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.

10.4.1.3 While there is no ecologically important site inside the assessment area for marine ecology, black corals, soft corals, gorgonians and sea pens in Green Island, Pak Kok and south Tsing Yi, and also the Indo-Pacific Hump-backed Dolphin, are identified as of conservation importance (**Table 10.11**).

10.4.1.4 Based on the above criteria, three bird species, Kestrel, Black-eared Kite and Oriental Plover, are identified as of conservation importance (**Table 10.11**). Kestrel and Black-eared Kite are protected by law in PRC and international convention. Oriental Plover is only recorded in a few places outside Kai Tak in Hong Kong. The study area is therefore of importance to this species. Intermediate Egret and Japanese Quail, although uncommon in Hong Kong, are not identified as species of conservation importance. Intermediate Egrets are mainly found in fish pond habitats in the Deep Bay area and the northern New Territories (Viney *et al*. 1994). Japanese Quail is rare but widespread, and can be found in many types of habitats in Hong Kong. The study area is not considered as important habitat to these species.

10.4.1.5 No plant species or other fauna recorded in the study area are of high ecological value.

Table 10.11 Species of Conservation Importance Recorded within the SEKD Study Area and Assessment Area

Species	Protection status	Distribution	Rarity
Black corals, soft corals, gorgonians and sea pens	For Black coral *Antipathes* sp. recorded in Green Island: Animals and Plants (Protection of Endangered Species) Ordinance (Cap. 187), Schedule 1 and CITES	Widespread in Hong Kong	Common in Hong Kong waters
Indo-Pacific Hump-backed Dolphin	Wild Animals Protection Ordinance (Cap 170) Animals and Plants (Protection of Endangered Species) Ordinance (Cap. 187) Class I Protected Animal in PRC CITES Appendix I	Distribute throughout the western Pacific and Indian Ocean. In Hong Kong, concentrate in the western waters .	Uncommon in Hong Kong
Kestrel	Class II Protected Animal in PRC Appendix II of CITES	Widespread in Hong Kong, favours open country (e.g., woodland edge, agricultural lands) Distributed all over China, except Xinjiang Province Not uncommon throughout its range in China	Local but not uncommon in Hong Kong
Black-eared Kite	Class II protected animals of PRC; Appendix II of CITES	Widespread in Hong Kong Distributed all over China and common throughout its range in China	By far the commonest bird of prey in Hong Kong Local nesting population declining due to increasing urbanization
Oriental Plover	-	-	Very rare in Hong Kong, only recorded in a few places (e.g., Kai Tak and Mai Po)

10.4.2 *Impacts on Aquatic Ecology*

10.4.2.1 The EIAO and the Technical Memorandum are used as guidelines to assess the potential ecological impacts of the project. Sources of impact arising from the construction and operation stages of the proposed project include:

- Dredging and reclamation during the construction stage;
- Discharge of site runoff during the construction stage;
- Hydrographical changes from the formed reclamation.

10.4.2.2 Impact causing factors and their potential impacts during construction and operation are evaluated and presented in **Table 10.12**.

Table 10.12 Prediction and Evaluation of Potential Ecological Impacts

Potential Impact	Location	Type	Evaluation of Impacts				
			Species of Conservation Importance	Size / Abundance	Duration	Reversibility	Magnitude
Construction Stage							
Disturbance from dredging	On-site	Direct	None	127 ha of sea bed	Temporal	Reversible	Insignificant
Habitat loss from reclamation	On-site	Direct	None	127 ha of seabed and 3.6 km of vertical seawalls	Permanent	Irreversible	Insignificant
Sedimentation	Off-site	Indirect	Black corals, soft corals, gorgonians and sea pens; Indo-Pacific Hump-backed Dolphin	Potentially large	Temporal	Reversible	Low
Contaminant release	Off-site	Indirect	Black corals, soft corals, gorgonians and sea pens; Indo-Pacific Hump-backed Dolphin	Potentially large	Temporal	Reversible	Low
Site runoff	Off-site	Indirect	Black corals, soft corals, gorgonians and sea pens; Indo-Pacific Hump-backed Dolphin	Potentially large	Temporal	Reversible	Low
Operation Stage							
Land use changes	On-site	Direct	None	Low	Temporal	Irreversible	Insignificant
Hydrographical changes	Off-site	Indirect	Black corals, soft corals, gorgonians and sea pens; Indo-Pacific Hump-backed Dolphin	Potentially large	Permanent	Irreversible	Low

10.4.2.3 Loss of about 127 ha of marine waters and about 3.6km of vertical seawalls to reclamation of part of KTAC, the inner half of the Kwun Tong Typhoon Shelter, and the inner Kowloon Bay constitutes the direct, permanent, and major aquatic ecological impact of the project.

10.4.2.4 There were three options for proceeding the reclamation, i.e. No Dredged Option, Minimum Dredged Option and Fully Dredged Option. The future seawall sites and the reclamation areas inside the approach channel, the inner half of Kwun Tong Typhoon Shelter and the inner Kowloon Bay will be dredged as part of the project construction in the Fully Dredged Option, while only the seawall sites will be dredged in the Minimum Dredged Option. In either one of the three options, seawall construction and reclamation will eliminate the soft bottom and the existing seawalls, and result in a permanent loss of benthic habitat and intertidal habitat.

10.4.2.5 Dredging usually kills benthic organisms during the physical removal of sediments from the seabed, and would also result in temporary loss of benthic habitat. In many cases, re-colonization of benthos occurs after the defaunation. Benthos in adjacent areas would be affected through increases in sedimentation. If the dredging is purposed for preparing reclamation, the subsequent reclamation would result in permanent and irreversible loss of benthic habitats.

10.4.2.6 In this case, however, both the results of the field survey (Stations E and F) and the literature review (Thompson and Shin 1983) revealed that it was very unlikely that any benthic organisms exist in the approach channel and the typhoon shelter. The inner Kowloon Bay

(Stations A and B) (Cai *et al*. 1997), though not abiotic, had a benthic community with very limited number of species which were all pollution-tolerant organisms. So no major impact on existing benthos would be expected. Even the Fully Dredged Option would not cause any significant disturbance to benthic habitat since the seabed inside the reclamation areas is either abiotic or highly disturbed.

10.4.2.7 Reclamation followed by dredging would entail a permanent and irreversible loss of approximately 2,900 m of sloping seawalls, 5,500 m of vertical seawalls, 1,300m of breakwaters, and 127 ha of shallow marine subtidal environment beneath the reclaimed area of KTAC, Kwun Tong Typhoon Shelter and inner Kowloon Bay. As the previous data indicated that the benthic conditions within this reclamation area were abiotic or in very poor conditions, the proposed reclamation will only result in a loss of some seabed of low ecological value, and thus the direct impact on the benthic communities are considered to be insignificant.

10.4.2.8 In terms of loss of seawalls, the new reclamation lands will provide some new seawalls, and the net loss of artificial seawalls will be about 1,150 m in length for sloping seawalls and 3,600 m for vertical seawalls. It should be noted that though a length of about 1,300 m of existing breakwaters will be lost during the reclamation works, new breakwaters of about 2,600 m in length will be provided in the new development project and result in an net gain of 1,300m breakwaters. As the majority of the new breakwaters will be of rubble-mount form on both sides, this section of additional breakwaters would not only compensate the loss of the 1,150 m of sloping seawalls, but would also provide additional intertidal habitat of similar type. As the marine water quality in the vicinity is expected to be improved after the complete of the proposed development, the future sloping seawalls and breakwaters would be a better intertidal habitat than the existing sloping seawalls and breakwaters. It is expected that the intertidal habitat would increase both in size and function. The benthic community on existing seawalls and breakwaters, are also subject to the serious pollution conditions in the Approach Channel and Kowloon Bay. Fauna recorded are all common and highly pollutant tolerant species (Maunsell, 1998). Therefore, the direct impact on the intertidal communities is considered to be minor.

10.4.2.9 Beside the direct impact of seabed and artificial seawall losses, reclamation activities may also impact indirectly upon the marine environment through disturbance and loss of sediments during dredging, re-suspension of filling materials from reclamation and land formation activities, site runoff, the off-site disposal of dredged material and the acquisition of marine fill, if required.

10.4.2.10 For the Fully Dredged Option and Minimize Dredged Option, contaminated sediment will be dredged and received *ex-situ* treatment, while the following reclamation works will involve deposition of filling materials. Suspension of sediments and filling materials into the water column may affect fish and other marine life in open waters. Sediments and filling materials will affect the water column in the following principal ways:

- *Increased suspended solid concentrations*: this has the potential to affect the physiology and reproduction of fish and other marine life;
- *Decreased oxygen levels*: this may result from decomposition of organic matter in the sediments or the blocking effect of suspended solid, and will reduce the oxygen available to marine organisms;
- *Re-deposition of suspended solids*: this has the potential to affect marine benthic communities, including corals, and to alter seabed characteristics; and
- *Release of contaminants* (e.g. heavy metals): This occurs mainly during the dredging activities only. Contaminants will be released from the solid and aqueous phase of suspended sediments and can be taken up into the food web.

10.4.2.11 As mentioned in Chapter 5 (Sediment Contamination), under the options where dredging will be required, suitable dredgers with mechanism to minimise sediment loss such as suction

dredge would be used. The sediments together with a certain amount of seawater would be pulled into suction pipe at the point of dredging. The sediment loss rate of a suction dredger would be 6 timer lower than that of a close garb dredger. Such reduction in sediment loss rate could alleviate oxygen depletion caused by decomposition of organic matter in sediments and therefore reduce the impacts on marine life.

10.4.2.12 As no inflow would enter the KTAC from the upstream locations after the diversion of Kai Tak Nullah and Jordan Valley box culvert, water movement inside the KTAC would be much slower when the construction works commence. Suspended particles dispersion and deposition during dredging and filling should be further reduced by the sheltering effects of Kai Tak runway and the breakwaters of Kwun Tong Typhoon Shelter and To Kwa Wan Typhoon Shelter. Based on the mitigated scenario of dredging and filling, new seawalls or rock barriers will be built at an early stage to enclose the reclamation site. The physical presence of the seawalls or barriers could confine the spreading of suspended solid during the filling activities. Silt curtains will also be deployed during the dredging and reclamation works in all locations including KTAC, KTTS, Cha Kwo Ling and Kowloon. The reclamation works will be carried out in a period of about 10 years. This phase-by-phase approach could prevent a sudden increase of suspended particles in a particular time. All these measures contribute to retain the suspended particles inside the work areas and prevent impacts on nearby waterbodies. Results of water quality impact assessment (Chapter 4) showed that, with these mitigation measures in place, the water quality will largely be acceptable with respects to the standard set by EPD (no exceedance of the WQO for SS) and the criteria set by WSD for seawater intakes during the construction stage. Furthermore site runoff would be desilted and re-used on-site where possible. Site runoff would not be discharged into embayed areas.

10.4.2.13 Although the sediments in the reclamation areas were heavily polluted, pre-treatment of the sediment could reduce the potential water quality impacts. As detailed in Chapter 4 (Water Quality Impact), based on the results of the elutriate test, release of heavy metals and metalloid from the sediments during dredging and filling into the water would be in low concentrations. These contaminants are also short-lived in dissolved phase and re-deposit on the sea bottom very quickly. Dispersion of these contaminants away from the working area would only occur when there is a significant water movement which would be prevented by the sheltering effects and silt curtains mentioned above. Therefore there would be no adverse impacts to the nearby aquatic environment in terms of release of heavy metals and metalloid. To minimize the potential impacts due to the release of organic micro-pollutants from the contaminated sediments, the rate of dredging would need to be monitored and controlled.

10.4.2.14 No benthos were found in the outer part of Kwun Tong Typhoon Shelter (Station D) during the current study. The outer Kowloon Bay is similar to the inner part in terms of benthic community structure and diversity. Therefore, no major impact on benthos in adjacent areas is anticipated. If silt curtain and suction dredging are used, impacts upon marine benthos further from the typhoon shelter would be minimal. Therefore, potential impacts on the benthic communities inside the harbour are considered to be minor.

10.4.2.15 As the above measures will reduce the potential for suspended sediments, organic and other contaminants to enter the local marine environment, impacts on benthos and other sessile or mobile organisms would be localised and would be self-correcting after project completion without active restoration efforts. Sensitive receivers in aquatic ecology such as soft corals and gorgonians in Green Island and the Indo-Pacific Hump-backed Dolphin in South Lantau waters would not be impacted. Impacts are thus ranked as minor in nature. Recently some colonies of both hard and soft corals have been found on the western coast of Junk Bay during a few ongoing EIA studies in TKO area. Junk Bay is outside the Assessment Area of the present

study. As shown in Section 4 - Water Quality Impact of this report, the main tidal current (**Drawing Nos. 22936/EN/160** & **22936/EN/161**), which goes through Victoria Harbour, would be the major agent to disperse the contaminants from the project area for this study. The main tidal current generally would not go into Junk Bay, and therefore would only have minor effect on marine water quality there. Results of water quality modeling also show that the marine water quality in Junk Bay would not change significantly even in 2003, i.e. the interim reclamation phase of the SEKD project. The suspended solid concentrations in marine water would be 2 to 5 mg/L in dry season (**Drawing No. 22936/EN/164**) and 5 to 10 mg/L in wet season (**Drawing No. 22936/EN/167**), while the mean depth averaged D.O. would be 6 to 7 mg/L in dry season (**Drawing No. 22936/EN/162**) and 5 to 6 mg/L in wet season (**Drawing No. 22936/EN/165**). The depth average D.O. in 2003 would still fulfill the WQO for Junk Bay WCZ which is only 4 mg/L (EPD 1999b). Based upon the above information, impacts on corals inside Junk Bay from the present project would thus be insignificant.

10.4.2.16 The reclamation will be performed in the most sheltered areas in Victoria Harbour. The sheltered conditions and the continuous input of sewage through the outfalls facilitated the accumulation of pollutants and organic matters in the area. After the implementation of the reclamation, the area will not be available for the settlement of pollutants and organic matters. Furthermore, the sewage outfalls will be relocated to the outer perimeter of the new reclamation area. This makes the entry points of sewage effluents into the sea closer to the main tidal current through the Harbour. Both consequences contribute to a more efficient dilution process of pollutants.

10.4.2.17 After reclamation, the smoothness of the coastline at the Kowloon side would be improved. Restriction to the flow movement and dispersion of pollutants would be reduced. The hydrographical changes from the formed reclamation would have a positive effect on the water quality of Kowloon Bay.

10.4.2.18 The ecological impacts of project construction and operation must be considered in the context of Victoria Harbour and the surrounding environment which were mostly urbanized and had little natural coastline. In the past 20 years or so, these areas have been subject to coastal reclamation; large-scale sewage discharges and increased marine traffic. The core area of Victoria Harbour is not now known to harbour any marine ecological resources of special importance. When considered together with the Tolo Harbour Action Plan and the Green Island Development, the reclamation works are not found to be a major contributor to cumulative impacts upon marine ecology in the vicinity. The disposal of dredged material and the sourcing of marine sand for this project, which may have indirect ecological impact, are out of the scope of the present EIA study.

10.4.3 *Impacts on Terrestrial Ecology*

10.4.3.1 Potential ecological impacts during the construction and operation stages of the revised scheme of SEKD would affect avifauna habitats, e.g. removal of planted grass habitats. Impact causing factors and their potential impacts during construction and operation are evaluated and presented in **Table 10.13**. Evaluation of ecological impacts is based on the criteria described in Annex 8, Table 1 of the *Technical Memorandum on Environmental Impact Assessment Process*.

Table 10.13 Prediction and Evaluation of Potential Ecological Impacts

Potential Impact	Location	Type	Evaluation of Impacts				
			Sensitive Receiver	Size / Abundance	Duration	Reversibility	Magnitude
Habitat Loss from construction	On-site	Direct	-	151.2 ha of Urbanised; 16.5 ha of grass (planted)	Permanent	Irreversible	Low impact
Pollutant from toxic chemicals	On site and off site	Direct and indirect	many species could potentially be affected	a large area could potentially be affected	Potentially long term	Dependent on chemicals involved	Potentially high impact
Human Disturbance from operation	Off-site	Indirect	None directly affected	Not quantified but probably low	Permanent	Reversible	Low impact

10.4.3.2 Site formation of the SEKD will cause a direct impact of the project, loss of all habitats, including 151.2 ha of Urbanised and 16.5 ha of Grass (planted) (**Table 10.13**). Due to the low ecological values of the habitat, potential ecological impacts are considered minor.

10.4.3.3 No sensitive receiver was identified on the SEKD study area. The study area is man-made and concrete, and hence is not the primary habitat for the bird species recorded during the field surveys. Alternative habitats for the species identified of conservation importance are available locally. The impact to these species is therefore considered to be minor.

10.4.3.4 Loss of habitats will cause minimal impact to other bird species that can be found in urban areas (e.g. Black-eared Kite, Kestrel, Spotted Dove, Barn Swallow, White Wagtail, Crested Bulbul, Chinese Bulbul, Magpie Robin, Common Tailorbird, Magpie, Jungle Crow, Black-necked Starling, Crested Myna and Tree Sparrow). It is expected these species will be able to inhabit the redeveloped area.

10.4.3.5 Bird species favouring grassy habitats (e.g. Richard's Pipit and White Wagtail) may experience loss of habitat. However, these bird species are primarily inhabitants of lowland cultivation. Alternative habitats are found in the northern New Territories and the Deep Bay area, where most records of these species were made. Impact to these bird species is therefore ranked as minor.

10.4.3.6 Egrets and herons may experience loss of feeding and roosting habitats due to the reclamation (see Sections 10.3.2.16 – 10.3.2.17 and 10.3.2.26 – 10.3.2.28 for results of bird surveys). However, the Kai Tak Approach Channel and the Kwun Tong Typhoon Shelter are not considered to be important foraging habitats for ardeids due to the poor water quality (see Section 4.2). Herons and egrets were only attracted by refuse from sewer outfalls. Alternative feeding and roosting habitats (other artificial coastline) are available near the site. In addition, more extensive feeding habitats are available in the northern New Territories and the Deep Bay area (e.g., fish ponds). Impact to ardeids is therefore ranked as minor.

10.4.3.7 Other terrestrial fauna recorded are of low ecological value. The fauna recorded during field surveys are low in abundance, disturbance tolerant and adapted to urban areas. These species will not be significantly affected by the project. Impact to these fauna is ranked as minor.

10.4.3.8 Indirect impacts include human disturbance to surrounding habitats during operational phase. Due to the highly urbanised nature of the surrounding environment, potential ecological impacts are considered minor.

10.4.3.9 Due to the former land use, pollutants released from toxic chemicals at the North Apron during site formation may cause direct or indirect impact to surrounding habitats and associated wildlife. However, due to paucity of wildlife, decontamination of the area is underway, and safety measures to be implemented during site formation, potential ecological impacts are considered minor.