia inornata*) (Chalmers 1986, Viney *et al*. 1994) (**Table 10.7**). These species are usually absent in urban areas, but are commonly found in marshy areas in the northern New Territories and Deep Bay area (Viney *et al*. 1994).

10.3.2.20 Kestrel *Falco tinnunculus*, Black-eared Kite *Milvus lineatus* and Oriental Plover *Charadrius veredus* are species of conservation importance among those recorded in the runway.

10.3.2.21 Kestrel is a Class II Protected Animals of the PRC (Hua and Yin 1993) and is listed in Appendix II of CITES (Xu 1995). This species is widespread and fairly common in Hong Kong, and favours open country (Viney *et al*. 1994).

10.3.2.22 Oriental Plover is a rare passage migrant with a few records annually. Records of this species mostly came from Kai Tak Airport before 1995 (Chalmers 1986, Picken 1988-1991, Carey 1992-1996a). However, in recent years Oriental Plovers have been recorded at Chek Lap Kok (Carey 1998, Carey and Tai 1999), where substantial areas of open grass provide the favoured habitat of this species.

10.3.2.23 Black-eared Kite is a Class II Protected Animal of the PRC (Hua and Yin 1993) and is listed in Appendix II of CITES (Xu 1995). The local nesting population of this species is declining due to increasing urbanization (Viney *et al*. 1994). Black-eared Kites were observed roosting along the runway during the surveys. Due to their high mobility, abundance of Black-eared Kites on the runway on each sampling day was estimated by the highest simultaneous count. The highest count during the field surveys was 35 birds (February 2000), while in half of the field surveys fewer than 10 birds (**Table 10.8**) were counted. The observations of the field surveys were similar to the records by Melville (1980). The maximum count by Melville (1980) was 48 birds, and the number was also usually below 10 birds. Melville considered the use of the runway as a kite roost was related to the safety and freedom from disturbance, and closeness to sewer outfalls (potential food supply) (*ibid*.). Black-eared Kites in Hong Kong mainly scavenge over the sea for refuse and dead fish (Viney *et al*. 1994; Melville 1980).

10.3.2.24 The local winter population of Black-eared Kites was estimated to range between 1220-1270 birds in a study done in January 1995 (Carey 1996b). Black-eared Kites in the study area made up only around 2.8% of the total in Hong Kong. The two main Black-eared Kite roosts, Stonecutters Island (250-300 roosting birds) and Magazine Gap (620-970 roosting birds), located within 7km from the Kai Tak Airport (*ibid*.), are potential alternative roosting sites for Black-eared Kites using the study area.

10.3.2.25 Japanese Quail *Coturnix japonica* is a locally rare species. Unlike the Oriental Plover, however, this species is widespread in distribution and can be found in many types of habitats and many localities in Hong Kong (Viney *et al*. 1994). In addition, Japanese Quail is not listed in the Appendix of CITES nor is a protected animal in PRC, and therefore is not considered as species of conservation importance among those recorded in the runway.

10.3.2.26 Five species of birds were recorded foraging or roosting on Kowloon Rock and artificial coastline along the runway during the surveys (**Table 10.9**). All are wading birds except Cormorants *Phalacrocorax carbo*.

Table 10.9 Abundance of Bird Species Recorded at Kai Tak Approach Channel

Common Name	Scientific Name	23/2	24/2	25/2	20/3	22/3	23/3	11/4	12/4	13/4	Status	Abundance
Cormorant	*Phalacrocorax carbo*	27	20	26	1	4	5				WV	C/U
Chinese Pond Heron	*Ardeola bacchus*		1			2			1	3	R	CW
Little Egret	*Egretta garzetta*	2	3	2	1	1	1	3	2	3	R	CW
Great Egret	*Casmerodius albus*			1		1	1		2	1	R	C/U

Common Name	Scientific Name	23/2	24/2	25/2	20/3	22/3	23/3	11/4	12/4	13/4	Status	Abundance
Common Sandpiper	*Actitis hypoleucos*			1	1			1		1	PM WV	CW
No. of birds		29	24	30	3	8	8	4	5	8		
No. of species		2	3	4	3	4	3	2	3	4		

Status: R = resident, PM = passage migrant, WV = winter visitor.
Abundance: CW = common and widespread, C/U = local but not uncommon.

10.3.2.27 Cormorants had the highest abundance among the species recorded (69.7% of total birds). The highest count was 26 birds (February 2000) (**Table 10.9**). During the field surveys, cormorants were mostly observed roosting on Kowloon Rock, and were rarely seen foraging in the sea near the study area. This may be related to the low food abundance in the sea, due to the high pollution level. Over-wintering cormorants in Hong Kong are mostly found in the Deep Bay area, where large amounts of food are available (Viney *et al*. 1994, Agriculture and Fisheries Department 1997). Cormorants recorded in coastal habitats only made up a minor proportion (0.3%) of the total in Hong Kong in February 2000 (7500 birds) (Hong Kong Bird Watching Society 2000).

10.3.2.28 The wading bird species recorded included Common Sandpipers *Actitis hypoleucos*, herons and egrets (ardeids). Ardeids and sandpipers recorded in coastal habitats were mainly single birds. Ardeids are mostly found in the northern New Territories and Deep Bay area, where large area of fish ponds are found (Viney *et al*. 1994).

Other fauna

10.3.2.29 Sightings of amphibians, reptiles, mammals and dragonflies at Kai Tak were reported in Melville (1979). Records of conservation interest included Chinese Bullfrogs *Rana rugulosa* and bats (species unidentified). Chinese Bullfrog is a Class II Protected Animal in the PRC (Hua and Yin 1993). All bats are protected in Hong Kong under the Wild Animals Protection Ordinance (Cap. 170).

10.3.2.30 Chinese Bullfrogs were recorded breeding in standing water in areas where drainage was poor during the wet season, but these areas may have been filled (Melville 1979).

10.3.2.31 Both the runway and the NAKTA area are highly developed and short grass is the only vegetation cover in the area. These two areas are expected to support a low diversity of fauna.

10.3.2.32 No sighting of mammals or their burrows was made on the runway and the NAKTA area during field surveys between February and April 2000.

10.3.2.33 No sighting of amphibians was made on the runway and the NAKTA area during field surveys between February and April 2000. Breeding habitats of amphibians such as ponds were not found in the NAKTA area during field surveys.

10.3.2.34 No sighting of reptiles was made on the NAKTA area during field surveys between February and April 2000. Reptile species recorded on the runway during field surveys between February and April 2000 included Red-eared Slider *Trachemys scripta* and Chinese Skink *Eumeces chinensis*. Both species are of little conservation importance. Red-eared Slider is an introduced species (Karsen *et al.* 1998). Chinese Skink is common and widespread in Hong Kong (*ibid.*). This species is also common throughout its distribution range (Zhao and Adler 1993, Karsen *et al*. 1998).

10.3.2.35 One dragonfly species was recorded on the runway and the NAKTA area. This was the Wandering Glider *Pantala flavescens*. Wandering Glider is the commonest dragonfly in Hong

Kong and can be found in many types of habitats (Wilson 1995). Breeding habitats of dragonflies such as ponds and marshes (*ibid*.) are not found in the NAKTA area.

10.3.2.36 One butterfly species was recorded in the runway and the NAKTA area. This was the Common Black Jezebel *Delias pasithoe*. Common Black Jezebel is a common species in Hong Kong (Walthew 1997). This species can be found in many types of habitats (Lau 1997).

10.4 Identification, Prediction and Evaluation of Potential Impacts

10.4.1 *Habitat and Species Evaluation*

10.4.1.1 Ecological value of habitats was assessed in accordance with *Table 2, Annex 8 of the Technical Memorandum on Environmental Impact Assessment Process*. None of the habitats recorded within the area were assessed as having high ecological value (**Table 10.10**).

Table 10.10 Evaluations of Overall Ecological Values of Each Habitat Type Within the SEKD Study Area

Criteria	Habitats					
	Urbanised	Grass (planted)	Amenity Planting	Marine		
				Study Area		Assessment Area
				Intertidal	Benthic	
Naturalness	Heavily disturbed by human activities	Man-made habitats	Man-made habitats	Man-made habitats	Heavily disturbed by human activities	Disturbed by human activities
Size	Largest habitat type within the study area (796.0 ha, 55.8% of Study Area)	Moderate (39.8 ha, or 2.8% of Study Area)	Small (12.6 ha, or 0.9% of Study Area)	Large (including about 5.5 km of vertical seawalls, 6 km of sloping seawalls and 1.3 km of breakwaters)	Large (574.7 ha, or 40.3%)	Large (covering 3 WCZs)
Diversity	Low	Low	Low	Low	Low	Moderate
Rarity	Neither habitat nor its associated species is rare	Kestrel, Black-eared Kite, and Oriental Plover	Neither habitat nor its associated species is rare	Neither habitat nor its associated species is rare	Neither habitat nor its associated species is rare	Neither habitat nor its associated species is rare
Re-creatability	Readily re-creatable	Readily re-creatable	Readily re-creatable	Readily re-creatable	Difficult to recreate	Difficult to recreate
Fragmentation	Least fragmented	Heavily fragmented	Heavily fragmented	least fragmented	Moderately fragmented	Moderately fragmented
Ecological linkage	Not linked with any important habitats	Not linked with any important habitats	Not linked with any important habitats	Not linked with any important habitats	Not linked with any important habitats	Not linked with any important habitats
Potential value	Low	Moderate provided that succession is allowed	Low	Low in general	Low	Moderate provided that human disturbance could be significantly reduced
Nursery/breeding ground	None	Possible feeding site of some avifauna	Not known	Not known	Not known	Not known
Age	N/A	Young	Young	N/A	N/A	N/A
Abundance/richness of wildlife	Low	Low	Low	Low	Low	Moderate
Overall Ecological Value	Low	Low	Low	Low	Low	Moderate

10.4.1.2 In accordance with *Table 3, Annex 8 of the Technical Memorandum on Environmental Impact Assessment Process*, the ecological value of species was assessed in terms of:

- Protection status;
- Species distribution; and
- Rarity.