

14 ECOLOGICAL IMPACT

14.1 Introduction

14.1.1 This section identifies and evaluates the nature and extent of potential impacts on terrestrial and marine ecological resources in the Assessment Areas resulting from all land-based and marine works proposed under the Kai Tak Development, hereinafter referred to as “the Project”. Several relevant baseline studies and assessment reports were reviewed and both direct and indirect impacts on terrestrial and marine ecological resources during construction and operation phases were included in the assessment.

14.1.2 The Assessment Area for the purpose of terrestrial ecological impact assessment includes all areas within 500 m from site boundaries of the Project area for all land based works. Assessment Area for marine ecological impact assessment includes all areas within and 300m beyond the Project area boundaries, plus the Victoria Harbour, the Eastern Buffer and the Western Buffer Water Control Zones (WCZs).

14.1.3 Where necessary, field surveys were undertaken in the Assessment Area to update the current knowledge on ecological baseline conditions. Ecological importance of habitats and species potentially affected by the proposed works were identified and assessed. The scale and significance of potential ecological impacts resulting from the Project was evaluated, and necessary mitigation measures are recommended. Residual and cumulative ecological impacts were also identified and evaluated, and ecological monitoring and audit requirements discussed.

14.2 Environmental Legislation, Policies, Plans, Standards and Criteria

14.2.1 This assessment made reference to the following HKSAR Government ordinances, regulations, standards, guidelines and documents when identifying ecological importance of habitats and species, evaluating and assessing potential impacts of the Project on the ecological resources:

- Environmental Impact Assessment Ordinance (EIAO) (Cap. 499) - aims to avoid, minimise and control the adverse effects on the environment by designated projects through the application of the environmental impact assessment process and the environmental permit system.
- EIAO Technical Memorandum on EIA Process (EIAO-TM) Annex 8 – provides guidelines for the evaluation of the ecological impact caused by the designated project. A list of criteria is provided for assessing the importance of habitat / species and the ecological impact.
- EIAO-TM Annex 16 – describes the general approach and methodology for assessment of ecological impacts arising from a project or proposal, to allow a complete and objective identification, prediction and evaluation of the potential ecological impacts.
- EIAO Guidance Note No. 3/2002 - provides guiding principles on the approach to assess the recommended environmental mitigation measures in EIA reports.
- EIAO Guidance Note No. 6/2002 - clarifies the requirements of ecological assessments under the EIAO.
- EIAO Guidance Note No. 7/2002 - provides general guidelines for conducting ecological baseline surveys in order to fulfil requirements stipulated in the EIAO-TM.
- EIAO Guidance Note No. 11/2004 - introduces general methodologies for conducting marine ecological baseline surveys.

- Wild Animals Protection Ordinance (Cap. 170) - designated wild animals are protected from being hunted, whilst their nests and eggs are protected from injury, destruction and removal. All birds and most mammals, including marine cetaceans, are protected under this Ordinance. The Second Schedule of the Ordinance, which lists all the animals protected, was last revised in June 1997.
- Protection of Endangered Species of Animals and Plants Ordinance (Cap. 586) – to give effect to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (CITES), the Ordinance strictly regulates the import, introduction from the sea, export, re-export and possession or control of certain endangered species of animals and plants and derivatives of those species scheduled in Appendices I, II and III. The Ordinance came into effect on 1 December 2006.
- Town Planning Ordinance (Cap.131) - provides for the designation of coastal protection areas, Sites of Special Scientific Interest (SSSIs), Conservation Area, Country Park, Green Belt or other specified uses that promote conservation or protection of the environment.
- The Marine Parks Ordinance (Cap.476) and Subsidiary Legislation - allows for designation, control and management of marine parks and marine reserves through regulation of activities therein to protect, conserve and enhance the marine environment for the purpose of nature conservation, education, scientific research and recreation. The Ordinance came into effect on 1 June 1995.
- The Country Parks Ordinance (Cap. 208) - provides for the designation and management of country parks and special areas. Country parks are designated for the purpose of nature conservation, countryside recreation and outdoor education. Special Areas are created mainly for the purpose of nature conservation.
- The Forests and Countryside Ordinance (Cap. 96) - prohibits felling, cutting, burning or destroying of trees and growing plants in forests and plantations on Government land. Related subsidiary Regulations prohibit the selling or possession of listed restricted and protected plant species. The list of protected species in Hong Kong which comes under the Forestry Regulations was last amended on 11 June 1993 under the *Forestry (Amendment) Regulation 1993* made under *Section 3* of the *Forests and Countryside Ordinance*.
- The Marine Fish Culture Ordinance (Cap.353) - regulates and protects marine fish culture by designating areas of fish culture zone, granting license, prohibiting unauthorized vessels and any deposition of chemicals or other substance which are likely to cause injury to fish in a fish culture zone. The list of designated fish culture zones was last revised in January 2000.
- The Protection of the Harbour Ordinance (Cap.531) – bases on a presumption against reclamation, the harbour is to be protected and preserved as a special public asset and a natural heritage of Hong Kong people.
- The Water Pollution Control Ordinance (Cap.358) – aims to control water pollution in the waters of Hong Kong. Water control zones are designated with individual water quality objectives to promote the conservation and best use of those waters in the public interest. The most updated water quality objectives for the Victoria Harbour Water Control Zone were revised in June 1997.

14.2.2 This assessment also made reference to the following international conventions and nearby national regulation:

- International Union for Conservation of Nature and Natural Resources (IUCN) 2006 Red Data Books - provides taxonomic, conservation status and distribution information on threatened species that have been evaluated using the IUCN Red List Categories and Criteria. This system is designed to determine the relative risk of extinction, and the main purpose of the IUCN Red List is to catalogue and highlight those taxa that are facing a higher risk of global extinction.
- The PRC National Protection Lists of Important Wild Animals and Plants - lists detailed Category I and Category II key protected animal and plant species under Mainland Chinese Legislation. The list was last updated in November 2002.

14.3 Assessment Methodology

Assessment Area

14.3.1 As required in the EIA Study Brief, the Assessment Area for the purpose of terrestrial ecological impact assessment includes all areas within 500 m from site boundaries of the Project area for all proposed land based works, whilst Assessment Area for marine ecological impact assessment includes all areas within and 300m beyond the Project area boundaries, plus the Victoria Harbour, the Eastern Buffer and the Western Buffer WCZs.

14.3.2 The terrestrial physical environment within the Assessment Area is predominantly the former Kai Tak Airport which currently consists of mostly construction sites at the North Apron and South Apron as well as most of the runway area. An abandoned golf facility also exists at the southern tip of the runway that is vegetated as a result of previous landscaping works when the golf facility was in operation. The former Kai Tak Airport is surrounded by highly urbanised areas with mostly residential / industrial buildings and frequent traffic roads / highways at To Kwa Wan, San Po Kong, Choi Hung, Kowloon Bay and Kwun Tong as well as some temporary car parking areas in the former airport. The boundaries of the Project area and Assessment Area for terrestrial ecological impact assessment are indicated in **Figure 14.1a**.

14.3.3 The marine environment of the Project area comprises the Kowloon Bay at the Victoria Harbour, Kai Tak Approach Channel (KTAC) and two typhoon shelters at To Kwa Wan (TKWTS) and Kwun Tong (KTTS).

Literature Review

14.3.4 The assessment of ecological impact on terrestrial and marine ecology within the Assessment Areas was undertaken with reference to previous baseline surveys and EIA studies, Government and private sector reports, independent and Government published literature, Agriculture, Fisheries and Conservation Department (AFCD) publications and academic studies. These included the following:

- Agreement No. CE 32/99, Comprehensive Feasibility Study for the Revised Scheme of South East Kowloon Development (SEKDCFS EIA Report)
- Agreement No. CE 42/2001, Environmental and Engineering Feasibility Assessment Studies in Relation to the Way Forward of the Harbour Area Treatment Scheme – Water Quality, Ecological and Fisheries Impact Assessment (HATS EEFS Report)
- Agreement No. CE 87/2001, Further Development of Tseung Kwan O – Feasibility Study (TKOFS EIA)

- Agreement No. 54/2001, Wanchai Development Phase II and Central-Wanchai Bypass Environmental Impact Assessment (WDII & CWB EIA)
- Central Reclamation Phase III Studies - Site Investigation, Design and Construction. Comprehensive Feasibility Study for Minimum Option: Final Key Issues and Initial Environmental Impact Assessment Report (CRIII EIA Report)
- Agreement No. CE 25/2002, Drainage Improvement in Northern Hong Kong Island – Hong Kong West Drainage Tunnel Environmental Impact Assessment Final Report
- Agreement No. CE 52/95, Strategic Sewage Disposal Scheme Environmental Impact Assessment Study (SSDS EIA study)
- Agreement No. CE 74/98, Wanchai Development Phase II Comprehensive Feasibility Study (WDII EIA Report)
- CityU Professional Services (2002) Consultancy Study on Marine Benthic Communities in Hong Kong. Final Summer Field Survey Report
- AFCD (2005) Monitoring of Finless Porpoises (*Neophocaena phocaenoides*) in Hong Kong Waters 2003-2005
- AFCD (2006) Monitoring of Chinese White Dolphins (*Sousa chinensis*) in Hong Kong Waters – Data Collection
- AFCD Port Survey 2001-2002
- EPD Marine Water Quality in Hong Kong 1986-2005

Ecological Surveys

14.3.5 As stipulated in Clause 3.2.2 (xii) and 3.4.14.4(iii) of the EIA Study Brief, field surveys on terrestrial and marine ecology were carried out from February 2007 to May 2007 in order to verify the information collected from literature review, fill in the information gaps and fulfill the objectives of the EIA study. Details of the field surveys are discussed below:

Terrestrial Ecology

14.3.6 After review of the above literatures, the existing baseline information gathered from previous literatures is considered sufficient to carry out a detailed impact assessment as there have been no substantial changes to the physical environment within the Assessment Area since the completion of the SEKDCFS EIA. However reconnaissance surveys were carried out in February and May 2007 to verify the findings of the literature review.

14.3.7 Reconnaissance surveys on habitat types, vegetation, avifauna, insect (butterfly and dragonfly), herpetofauna (reptile and amphibian) and mammal covering the whole Assessment Area were carried out in order to verify the previous literatures. Terrestrial habitats within the Assessment Area were identified and each habitat type was surveyed by active searching and all flora and fauna species and their relative abundance at each habitat type were recorded by direct observation and/or hearing. All species of conservation importance recorded during the surveys were also located and mapped.

Marine Ecology

14.3.8 Field surveys are considered necessary to supplement and check the validity of data collected through the literature review process. The field surveys undertaken under this assessment included:

- Intertidal and dive surveys within the vicinity of proposed dredging areas and in other impact areas was conducted in April 2007. The survey included spot-check reconnaissance dives on selected representative line transects and Rapid Ecological Assessment (REA) (DeVantier et al., 1998) at selected transects where presence of corals was located during the spot-check dives.
- Benthos survey on seabed within the proposed dredging areas contained in this Project was carried out in March 2007 by grab sampling method. Five replicates of grab samples over a 0.1m² area seabed substrate were collected using a van Veen grab and samples were sieved through 0.5 mm sieves. Collected organisms were then counted and identified to the lowest practicable taxon as possible. Species diversity H' and evenness J were calculated for pooled data, using the formulae:

$$H' = -\sum (N_i / N) \ln (N_i / N); \text{ and}$$

$$J = H' / \ln S$$

where S is the total number of species in the sample, N is the total number of individuals, and N_i is the number of individuals of the ith species.

- Intertidal communities surveys on artificial intertidal habitats that would be directly impacted were conducted in February, March and May 2007 using line transects where possible, with one transect deployed on the seawall, starting from the high water mark down to low water mark. Along each transect, standard ecological sampling quadrat was laid at 1 m intervals (or other suitable quadrat dimension and interval distance depend on the field situation). Intertidal fauna and flora were identified and enumerated. Fauna / flora species and relative abundance / coverage were recorded and identified according to Williams (2003).

Impact Assessment Methodology

- 14.3.9 Evaluation and assessment of potential impact on ecological resources was conducted in accordance with the criteria and guidelines specified in Annex 8 and Annex 16, respectively, of the EIAO-TM.
- 14.3.10 The significance of impacts was ranked as “low”, “moderate” or “high”. The description of the ranking is as below:
- Low - Impacts to species or groups are assessed as “low” if the predicted impact would result in a slight, and / or short-term reduction in the local population numbers or geographic distribution of a species or group, but the species or group is predicted to recover from the perturbation with no-long term adverse impacts. Impacts to habitat are assessed as “low” when the habitat is widely distributed locally and that no rare or restricted species are found in the habitat.
 - Moderate – Impacts to species or groups are considered “moderate” if the predicted impact probably would result in non-recoverable and / or long-term reduction in population numbers. However, the species in question should be considered widely distributed or common, and abundant on a local, regional or global scale. Impacts to habitat are assessed as “moderate” if the habitat is of limited local or regional distribution or declining in extent and that the habitat has a potential of supporting rare or restricted flora and / or fauna.
 - High – Impacts to species or groups are judged to be “high” if the predicted impact has an adverse effect on species or groups which are rare, protected or of conservation importance locally, regionally, or globally. Impacts to habitat are considered to be “high” if the habitat in question is of limited local or regional distribution or declining in extent and that it contains rare, protected or conservation importance species or generally considered by the scientific community to be of local, regional or global importance to the support of rare or restricted flora and/or fauna species.

- 14.3.11 If impacts on ecological resources are found to be significant (that is, moderate or high), mitigation measures would be recommended in accordance with the EIAO-TM Annex 16 and EIAO Guidance Note No. 3/2002. Impact mitigation would be sought in the following priority: avoidance, minimization, on-site compensation and off-site compensation.
- 14.3.12 Impact avoidance generally consists of modifications to the preferred development options, but may in some extreme cases require abandonment of the project.
- 14.3.13 Impact minimization includes any means of reducing the scope or severity of a given impact, for example, through timing of construction programme, modification in the design or ecological restoration of disturbed areas following the completion of works.
- 14.3.14 Impact compensation would be recommended if the effect on a given species or habitat is irreversible and attempts would be made to compensate it elsewhere, for example, enhancement, creation of suitable habitats or recreation of the habitat. Compensation could be on-site or off-site.

14.4 Description of the Environment

Area of Conservation Importance

- 14.4.1 There are no ecological sensitive receivers, such as SSSIs, Country Park, Marine Parks / Reserves, Conservation Area, Fish Culture Zones or other areas of conservation importance, in both Assessment Areas for terrestrial and marine ecological impact assessments.

Terrestrial Environment

- 14.4.2 The terrestrial physical environment of the Assessment Area includes mostly the former Kai Tak Airport and highly developed urban land at its surrounding vicinity. The Kai Tak Airport consists of the North and South Apron as well as runway area. Presently, majority of the infrastructures made up the former Kai Tak Airport have been decommissioned and demolished and the vacant land is now predominantly the construction sites. All these areas are predominantly concreted but there are some vegetative patches fringing the runway and apron areas. At the southern tip of the runway there is a vegetated area that was previously a golfing facility. Some periphery areas of the Kai Tak Airport and its vicinity are entirely the highly developed urban land with some amenity plantings along roadsides and in some residential estates.

Habitat / Vegetation

- 14.4.3 In total, five types of terrestrial habitats were identified within the Assessment Area, including the wasteland, developed area, plantation/grassland mosaic, watercourse and artificial coastline. The locations of each habitat type and species of conservation importance recorded during the recent surveys are shown in **Figure 14.1b**. Representative photographs of each identified habitat type and a list of floral species recorded in recent surveys are given in **Appendix 14.1** and **Appendix 14.2**, respectively. **Table 14.1** lists out the size of each habitat type within the Assessment Area.

Table 14.1 Size of Terrestrial Habitat Type within the Assessment Area

Habitat Type	Size
Developed Area	614.8 ha
Wasteland	202.7 ha
Plantation/grassland mosaic	15.8 ha
Watercourse	1.5 km
Artificial coastline	15.7 km

- 14.4.4 A broad bush tree survey undertaken by the Landscape and Visual Impact Assessment Section of this EIA study estimated that there were more than 6000 individuals of tree located within the Assessment Area. All of them were common and widespread tree species and are considered of very low ecological value. An Old and Valuable Tree (OVT) and two Champion Trees were located in the Assessment Area but they were outside the boundary of Project area and would not be directly affected. Details of the broad bush tree survey findings are presented in S13.6.9, S13.9.16, S13.10.3 and Table 13.3 & 13.5.

Wasteland

- 14.4.5 The wasteland area identified within the Assessment Area covers approximately 202.7 ha area and comprises mainly the construction sites and vacant lands found at the North and South Apron as well as most of the runway areas of the former Kai Tak Airport. There were totally 46 floral species recorded within this habitat type and the majority of vegetation recorded was ruderal species such as *Bidens alba* and *Lantana camara*, that are common and widespread in the Hong Kong. Other grasses, including *Neyraudia reynaudiana*, *Rhynchelytrum repen*, *Panicum maximum*, *Kyllinga aromatica* and *Chloris barbata*, and herb species, *Ageratum conyzoides* and *Wedelia trilobata* as well as climber *Passiflora foetida* were also commonly found in the wasteland habitat.

- 14.4.6 There were more than 1000 individual trees scattering throughout the wasteland habitat. Predominant species were exotic trees / shrubs and included *Leucaena leucocephala*, *Albizia lebeck* and *Casuarina equisetifolia*. Other exotic species including *Acacia auriculiformis*, *Acacia confusa*, *Aleurites moluccana*, *Archontophoenix alexandrae*, *Caryota ochlandra*, *Cassia siamea*, *Delonix regia*, *Phoenix roebelenii* and some common native species such as *Celtis sinensis*, *Ficus microcarpa*, *Ficus virens*, *Hibiscus tiliaceus*, *Macaranga tanarius*, *Bauhinia blakeana* and *Livistonia chinensis* were also found in this habitat. No rare or protected species were recorded within the wasteland habitat during the recent surveys.

Developed Area

- 14.4.7 A total of 614.8 ha developed area was identified within the Assessment Area, included wholly the urban land with residential / industrial buildings and frequent traffic road / highway found at the vicinity of the former Kai Tak Airport as well as some temporary parking areas at the periphery of the former airport. Trees and vegetation were found mainly in amenity planting areas along roadsides and within sitting out areas and parks in some estates. More than 4500 trees were located in this habitat type and the most commonly recorded species included *Aleurites moluccana*, *Bauhinia blakeana*, *Bombax ceiba*, *Ficus microcarpa*, *Melaleuca quinquenervia*, *Delonix regia*, *Casuarina equisetifolia* and *Acacia confusa*. All the recorded species are common and widespread throughout Hong Kong. No rare or protected species were recorded.

Plantation/grassland mosaic

- 14.4.8 Small area (15.8 ha) of plantation/grassland mosaic habitat that was an abandoned golf facility with dense vegetative planting were located at the southern tip of the former airport runway. In total, there were 36 floral species recorded within this habitat and most of them were common and exotic plantings. About 350 trees were located in this habitat but they were mostly relatively young with trunk diameter less than 200mm. Amenity plantations including *Ficus benjamina*, *Hibiscus tiliaceus*, *Hibiscus rosa-sinensis* and *Rhododendron* spp. were the most dominant tree and shrub species found in this habitat and other common tree/shrub species such as *Leucaena leucocephala*, *Casuarina equisetifolia*, *Chrysalidocarpus lutescens*, *Eucalyptus citriodor*, *Ficus microcarpa*, and *Macaranga tanarius* were also recorded. Scattered grassy area with common grasses such as *Chloris barbata* and *Rhynchelytrum repen* as well as weed species such as *Bidens alba*, *Lantana camara* and *Mikania micrantha* were also found within this habitat. All the recorded species are common and widespread in Hong Kong with low ecological importance.

Watercourse

- 14.4.9 The watercourse identified within the Assessment Area only included the Kai Tak Nullah, which is an artificial concrete-lined channel of about 1.5 km long for drainage purpose and located at the North Apron of the former Kai Tak Airport. Very limited riparian vegetation of only 13 plant species were recorded from this habitat. Individual trees/shrubs such as *Leucaena leucocephala* and *Albizia lebbek* were found in this habitat whilst some common herb and grass species, including *Bidens alba*, *Chloris barbata*, *Kyllinga aromatica*, *Lantana camara*, *Solanum nigrum*, *Neyraudia reynaudiana* and *Rhynchelytrum repen* were also occasionally found. No rare or protected species was recorded from this habitat during recent surveys.

Artificial coastline

- 14.4.10 Totally 15.7 km long artificial coastline made up of mainly man-made rock / boulder slopes and vertical seawall as well as breakwaters were found along the runway area of the former Kai Tak Airport, the Kai Tak Approach Channel (KTAC) and at the To Kwa Wan Typhoon Shelter and Kwun Tong Typhoon Shelter. Only scarce and scattered tree / shrub individuals of common species such as *Ficus microcarpa*, *Ficus virens*, *Hibiscus tiliaceus* and *Leucaena leucocephala* were recorded from this habitat. No rare or protected species was found.

Fauna

Review of SEKDCFS EIA

- 14.4.11 The previous SEKDCFS EIA Report (Arup, 2001) conducted and reported the terrestrial fauna surveys at the former Kai Tak Airport. Avifauna surveys were carried out on the North Apron and runway areas between February and April in 2000. Bird roosting and foraging activities were also observed along the artificial coastline in the typhoon shelters and the KTAC. Total number of birds seen at each location was counted by species and recorded. All non-avian fauna with potential conservation significance (e.g. mammals, reptiles and amphibians, butterflies and dragonflies) recorded incidental to bird sampling were also counted and identified to species. A summary of the findings under the SEKDCFS EIA Report is presented below.
- 14.4.12 At the North Apron, Richard's Pipit *Anthus richardi* (24.4% of total birds), Tree Sparrow (24.4%) and Fantail Warbler, *Cisticola juncidis* (22%) were the three most abundant bird species, with similar degree of dominance. Kestrel, *Falco tinnunculus* (3%) was the only species of conservation importance among those recorded in the North Apron area.
- 14.4.13 At the runway area, 14 species were recorded during the field surveys. No sign of breeding was observed. Black Kite, *Milvus migrans*, a species of conservation importance, was the most dominant species (49.6% of total birds), followed by Fantail Warblers (39.2%) but Richard's Pipit, *Anthus richardi* and Crested Myna, *Acridotheres cristatellus* were also abundant. Also recorded and considered of conservation importance was Kestrel (2.2%).
- 14.4.14 At the artificial coastline surrounding the former Kai Tak Airport including the KTAC, a number of waterbird species were recorded roosting and foraging including some of conservation importance. Little Egret (*Egretta garzetta*) was the most abundant species (80.1% of total birds) while other ardeids such as Great Egret (*Ardea alba*), Intermediate Egret (*Egretta intermedia*), Cattle Egret (*Bubulcus ibis*), Grey Heron (*Ardea cinerea*) and Chinese Pond Heron (*Ardeola bacchus*) were also found in these areas.
- 14.4.15 No sighting of reptiles, amphibians or mammals was made on either the runway or the North Apron area during the surveys. Breeding habitats of amphibians were also not observed and nor were burrows of mammal species.

- 14.4.16 No sighting of reptiles was made on the North Apron area but Red-eared Slider, *Trachemys scripta* and Chinese Skink, *Eumeces chinensis* was recorded in the runway area. 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.).
- 14.4.17 One dragonfly and one butterfly species was recorded on the runway area and North Apron area. These were the Wandering Glider, *Pantala flavescens* and the Red-based Jezebel, *Delias pasithoe*, respectively. The Wandering Glider is the commonest dragonfly in Hong Kong and can be found in many types of habitats (Wilson 1995).

Findings of recent surveys

- 14.4.18 The baseline information gathered from the previous SEKDCFS EIA is considered sufficient to carry out a detailed impact assessment. As all the recorded species of conservation importance, previously reported in the SEKDCFS EIA are well known to be common and widespread in the Hong Kong, and there was no substantial changes to the physical environment of the Assessment Area since the completion of the SEKDCFS EIA, reconnaissance surveys were considered sufficient to verify the findings of the literature review. Surveys were carried out in February and May 2007 to cover each terrestrial habitats identified within the Assessment Area, including wasteland, plantation/grassland mosaic, watercourse, developed area and artificial coastline with particular attention paid to presence of waterbirds and any uses of habitats (e.g. roosting and foraging) within the Assessment Area. **Appendices 14.3a-c** and **14.4a-c** present the full list of fauna recorded in the February and May surveys, respectively.

Avifauna

- 14.4.19 In total, 36 bird species and 535 individuals were recorded from the Assessment Area during the February and May surveys. Generally, the species richness of bird was low in the Assessment Area but moderate abundance, especially at artificial coastline habitat in February survey, was recorded during the recent surveys.
- 14.4.20 In February 2007 the highest abundance of birds (177 individuals) was recorded at the artificial coastline habitat with 12 species observed. The dominant species were Great Cormorant (28%), Little Egret (21%) and Crested Myna (16%). The Great Egret and Grey Heron were also both present in relatively high numbers (11% each). Among the recorded species, Little Egret, Great Egret, Grey Heron, Black-crowned Night Heron, Chinese Pond Heron, Great Cormorant and Black Kite are considered of having conservation importance.
- 14.4.21 In the wasteland area, eight species of bird and 82 individuals were recorded in February 2007. All species recorded are common and wide spread in Hong Kong including the dominant species, Black Kite, a species of conservation importance, which accounted for 82% of individuals recorded. One individual of Grey Heron, a species of conservation importance, was also recorded.
- 14.4.22 The habitat supporting the most diverse assemblage of birds was the plantation/grassland mosaic where 58 individuals and 16 species were recorded in the February survey. Again the Black Kite was the dominant species (25%), but White Wagtail (19%), Richards Pipit (14%) and Chinese Bulbul (9%) were relatively abundant. Only Little Egret and Black Kite are considered of conservation importance among bird species recorded from this habitat.
- 14.4.23 In May 2007 the highest abundance of birds (96 individuals) was recorded at the plantation/grassland mosaic habitat with 20 species observed. This area again supported the most diverse assemblage of species. The dominant species was the Scaly-breasted Myna (21%) and Cattle Egret (14%). Species of conservation importance, Little Egret, Cattle Egret and Black Kite were also observed.

- 14.4.24 In the wasteland area, 14 species of bird and 29 individuals were recorded in May 2007. All species recorded are common and wide spread in Hong Kong. The dominant species, Black Kite, is considered of conservation importance and accounted for 32% of individuals recorded. In addition, one individual each of Chinese Pond Heron and Greater Coucal, species of conservation importance, were also recorded.
- 14.4.25 Ninety-three individuals and nine species of bird were recorded at the artificial coastline within the Assessment Area in May 2007. The dominant species was Little Egret (70%) and Black Kite (12%). Both these species are considered of conservation importance. Also recorded waterbirds included Great Egret, Cattle Egret, Chinese Pond Heron and Black-crowned Night Heron which are all considered of conservation importance.
- 14.4.26 The species of conservation importance, Kestrel and Intermediate Egret, recorded in previous surveys carried out under the SEKDCFS EIA were not recorded during recent surveys in both February and May 2007.
- 14.4.27 All wild birds (including nests) are protected under the Wild Animals Protection Ordinance (Cap. 170). There were totally nine bird species of conservation importance recorded during recent surveys. The distribution and conservation status of those birds of conservation importance recorded in the recent surveys are described in detail below.
- 14.4.28 Black 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).
- 14.4.29 Little Egret is a common ardeid which is widely distributed in the coastal waters throughout Hong Kong, but it is considered to be a species of conservation importance regionally due to its restricted site of breeding and roosting (Fellowes *et al.*, 2002).
- 14.4.30 Great Egret is a common resident and winter visitor in Hong Kong, but this species is considered to be of conservation importance regionally due to its restricted breeding and roosting area (Fellowes *et al.*, 2002).
- 14.4.31 Cattle Egret occurs commonly in Hong Kong and its roosting site is mostly confined to the local wetland habitats. Although good numbers are still recorded, the reduction of wetland habitats and abandonment of the use of buffaloes is causing a local decline (Viney *et al.*, 2005).
- 14.4.32 Black-crowned Night Heron is considered to have local conservation importance due to its restricted breeding and roosting sites in Hong Kong (Fellowes *et al.*, 2002).
- 14.4.33 Chinese Pond Heron is considered of conservation importance due to its locally declining populations. Despite the reduced numbers of this species in Hong Kong, the local population is still large enough to be of regional significance (Carey *et al.*, 2001).
- 14.4.34 The large, fair secure populations of Grey Heron that occur in Hong Kong as mostly winter visitor are considered potentially important in a regional context (Fellowes *et al.*, 2002).
- 14.4.35 Great Cormorant is abundant winter visitor in Hong Kong and Deep Bay holds one of the largest wintering populations in Asia (~6.8% of the regional population) (Carey *et al.*, 2001). It is considered to be of potential conservation importance in regional context by Fellowes *et al.* (2002).
- 14.4.36 Although locally common and widespread, populations of Greater Coucal in mainland China have been decreased drastically in recent years as a result of overhunting for its high value in traditional medicine. It is listed as 'Vulnerable' in the China Red Data Book and also a national Category II protected animal in China.

Other terrestrial fauna

- 14.4.37 Other terrestrial fauna recorded during surveys in February and May 2007 included dragonflies, damselflies and butterflies. All species recorded are common and widespread in Hong Kong.
- 14.4.38 In February 2007, four species of butterfly and 17 individuals were recorded. The most abundant species was the Indian Cabbage White (*Pieris canidia*) but also present were the Red-base Jezebel (*Delias pasithoe*), Pale Grass Blue (*Zizeeria maha*) and Glassy Tiger (*Parantica aglea*).
- 14.4.39 In May 2007, only two individual butterflies were recorded. One was the Common Grass Yellow (*Eurema hecabe*) and the other was the Glassy Tiger (*Parantica aglea*).
- 14.4.40 Dragonflies and Damselflies recorded in both February and May 2007 were the Common Red Skimmer (*Orthetrum pruinosum*), Lesser Blue Skimmer (*Orthetrum Triangulare*), Russet Percher (*Neurothemis fulvia*) and Yellow Featherlegs (*Copera marginipes*), Orange-tailed Midget (*Agriocnemis femina*), Black Threadtail (*Prodasineura autumnalis*), respectively.
- 14.4.41 No sighting of reptiles, amphibians or mammals was made during field surveys in February and May 2007. Signs of reptile breeding or breeding habitats of amphibians were not observed and nor were burrows of mammal species.

Marine Environment

- 14.4.42 The marine environment in the Project area is composed of the marine water of Kowloon Bay and eastern Victoria Harbour, two typhoon shelters at To Kwa Wan (TKWTS) and Kwun Tong (KTTS), as well as Kai Tak Approach Channel (KTAC). Representative photographs of marine environment within the Project area are presented in **Appendix 14.5. Figure 14.2** indicates the locations of ecological surveys conducted within the Project area under previous literatures and also under the present EIA study.
- 14.4.43 Dive surveys have been conducted to provide updated information on marine ecological resources in the area that would be directly affected by marine works and far field ecological sensitive receivers have also been identified. These potential off-site ecological sensitive receivers include coral areas located at Green Island and Little Green Island (over 10 km), Junk Bay (6 km) and Tung Lung Chau (8 km), Fish Culture Zone at Tung Lung Chau (8 km) and Ma Wan (over 10 km).

Abiotic

Water

- 14.4.44 Under the Water Pollution Control Ordinance (Cap. 358), the marine water within the Project area is within the gazetted Victoria Harbour WCZ. Due to the direct discharge of wastewater after simple screening into the harbour area before the 1990s, water quality in the Victoria Harbour was known as poor with high nutrient and sewage bacteria.
- 14.4.45 However, after the commissioning of the Stonecutters Island Sewage Treatment Works (SCISTW) in 2002 under Stage 1 of the Harbour Area Treatment Scheme (HATS), water quality has improved significantly, especially in the Eastern Harbour area. According to EPD's water quality monitoring in 2005, marine water in the Project area (Station VM1 and VM2) is now less turbid (suspended solid 0.9-10.8 mg/L), more oxygenated (dissolved oxygen 4.2-6.9 mg/L), and lower in inorganic nutrients (total nitrogen 0.22-0.63 mg/L and total phosphorus 0.02-0.06 mg/L) over the last 20 years (EPD, 2006).

- 14.4.46 However, the levels of faecal contamination were generally high in the Harbour area, though the Eastern Harbour (VM1 & VM2) resulted in lower levels of *E. coli* (88-31000 cfu per 100 mL) and faecal coliforms (300-50000 cfu per 100 mL) compared with the Central and Western Harbour areas (EPD, 2006).
- 14.4.47 According to EPD's water quality monitoring results, water quality within the To Kwa Wan Typhoon Shelter (TKWTS) (VT11) was similar to the Harbour area in term of water clearance (suspended solid 1.3-7.3 mg/L), oxygenation (dissolved oxygen 3.7-8.0 mg/L), nutrient level (total nitrogen 0.51-0.58 mg/L and total phosphorous 0.04-0.09 mg/L) and faecal contamination (*E. coli* 150-2800 cfu per 100 ml and faecal coliforms 880-7200 cfu per 100ml).
- 14.4.48 In contrast, water quality within the Kwun Tong Typhoon Shelter (KTTS) (VT4) was more eutrophic (total nitrogen 0.84-1.73 mg/L and total phosphorus 0.13-0.37 mg/L) and less oxygenated (dissolved oxygen 2.9-6.7 mg/L), though water turbidity (suspended solid 1.3-3.9 mg/L) and level of faecal contamination (*E. coli* 1500-26000 cfu per 100 ml and faecal coliforms 3200-50000 cpu per 100ml) were more or less the same as the Harbour area (EPD, 2006).
- 14.4.49 As KTTS is located at the immediate downstream of Kai Tak Approach Channel (KTAC), the poor water quality at KTTS was mainly due to the poor water circulation and pollution discharges from the upstream Kai Tak Nullah and other storm culverts.
- 14.4.50 In general, water quality in the Harbour area has been improved recently but the Victoria Harbour provides a relatively poor marine habitat compared to eastern and southern waters in Hong Kong.

Sediment

- 14.4.51 The seabed in the Harbour area is mainly composed of soft bottom sediment with coarse particle size. The marine sediment in the Victoria Harbour (VS3), according to EPD sediment monitoring results, is highly anaerobic (electrochemical potential -421mV to -213 mV) due to high organic loading from sewage discharges over the years. The sediment is toxic with high level of total sulphide (200-590 mg/kg). The sediment is classified as Category M or H, as defined in the ETWB Technical Circular (Works) No. 34/2002, as it is also highly contaminated with copper (27-190 mg/kg) and silver (1.0-5.6 mg/kg) which exceed the Lower Chemical Exceedance Level (LCEL) or Upper Chemical Exceedance Level (UCEL) (EPD, 2006).
- 14.4.52 Numerous sediment toxicity studies have been conducted in the Victoria Harbour and the sediment within the Harbour area was usually determined as polluted in nature by ecotoxicity testing using single species or indicator groups (e.g. barnacles, Chan et al., 1990; Rainbow and Smith, 1992; Blackmore, 1999; fish, Kwan, 1999 and mussel, Nicholson, 1999).
- 14.4.53 A recent sediment toxicity test was carried out under the HATS EEFS Study and sediments collected from the Victoria Harbour (Station XN4 and VM7) were highly toxic to benthic amphipod *Leptocheirus plumulosus*, resulting in very low survivorship of 9-31% only (CDM, 2004).
- 14.4.54 Sediment contamination within TKWTS, KTTS and KTAC was one of the most serious in Hong Kong marine waters. According to EPD sediment monitoring results, sediments collected from both typhoon shelters were also highly contaminated with various types of heavy metals and organic pollutants which largely exceeded the UCEL. In addition, chemical analysis of sediments collected from KTAC, undertaken for the SEKDCFS EIA Study, showed that levels of heavy metals and/or organic contaminants were higher than even 10 times of the LCEL (Arup, 2001).

Biotic

14.4.55 The Project area comprises several broad marine habitats including:

- Benthic habitat on soft bottom substratum at Kowloon Bay, eastern Victoria Harbour, TKWTS, KTTS and KTAC
- Intertidal habitats on artificial seawall along the former airport runway and at the coastlines of TKWTS, KTTS and KTAC
- Subtidal habitat at Kowloon Bay, eastern Victoria Harbour, TKWTS, KTTS and KTAC

Soft bottom benthos

14.4.56 There have been numerous studies on benthic fauna assemblage conducted within the Victoria Harbour, showing that the Harbour area is generally of low habitat quality with low species diversity and species abundance recorded in the past years.

14.4.57 Thompson and Shin (1983) reported that benthic assemblages in the Harbour area were typically of low diversity and abundance, and community structure was largely dictated by organic pollution from sewage discharges in the past. As only a limited number of hypoxia tolerant species can survive the bottom conditions within the study area region, fauna was dominated by opportunists such as bivalves and polychaetes.

14.4.58 Dominant polychaetes include *Minuspio cirrifera* and the best-known marine organic enrichment indicator *Capitella capitata*. These polychaetes may be indicators of moderate and severe organic pollution, respectively. The moderately pollution tolerant bivalve *Ruditapes philippinarum* (stated as *Tapes philippinarum*) was also found dominant in the benthic infaunal population in the same study (Thompson and Shin, 1983).

14.4.59 Another field survey of soft bottom benthic organisms at the seabed in the Victoria Harbour near the Central District conducted for CRIII EIA Study (Atkins China Ltd., 1999) was also reviewed in previous assessment. This field survey indicated that the soft bottom marine environment in the Victoria Harbour was polluted and lacked a macroinvertebrate community.

14.4.60 The field survey carried out for the SSDS EIA Study also confirmed a very low species diversity and evenness for benthic assemblages in the Victoria Harbour and was indicative of stressful environment for benthos (Binhai, 2000).

14.4.61 A recent study on marine benthic communities in Hong Kong showed that a coarser sediment benthic group was found in the Eastern Victoria Harbour (Station 53 & 54) as compared to eastern and southern waters, with lower species diversity and evenness resulted (CityU, 2002). This study showed that the benthic communities in the Victoria Harbour comprised of mainly polychaete (*Cirratulus* sp., *Schistomeringo rudolphi*, *Dodecaceria* sp., *Naineris* sp., *Sigambra hanaoka* and *Prionospio* sp.), oligochaete (*Thalassodrilides gurwitchi*), bivalve (*Ruditapes philippinarum*) and crustacean (amphipod *Cheiriphotis megacheles*) (CityU, 2002). It indicated a distinct benthic composition which is characterized by species strongly adaptable to eutrophic environment.

14.4.62 Other recent survey for HATS EEFS Study on benthic assemblages in the Victoria Harbour near North Point (Station VM2 and XM4) also indicated that the benthic assemblage was dominated by polychaeta (*Naineris* sp., *Glycera* sp., *Prionospio* sp.), mollusca (*Ruditapes* sp.) and crustacea (*Corophium* sp.). Bivalve *Ruditapes* sp. is the most abundant (44%) fauna, comprising 95% of the whole benthic assemblage biomass. Although it is a commercial species, the conservation value is not high. It was noted that the benthic community structure has been relatively stable over the years and so quite robust to environmental disturbance (CDM, 2004).

- 14.4.63 Previous SEKDCFS EIA Study has undertaken benthos samplings at the TKWTS, KTTS and KTAC. Only two species of benthic fauna were found at the TKWTS, including the dominant (>99% of all collected specimens) polychaete (*Capitella capitata*) and a juvenile ocypodid crab (*Macrophthalmus* sp.). The species diversity and evenness were low (both equal to 0.049). No living organism was collected from the sampling locations at the KTAC and KTTS, indicating the very poor habitat quality at these areas (Arup, 2001).
- 14.4.64 To fill in the information gap, recent benthos survey was carried out at the Kowloon Bay and KTTS in March 2007. Locations of benthos sampling, detailed methodology and survey results are presented in the Benthos Survey Report (**Appendix 14.6**). Totally three sampling locations (Stations A and B at the Kowloon Bay near the southern tip of former Kai Tak Airport runway as well as Station C at the KTTS) were surveyed by the grab sampling method. Collected benthic fauna was sorted and identified to the lowest practical taxon as possible.
- 14.4.65 A total of 1,367 specimens were collected in the present survey. Collected taxa included annelids (36 polychaete species and an oligochaete), crustaceans (12 species), molluscs (three species), nemertean (one species) and fish (one species). In terms of individual number, 61%, 36%, 3% of specimens were polychaeta, crustacean and other taxa respectively. Polychaeta was the most abundant taxon and *Eunice indica* was the most dominant species, followed by *Mediomastus* sp., *Cirriformia* sp., *Glycinde gurjanovae*, *Glycera chirori* and other species. The other common taxon was crustacea which included mostly the amphipods. Table 3.1 of **Appendix 14.6** showed the twenty most abundant species found in this survey. All the species recorded in the present survey are common and widespread in Hong Kong waters.
- 14.4.66 Recent survey revealed similar benthos assemblages on soft bottom seabed in the Kai Tak area and the benthic composition found in the present survey was generally consistent with the past recorded results (see Table 3.3 of **Appendix 14.6**). Owing to the long-term sewage discharge in the Victoria Harbour, the benthic species recorded within the Kai Tak area was mostly adapted to the organic-enriched sediment and considered as low ecological significance.

Intertidal communities (artificial)

- 14.4.67 The existing artificial coastline in the Project area is made of both artificial vertical seawalls at the area of typhoon shelters and man-made sloping seawalls as well as rockfills along the former Kai Tak Airport runway. Though fouling organisms were regarded as common on artificial seawalls (Morton & Morton, 1983), there was no intertidal fauna being observed on vertical seawalls within the Project area during the previous SEKDCFS EIA Study (Arup, 2001). On the other hand, only intertidal fauna of low ecological value such as isopod and grapsid crabs were recorded on the rubble-mount seawalls.
- 14.4.68 A number of literatures indicated that fauna presented in seawalls and rockfills in the other Harbour area were largely restricted to encrusting sessile organisms such as bivalves, molluscs and barnacles (Morton and Morton, 1983; Lee, 1985; Lee and Morton, 1985). Fauna commonly encountered included molluscs such as the common neogastropod (*Thais clavigera*) and the pollution-tolerant bivalve (*Perna viridis*), as well as encrusting crustaceans such as barnacles (*Balanus* spp., *Tetraclita squamosa* and *Capitulum mitella*) and the ubiquitous mobile isopod (*Ligia exotica*) (Morton and Morton, 1983; Lee, 1985; Lee and Morton, 1985). Flora is mostly restricted to algae that are either organic or nutrient enrichment indicators such as *Ulva* spp. and *Cladophora* (Morton and Morton, 1983; Ho, 1987; Moore, 1990).

- 14.4.69 A recent intertidal fauna survey on artificial seawalls and rockfills in central Harbour area at Wanchai, conducted under Wanchai Development Phase II (WDII) and Central-Wanchai Bypass (CWB) EIA Study, reported that artificial seawalls along the coastline were found to be generally inhabited densely by few species of sessile encrusting fauna, including chiton (*Acanthopleura japonica*), barnacle (*Tetraclita squamosa*) and bivalve (*Saccostrea cucullata*). The only mobile species found on the artificial seawalls were the common Sea Slater (*Ligia exotica*) and topshell (*Monodonta labio*). Encrusting algae (*Pseudulvella applanata* and *Hildenbrandia* sp.) were recorded on the surface of artificial vertical seawalls but no erect algae or higher flowering plant was found during the survey. All of the fauna and flora are common local intertidal species with low conservation importance. Compared with the homogenous nature of the concrete seawalls, artificial rockfills provided a more diverse and abundant intertidal community.
- 14.4.70 Recent intertidal surveys within the Project area were carried out in February, March and May 2007 to confirm the validity of the literature results. A total of five locations were surveyed on the intertidal assemblages, including two sites (Sites 1 & 2) at KTAC and three sites (Sites 3, 4 & 5) on the runway along the coast of the Kowloon Bay (see **Figure 14.2**). The intertidal habitats within the Kai Tak area are all man-made in nature but include different types of artificial seawalls (vertical seawall and sloping boulder-mounted seawall) as well as rockfills of big boulders. Representative photographs of intertidal habitats at each survey location are presented in **Appendix 14.7**.
- 14.4.71 Compared to other relevant findings within the Victoria Harbour, similar biotic assemblages on artificial intertidal habitats in the Project area were found in recent survey and the intertidal composition in the Assessment Area was generally consistent with the past recorded results. The list of intertidal fauna recorded in the recent surveys are summarised in **Appendix 14.8a-b**.
- 14.4.72 There was no intertidal fauna recorded for all quadrats at survey locations along the KTAC (Sites 1 and 2) during all recent surveys, only algae *Hincksia mitchelliae* was recorded. The habitat quality is considered as very poor due to the poor water quality and has very limited ecological value.
- 14.4.73 On the other hand, artificial seawalls along the former runway (Sites 3, 4 & 5) were found to be generally inhabited densely by several species of sessile encrusting fauna, such as periwinkle (*Echinolittorina radiata*), topshell (*Monodonta labio*), limpets (*Cellana grata*, *C. toreuma* and *Patelloida saccharina*), bivalve (*Saccostrea cucullata*) and barnacles (*Balanus Amphitrite*, *Tetraclita japonica* and *T. squamosa*). The mobile species found on the artificial seawalls included the common Sea Slater (*Ligia exotica*) and crabs.
- 14.4.74 Encrusting algae (*Pseudulvella applanata* and *Hildenbrandia rubra*) were commonly recorded on the surface of artificial seawalls at Sites 3, 4 & 5 while erect algae (*Hincksia mitchelliae*) was also found during the recent survey. In general, the artificial intertidal habitats within the Kai Tak area were very typical of Hong Kong and all of the recorded fauna and flora were common local intertidal species with low conservation importance.

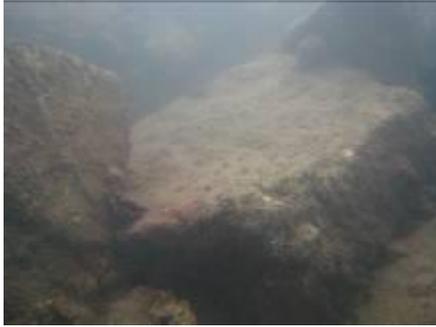
Subtidal fauna

Coral

- 14.4.75 In Hong Kong, the richest coral communities are found in the eastern part where water is free from the influence of estuarine water from the Pearl River. As water in the Victoria Harbour was generally turbid with high level of suspended solids, it was unsuitable for coral to survive and colonise there. Based on the review on a number of previous literatures, there was no significant record of coral reported within the Harbour area in the past decade.

- 14.4.76 However, recent dive surveys in the central Victoria Harbour carried out under WDII and CWB EIA (Maunsell, 2007) reported a low coverage (< 1%) of one species of hard coral (*Oulastrea crispata*) and one species of octocoral (gorgonian *Echinomuricea* sp.) at the central Harbour area (2 km and 4 km west from the Project area). All the colonies found were in fair health condition but in small size (hard coral 3-8 cm in diameter). Neither soft coral nor black coral was identified during this survey.
- 14.4.77 The EIA study for Tseung Kwan O Further Development also identified the presence of small colonies of hard corals with sparse cover of soft corals and gorgonians found in Chiu Keng Wan located at the north western Junk Bay, which is about 6 km southeast from the Project area (Maunsell, 2005).
- 14.4.78 Recent dive survey for HATS EEFS Study also indicated that the shallow water of Joss House Bay and north-west Tung Lung Chau (8 km southeast of the Project area) supported reasonably diverse but low cover hard coral communities. However, the same study showed that there were no hard corals or soft corals observed in the North Point areas (CDM, 2004).
- 14.4.79 Literature review also indicated far-field soft corals and gorgonians have been recorded at Green Island and Little Green Island over 10 km west from KTD. A low coverage of black coral of *Anthipathes* sp. was also found at Green Island (TDD, 1998). In general, soft coral and gorgonians are more resistant to turbid waters than hard coral as most of them do not contain symbiotic algae zooxanthellae and do not require light penetration for photosynthesis. Therefore, soft corals and gorgonians are more widely distributed in Hong Kong and are also found in areas of higher turbidity.
- 14.4.80 In order to provide sufficient and updated baseline information on marine ecology in the vicinity of the Project area, recent dive surveys consisting of spot-check reconnaissance dives and Rapid Ecological Assessment (REA) were carried out in April 2007. Spot-check reconnaissance dives were first conducted to identify the extent of hard substrate with an emphasis on gaining an overview of coral occurrence within and adjacent to the proposed marine works areas in KTD. Areas with signs of coral colonies observed in spot-check dives were then further surveyed using REA technique along 100 m transects. **Figure 14.2** indicates the locations of transects covered by the spot-check dives and the locations where the REA transects were deployed.
- 14.4.81 Twenty transects (Site 1 – 20) in and within the vicinity of the proposed marine works areas were surveyed during the spot-check surveys and information on GPS location, transect distance, visibility, substrate type, presence of coral colony and other invertebrates, and estimated size, percent cover and condition of coral were recorded. Eight transects with signs of coral colonies observed in the spot-check dives were further surveyed by REA. A 100 m horizontal transect was laid following the contour of seabed at each of the eight selected transects and benthic cover, taxon abundance, and ecological attributes within a swathe of 2 m wide (1 m of either side of the transects), were recorded following the REA technique as described in DeVantier *et al.* (1998). Photographs of seabed condition and representative coral colonies in each surveyed site were taken using an underwater digital camera. Information concerning the physical nature of the surveyed sites such as the degree of wave exposure of the sites, the nature of the substrate type and the topographic profile of the sites were recorded during the REA survey. More detailed information on the methodology, surveyed area, results, and discussion are provided in the Dive Survey Report (**Appendix 14.9**).
- 14.4.82 As illustrated in Table 2 of **Appendix 14.9**, 20 representative line transects of totally 6430 m were surveyed in spot-check dives. The underwater visibility at all surveyed sites was generally poor (< 2 m). The maximum water depth in all the surveyed sites ranged from 3 m to 22 m. Bottom substrata were mainly big boulders and rocks in shallow water but sand and mud in deeper water (see **Photo 1** below).

Photo 1 Bottom Substrata of Kai Tak area



Boulders



Rocks



Muddy substrata



Sandy substrata

- 14.4.83 In all of the surveyed sites, only isolated colonies of a species of hard coral (*Oulastrea crispata*) were found at Sites 9, 11, 12, 13, 14, 16, 19 and 20, with extremely low coverage of less than 1% at each survey site. Neither soft coral nor black coral was identified during the recent spot-check dives.
- 14.4.84 More detailed REA surveys were then carried out at Sites 9, 11, 12, 13, 14, 16, 19 and 20. Substrata at Sites 9, 11, 12, 13, 14 and 16 were mainly medium-sized boulders and rocks while Sites 19 and 20 comprised big boulders with fewer rocks. In general, the Victoria Harbour area is mainly of muddy sea bottom. The marine sediment, according to EPD's sediment monitoring results, is highly anaerobic and toxic with high level of total sulphide. Due to the low habitat quality, the surveyed sites supported low species diversity and species abundance.
- 14.4.85 Very limited marine life was observed within all REA survey sites. Only sparse coverage (1-5%) of single hard coral species (*Oulastrea crispata*) was recorded during the REA survey. Most of the isolated colonies were attached on the surface of the boulders and rocks. All the colonies found were in fair health condition and ranged from less than 1 cm to 30 cm in diameter. In general, most of the colonies found were small in size (~3 cm to 8 cm) and some, at Sites 11, 12 and 13 were even less than 1 cm in diameter with only one single polyp (**Photo 2**). Most of the coral colonies were found to be covered by layer of sediment (**Photo 3**).

Photo 2 Colonies of *Oulastrea crispata* with single or few polyps



Photo 3 Layer of sediment covering on colonies of *Oulastrea crispata*



- 14.4.86 In general, the Project area is mainly composed of muddy and sandy sea bottom with limited marine life, and is only sparsely covered by scattered colonies of single coral species (*Oulastrea crispata*). *Oulastrea crispata* has a wide range of adaptations to different environmental conditions (including those unfavourable to corals) as well as geographic locations, which is a result of its stress-tolerant ability (Chen, *et al.* 2003). With an opportunistic life history trait, a wide range of reproductive strategies and surface-orientation independent growth, *O. crispata* is able to colonise a variety of substrata and to flourish as a pioneer coloniser of newly immersed structures (Lam, 2000a & 2000b). It is common and widespread in Hong Kong marine waters, especially those more turbid and harsh environment in the western waters (Chan, *et al.* 2005).

Marine Mammal

- 14.4.87 Literature review has shown that there were no sighting or significant record of marine mammals within the Project area. One of the most important marine mammals in Hong Kong waters is the Chinese White Dolphin (*Sousa chinensis*) which was only seen in the western estuarine waters in Hong Kong including outer Deep Bay, north, south, Lantau and west Lamma (Hung, 2007). The other common marine mammal Finless porpoise (*Neophocaena phocaenoides*) was also never reported in the Victoria Harbour and only occurs in the eastern and southern waters of Hong Kong (Hung, 2005). There is no significant record of such marine mammals with high conservation importance in and within the vicinity of the Project area.

Ecological Importance

- 14.4.88 Based on the available literatures and discussion presented above, the ecological values of terrestrial and marine ecological resources present within the Assessment Areas have been assessed and evaluated, in accordance with the EIAO-TM Annex 8 Table 2 criteria and are shown in **Table 14.2** and **Table 14.3**.

Terrestrial Habitat

- 14.4.89 Terrestrial habitat types identified within the Assessment Area included wasteland, plantation/grassland mosaic, watercourse, developed area and artificial coastline.
- 14.4.90 Floral assemblages recorded in the Assessment Area were common and widespread species found throughout the Hong Kong region. The majority of vegetation recorded from the wasteland area was also common and widespread ruderal species. Due to commonness of the species recorded and the highly developed nature of Assessment Area, vegetation found within the Assessment Area is considered to have a very low ecological value.
- 14.4.91 Although a relatively high abundance of Black Kite was recorded at the wasteland habitat, the wasteland habitat within Assessment Area is not considered as an important habitat for this species. The Black Kite is a Class II Protected Animal of the PRC but it is common and widespread in the Hong Kong and there are other similar sites available nearby, e.g. Causeway Bay Typhoon Shelter that are commonly utilised by this species. The diversity and abundance of other bird species was low and the species reported are common and widespread in Hong Kong. The wasteland and developed area are therefore considered to have very low ecological importance due to their highly disturbed and man-made nature.
- 14.4.92 The plantation/grassland mosaic habitat is also considered to have a very low ecological value as it is not a natural area and the majority of trees and other vegetation are exotic species planted for aesthetic purposes and therefore have little ecological value. As it is the only highly vegetated area within the Assessment Area, it supported relatively higher diversity of bird species which are common and widespread in Hong Kong. The ecological value of this habitat is considered as very low due to their highly disturbed and man-made nature. The redevelopment of the Project area under this Project would involve the provision of district and regional open spaces that would include native vegetation and tree species and thus provide large areas of suitable new habitat for common bird species that currently utilise the existing habitat.
- 14.4.93 Watercourse identified in the Assessment Area is only man-made channel and mainly purposed for drainage use. Only very limited riparian vegetation of low ecological value was recorded and no fauna species was found from this habitat. This habitat was therefore considered of very low ecological value.
- 14.4.94 Although a number of waterbirds of conservation importance were recorded from the artificial coastline within the Assessment Area, especially at the KTAC and both typhoon shelters, this habitat is not considered as an important habitat and the sole roosting/feeding ground for these waterbirds in the vicinity of the Assessment Area where a number of similar roosting/feeding areas such as the Victoria Harbour and the Causeway Bay Typhoon Shelter can be identified. Also, given the poor marine water quality as described in the Marine Ecology Section and the existing high level of human disturbance, this habitat is therefore ranked as low in ecological significance.

Table 14.2 Criteria and Evaluation of Ecological Importance of Terrestrial Habitats in the Assessment Area

Criteria	Wasteland	Plantation/grassland mosaic	Developed Area
Naturalness	Not natural, previously developed	Relatively natural, although man-made habitat	Not natural, highly disturbed urbanised area
Size	Large	Small	Large
Diversity	Low, species recorded are common and widespread in Hong Kong	Low, species recorded are common and widespread in Hong Kong	Low, species recorded are common and widespread in Hong Kong
Rarity	No rare species found but 4 bird species of conservation importance including Grey Heron, Chinese Pond Heron, Black Kite and Greater Coucal which are common and widespread in Hong Kong were recorded	No rare species found but 3 bird species of conservation importance including Little Egret, Cattle Egret and Black Kite which are common and widespread in Hong Kong were recorded	No rare species or other species of conservation importance found
Re-creatability	Very High	Very High	Very High
Fragmentation	The habitat is not fragmented	The habitat is not fragmented	The habitat is not fragmented
Ecological linkage	Not functionally linked to any highly valued habitat in close proximity	Not functionally linked to any highly valued habitat in close proximity	Not functionally linked to any highly valued habitat in close proximity
Potential value	Very low	Very Low	Very Low
Nursery ground	No significant record	No significant record	No significant record
Age	NA	NA	NA
Abundance / Richness of wildlife	Low for abundance and species richness	Low for abundance and species richness	Low for abundance and species richness
Ecological importance	Very low	Very low	Very low

Table 14.2 Criteria and Evaluation of Ecological Importance of Terrestrial Habitats in the Assessment Area

Criteria	Watercourse	Artificial coastline
Naturalness	Man-made habitat.	Artificial, disturbed by marine traffic and human activities
Size	Small	Moderate
Diversity	Very low floral diversity and no fauna recorded from this habitat during recent surveys.	Low, species recorded are common and widespread in Hong Kong
Rarity	No rare species or other species of conservation importance found	No rare species recorded but 8 bird species of conservation importance including Little Egret, Great Egret, Grey Heron, Chinese Pond Heron, Black-crowned Night Heron, Cattle Egret, Great Cormorant and Black Kite which are common and widespread in Hong Kong were recorded
Re-creatability	Very high	Very high
Fragmentation	The habitat is not fragmented	The habitat is not fragmented
Ecological linkage	Not functionally linked to any highly valued habitat in close proximity	Not functionally linked to any highly valued habitat in close proximity
Potential value	Very Low	Very Low
Nursery ground	No significant record	No significant record
Age	NA	NA
Abundance / Richness of wildlife	Very low for abundance and species richness	Moderate for abundance but low for species richness
Ecological importance	Very Low.	Low

Marine Habitat

14.4.95 Soft bottom seabed and artificial intertidal seawall are considered to have very low ecological importance based on the considerations of their highly disturbed and man-made nature, commonness of recorded species and low in species diversity and abundance.

14.4.96 Although hard coral (*Oulastrea crispata*) was found in the subtidal habitat, this species is common in Hong Kong waters and tolerant to more turbid and harsh environment (Chan, *et al.* 2005). The species diversity and abundance of coral found in the Kai Tak area is extremely low when compared with other coral areas in eastern and north eastern waters of Hong Kong. In addition, most of the recorded colonies were isolated and in low coverage (<1%) and small size (~3 cm to 8 cm). Therefore, given the low abundance and species diversity as well as the commonness of coral species found there, the subtidal habitat is considered as having low ecological value and is not identified as an important habitat or sensitive coral site in this assessment.

Table 14.3 Criteria and Evaluation of Ecological Importance of Marine Habitats in the Project Area

Criteria	Soft bottom habitat	Intertidal habitat (artificial)	Subtidal habitat
Naturalness	Subjected to extensive anthropogenic disturbance	Man-made habitat	Highly disturbed by marine traffic, subjected to extensive water pollution
Size	Large	Large	Large
Diversity	Low, mainly dominant by pollution-tolerant fauna	Low, mainly composed of few intertidal fauna	Low, species confined to those resistant to polluted water
Rarity	No rare species found	No rare species found	No rare species found but only a single species of a common hard coral (<i>Oulastrea crispata</i>) was recorded
Re-creatability	High	Very High	High
Fragmentation	The habitat is fragmented by the former airport runway	The habitat is not fragmented	The habitat is fragmented by the former airport runway
Ecological linkage	Not functionally linked to any highly valued habitat in close proximity	Not functionally linked to any highly valued habitat in close proximity	Not functionally linked to any highly valued habitat in close proximity
Potential value	Very low	Very low	Very Low
Nursery ground	No significant record	No significant record	No significant record
Age	NA	NA	NA
Abundance / Richness of wildlife	Low for abundance and species richness	Low for abundance and species richness	Low for abundance and species richness
Ecological importance	Very low	Very low	Low

14.5 Identification of Environmental Impacts

Terrestrial Ecological Impacts

Direct Impact

- 14.5.1 Potential ecological impacts during construction and operation of the Project would involve direct loss of habitats (permanent loss of 202.7 ha wasteland and 15.8 ha plantation/grassland mosaic and permanent and temporary loss of 0.7 km and 1.6 km artificial coastline, respectively) and associated vegetation. No potential impact to any terrestrial area of conservation importance was identified.
- 14.5.2 Under the worse case scenario, all existing vegetation and trees within the Project area would be cleared as part of the site formation works during construction works. Therefore there would be potential direct loss of all existing floral assemblages within the affected habitats resulting from the proposed development.
- 14.5.3 In addition, proposed excavation works at the Kai Tak Nullah would cause direct impact to the existing watercourse habitat during the construction phase of the Project.

Indirect Impact

- 14.5.4 Potential secondary impact on the waterbird populations within the Assessment Area may occur during the construction phase due to the reduced food availability arising from the potential change of marine water quality caused by the proposed marine works as discussed in detail below under the Marine Ecology Section (Para. 14.5.10 – 14.5.15 & 14.6.14 – 14.6.30).
- 14.5.5 Indirect disturbance impacts on surrounding habitat and associated bird populations within the Assessment Area may result from construction noise and increased human disturbance during both construction and operation of the Project. Potential impact to other fauna groups (butterfly, dragonfly, reptile, amphibian and mammal) is expected to be minimal as only few species commonly found throughout Hong Kong were recorded from the Assessment Area during recent surveys.

Marine Ecological Impacts

- 14.5.6 The vast majority of works proposed under this Project (designated projects and non-designated projects) are terrestrial based and therefore potential impacts on marine ecological resources would mostly be resulted from deterioration of water quality due to surface runoff during construction activities. The impacts associated with surface runoff and subsequent deterioration of water quality are discussed below.
- 14.5.7 Works packages taking place under the Project that would potentially impact on the marine environment include decommissioning of an abandoned fuel dolphin, opening of a 600 m gap in the northern part of the former runway, construction of public landing steps cum fireboat berth, dredging works for the cruise terminal, dredging works for the submerged tunnels of Road T2 and Central Kowloon Route (CKR) and the localised maintenance dredging at KTAC as part of the KTAC odour remediation works. Other concurrent projects involving dredging within the Victoria Harbour would also take place. The potential impacts on marine ecological resources associated with dredging and other construction activity for the above works packages are discussed and evaluated below. No operational phase impact on marine ecological resources within the Assessment Area is identified.

14.5.8 No dredging works would be involved for the decommissioning of the abandoned fuel dolphin and works would be small in scale and undertaken within the semi-enclosure of the breakwaters of To Kwa Wan typhoon shelter. Taking into account the small scale of the proposed decommissioning works, no off-site marine water quality impact would be expected and any local water quality impact would be transient. The details are discussed in the approved EIA Report on Decommissioning of the Former Kai Tak Airport other than the North Apron (EIAO Register No. AEIAR-114/2007). No further discussion is presented here.

Direct Impact

14.5.9 Potential direct impacts on marine ecology arising from the Project would include loss of marine habitats and the associated marine species due to construction activities. This would include:

- Loss of 1.2 km (permanent loss of approximately 0.7 km and temporary loss of 0.5 km) of artificial seawall as a 600 m gap would be opened at the northern part of the former runway (600 m loss on either side of the runway).
- Temporary loss of small area (approximately 2 hectares) of soft bottom seabed and subtidal habitat during dredging, on either side of the 600 m runway gap, to remove built up sediment.
- Temporary loss of approximately 1.1 km long artificial seawall due to construction of the berthing structure of the cruise terminal and the public landing steps cum fireboat berth.
- Temporary loss of approximately 57.6 hectares (including 57 ha dredging area for the manoeuvring basin of the cruise terminal and 0.6 ha for public landing steps cum fireboat berth) of soft bottom seabed and subtidal habitat at Kowloon Bay of Victoria Harbour near the southern tip of former Kai Tak Airport runway.
- Temporary loss of approximately 5.8 hectares of soft bottom seabed and subtidal habitat (including 1.4 ha dredging area along proposed alignment of Central Kowloon Route (CKR), 4.1 ha along Road T2 alignment and 0.3 ha along the reconstructed section of Kwun Tong submarine outfall) at TKWTS, KTTS and Victoria Harbour.
- Temporary loss of approximately 9 hectares of soft bottom seabed and subtidal habitat in the KTAC due to localised dredging at KTAC as part of the KTAC odour remediation works.

Indirect Impact

Changes in water quality

14.5.10 Possible indirect impact on intertidal and subtidal habitats may include water quality deterioration due to sediment laden surface runoff from land based construction activities or the siltation effects during dredging works. Marine fauna especially sessile filter feeders are susceptible to deleterious impacts from sedimentation through smothering and clogging of their respiratory and feeding apparatus. Similarly, more turbid water may reduce the amount of light reaching beneath the water surface, which may also be detrimental to marine flora and fauna. This may result in both direct (e.g. mortality) and indirect (e.g. slow growth rate, low in reproductive success rate) impacts on marine life and may eventually cause the reduction of population size of marine assemblage.

- 14.5.11 To assess the impacts associated with elevated SS, the assessment was based on compliance with the statutory Water Quality Objectives (WQOs) for the concerned Water Control Zones, which is set for among other reasons, to offer protection for marine ecological resources. Water quality modelling predictions were analysed for compliance with the WQOs through comparison of worst case scenario's SS level against baseline levels. Using this criterion, if the elevation in SS levels exceeds 30% above ambient baseline conditions, adverse impacts would be expected and suitable mitigation should be pursued.
- 14.5.12 There are no WQOs regarding sedimentation rates. To assess impacts due to sediment deposition on far-field ecological sensitive receivers, the sedimentation rate of not exceeding 100 mg cm^{-2} per day (or 0.1 kg m^{-2} per day) which was also adopted in other EIA studies in Hong Kong for ecological resources conservation (Hyder, 1997; ERM, 2001; Black & Veatch, 2006), is considered as suitable for coral protection in this assessment.
- 14.5.13 As bottom sediment is disturbed during dredging activities and particles released into the water column, organic and inorganic contaminants contained in the sediment may be released to the water column. Released contaminants may cause toxic effects to marine fauna.
- 14.5.14 In addition, the release of inorganic substances may cause eutrophication and algal bloom. Oxidation of dead algae may use up some of the oxygen in the water. If oxygen levels are depleted to low levels, benthic organisms unable to tolerate such conditions may suffer hypoxia-induced mortality and / or stress including reduced feeding and growth rate. The WQO standard that the average-depth and bottom water DO should remain above 4 mg/L and 2 mg/L respectively for 90% of the time was adopted.
- 14.5.15 In-situ bioremediation is being considered to suppress odour generated from the contaminated sediment along the seabed of KTAC. The major environmental concerns associated with in-situ bioremediation are the potential release of nitrate-nitrogen, ammonia and heavy metal contaminants from the sediments into the surrounding water bodies during the bioremediation activities. The impacts associated with the release of nitrate-nitrogen, ammonia and contaminants contained within the sediment have been discussed in Section 8.7.21 – 8.7.22.

14.6 Prediction and Evaluation of Environmental Impacts

Terrestrial Ecology

- 14.6.1 In general the impacts resulting from the proposed development are considered to be minor as all the affected terrestrial habitats are highly man-made and mainly consists of open sparsely-vegetated wasteland and plantation/grassland mosaic area. These habitats supported very limited assemblage of common flora and fauna and are considered of very low in ecological values. Thus the proposed redevelopment is not expected to have any significant adverse impacts on terrestrial ecological resources.

Direct Impact

- 14.6.2 Direct loss of all wasteland (202.7 ha) and plantation/grassland mosaic (15.8 ha) habitats within the Project area and indirect disturbance impact to the associated avifaunal assemblages would occur during the construction phase. Yet as the wasteland area is almost totally concreted and the plantation/grassland mosaic area is highly man-made, these areas are not considered to be primary habitats for those common bird species recorded during recent surveys. Direct loss of all these habitats of very low ecological values is considered very minor in nature. Beside, after the construction phase, about 127 ha open spaces with native trees and vegetation would be provided within the Project area, which are considered to be more favourable habitat for the uses of existing bird populations. Thus potential construction phase impact on the associated bird assemblages would only be minor and temporary.

- 14.6.3 There were more than 6000 trees of mainly exotic species with very low ecological importance such as *Leucaena leucocephala* scattering throughout the Assessment Area. According to the Landscape and Visual Impact Assessment of this EIA study (S13.11.2 refers), it is estimated that about 2250 existing trees in habitats of wasteland, plantation/grassland mosaic and developed area within the Project area would be directly impacted by the Project. Although removal of these trees would be unavoidable, all of the affected species are very common and widespread in Hong Kong. The potential impact due to the direct loss of vegetation is therefore considered minor in nature. Besides, as far as possible, such impact would be mitigated by compensatory planting after the construction works as described in Para. 14.7.2.
- 14.6.4 A total loss of about 2.3 km long artificial coastline would be resulted from the proposed opening of 600 m gap at the northern part of the former runway (1.2 km loss) and construction of the berthing structure of the cruise terminal and the public landing steps cum fireboat berth at the southern tip of runway (1.1 km loss). Although a number of waterbird species were recorded from this habitat, all of them are common and widespread species in Hong Kong. In addition, reconstruction of new artificial coastline of totally 1.6 km long would be provided as far as possible to recover loss of this habitat after the construction phase. Nevertheless, considering its low ecological value, permanent loss of a short length (0.7 km, ~ 4%) of this habitat is not expected to result in significant adverse impact to the existing waterbird populations in the Assessment Area.
- 14.6.5 Direct impact to the channel bed of existing watercourse habitat would occur during the proposed excavation works at the Kai Tak Nullah. Currently, the identified watercourse is highly concrete channel with very limited riparian floral species recorded. No rare, protected species or other species of conservation importance was recorded from this habitat. Considering the temporary nature of the proposed works and the very low ecological value of watercourse habitat, such impact is considered very minor in nature.

Indirect Impact

- 14.6.6 Potential secondary impact on waterbirds may be resulted from reduced food availability within the Assessment area caused from deterioration of marine water quality during the proposed marine works. However alternative similar habitats, such as To Kwa Wan, Hung Hom and Causeway Bay Typhoon Shelter are available nearby, and easily accessible to these bird species, which are able to move easily between foraging sites (Carey et al, 2001). All the bird species of conservation importance and other recorded species are common and widespread in Hong Kong and thus impacts on avifaunal species is expected to be minor and acceptable.
- 14.6.7 Indirect disturbance impacts to the nearby habitats (i.e. developed area) and the associated wildlife in and surrounding the Project area would be resulted from the increased human activities / noise disturbance during the construction and operation phases. Such impacts could be arisen from noise-generating machinery during excavation, demolition and other marine-/land-based construction works and general increases in human activity during and after the construction. However, in view of that the terrestrial habitat (i.e. developed area) and the associated wildlife surrounding the Project area, are considered to have very low ecological value as this habitat is highly developed and already subjected to major anthropogenic disturbance, the associated wildlife is considered to be well adapted to noise and human disturbance and such impact is considered to be very minor in nature.

Marine Ecology

Direct impact

- 14.6.8 Direct impacts to marine ecological resources would include permanent loss of 0.7 km of artificial sea wall habitat, as a 600 m gap would be opened in the runway. Initially 1.2 km of the artificial intertidal habitat would be removed but once the gap has been opened, approximately 0.25 km of artificial intertidal habitat would be provided at each side of the gap (in total 0.5 km new intertidal habitat), which would be available for recolonisation by intertidal species. Intertidal species recorded in the affected area are very common and widespread in Hong Kong and the seawall habitat within the assessment area is thus considered to have a very low ecological value. No species of conservation importance were recorded during the intertidal surveys. The opening of the runway gap is expected to increase water circulation and hence to improve the water quality in the Kai Tak Approach Channel. As this habitat is considered to have a very low ecological value and the opening of the runway gap is expected to improve water quality in the Kai Tak Approach Channel which could in turn increase diversity in this area, the loss of this habitat is considered to have a minor and acceptable impact on marine ecological resources.
- 14.6.9 Localized dredging work, to remove built up sediment on either side of the runway gap (once opened) would lead to a temporary loss of 2 ha of soft bottom and subtidal habitat.
- 14.6.10 In addition, construction of the submarine sections of the CKR and Road T2 as well as the reconstruction of a section of the Kwun Tong submarine outfall would also involve localized dredging activities at the TKWTS, KTTS and Victoria Harbour, and lead to temporary loss of 1.4 ha, 4.1 ha and 0.3 ha, respectively, of the soft bottom and subtidal habitat.
- 14.6.11 The KTAC odour remediation works would include localised maintenance dredging activities at selected areas of the KTAC and would result in temporary loss of about 9 ha of soft bottom and subtidal habitat in these areas as well.
- 14.6.12 The marine works for construction of the cruise terminal and public landing steps cum fireboat berth would lead to the temporary loss of approximately 57 ha and 0.6 ha, respectively, of soft bottom and subtidal habitat due to dredging.
- 14.6.13 The cruise terminal together with the public landing steps cum fireboat berth works would also lead to temporary loss of approximately 1 km and 0.1 km, respectively of artificial intertidal habitat due to reconstruction of the seawall.
- 14.6.14 Temporary loss of these habitats would only cause minor impact on the marine ecological system in and within the vicinity of the Project area, considering the generally very low ecological values of the soft bottom seabed, subtidal and intertidal (artificial) habitats as well as the associated flora and fauna species as discussed above. The only species of conservation importance identified in these affected habitats are the small and isolated hard coral colonies (*Oulastrea crispata*) which would unavoidably be affected by the dredging works described above. To avoid and minimise direct loss or damage of this species of conservation importance, it is recommended to translocate those existing coral colonies attached on rocks / boulders located in the hard substrata sea area within those dredging sites (**Figure 14.3**) to the other suitable locations as far as possible. As *Oulastrea crispata* is not a competing and aggressive species (Lam, 2000a), this species is not expected to have any negative pressure on the other existing corals in the recipient site(s) and it is considered suitable for translocation. Considering the commonness and opportunistic nature of this coral species that can rapidly recruit and settle on available hard substrate, particularly in marine water of high current movement and particulate matter, removal of some of these small and isolated coral colonies of low ecological value as a result of the dredging works is considered to be of minor ecological impact and acceptable.

14.6.15 Nevertheless, based on their opportunistic nature, rapid recruitment and settlement of *Oulastrea crispata* is expected to occur on the available substrates of the newly-formed seawalls after the construction work. Other similar benthos, subtidal and intertidal communities are also expected to naturally re-colonise in the Project area after dredging activities and this would recover such minor impact identified in this assessment.

14.6.16 Taking into account all of the mitigation measures proposed including coral translocation and provision of newly constructed seawalls, all the marine habitats and associated flora and fauna including some small and isolated coral colonies that would be directly affected due to this Project are all of low ecological values and therefore such impact is considered as minor.

Indirect impact

Changes in water quality

Elevation of Suspended Sediments

14.6.17 Site runoff would potentially contain a high level of sediment. If this is discharged into the marine environment, it could lead to deterioration in water quality which could negatively affect corals and other marine organisms. If standard good site practice is implemented and all site runoff is discharged through sediment and silt traps, no adverse impact is expected on marine ecological resources.

14.6.18 Indirect impacts on coral and marine ecology would also be associated with changes of water quality due to dredging activities. Dredging activities would be necessary for the following works associated with the Kai Tak Development:

- Construction of cruise terminal (capital and maintenance dredging)
- Construction of public landing steps cum fireboat berth
- Opening of runway gap (dredging along the seawalls)
- Submerged tunnels of Road T2 and CKR
- Reconstruction of a section of the Kwun Tong submarine outfall
- Localised maintenance dredging at KTAC as part of KTAC odour remediation works

14.6.19 Possible concurrent dredging activities that would also affect the Project include:

- Submarine gas main relocation
- Wan Chai Reclamation Phase 2
- Western Cross Harbour Main
- Further Development of Tseung Kwan O
- Lei Yue Mun Waterfront Enhancement

14.6.20 Dredging activities would temporarily elevate the suspended sediment level and create sediment plumes. Benthic epifauna could be susceptible to the effects of increased sediment loads. Effects could be lethal or sublethal through reduction in survivorship, growth rate and reproductive potential due to stress incurred by the need to constantly flush out deposited material. The effects of sedimentation on organisms depend on several factors, such as species tolerance to suspended solids, life modes of organisms (sessile or free-swimming) and water movement.

14.6.21 In order to assess the nature and extent of potential impacts on marine ecological resources resulting from dredging activities associated with the Kai Tak Development and other possible concurrent projects as identified above, representative worst case scenarios were selected for water quality modelling. The scenarios modelled covered all possible concurrent dredging works and the assessment results were presented in Section 5 of the approved EIA Report on Dredging Works for Proposed Cruise Terminal at Kai Tak (EIAO Register No. AEIAR-115/2007).

- 14.6.22 In order to open the runway gap, bulk fill material would be excavated from the area between the seawalls. This excavation work would take place behind the seawalls and thus any sediment plume resulting from the excavation would be confined to the works area and would not cause deterioration in water quality outside the seawall. However once the central area has been excavated, the seawalls would have to be demolished. This would involve removal of gravel only, which would not create significant SS impact. Loss of fill material during seawall demolition is not expected and therefore the demolition of the seawall would not cause deterioration in water quality. Thus the opening of the runway gap is not expected to have any adverse indirect impacts on marine ecological resources.
- 14.6.23 It is likely some accumulation of sediments alongside the runway has occurred, so there will be a need to dredge the existing seabed along the seawalls during the seawall demolition works. Thus, potential water quality impact of SS will arise from the dredging on either side of the 600m opening along the seawalls. The dredging alongside the 600m opening has been included in the water quality modelling scenarios for cumulative assessment.
- 14.6.24 Based on the prediction of the sediment plume modelling for the unmitigated scenarios under the water quality impact assessment as presented in the approved EIA Report on Dredging Works for Proposed Cruise Terminal at Kai Tak, potential water quality impact due to elevation of SS would occur at coastal waters of the Kowloon Bay and TKWTS. A number of mitigation measures to control water quality are therefore recommended to confine sediment plume within the proposed dredging areas and to minimize indirect impacts to the nearby intertidal and subtidal flora and fauna during dredging operations. With the implementation of the proposed mitigation measures, the water quality modelling results indicate that the SS elevation arising from this Project could be effectively reduced. The recorded coral colonies found within the Project area are species with high tolerance to more turbid water and high sedimentation (Chen, *et al.* 2003), potential indirect impact on those coral colonies is therefore expected to be minor and acceptable. Considering that the intertidal and subtidal communities identified in the Kai Tak area are of generally very low ecological value and in view of the impact of SS elevation is temporary, only minor impact is anticipated.
- 14.6.25 Impact from the dredging works identified above are not expected to occur at far field ecological sensitive receivers including the coral areas located in the vicinity of Green Island, Little Green Island, Junk Bay and Tung Lung Chau. With the mitigation measures detailed in Section 8.8 of this report, full compliance with the relevant assessment criteria will be achieved and thus no significant adverse impact is expected on far field ecological sensitive receivers.

Contaminant Release During Dredging

- 14.6.26 As sediment in the Project area is contaminated with heavy metals and organic pollutants, turbulence caused by dredging activities could release these substances to the water column. Increase of toxic substances in water could cause lethal or sublethal effects to subtidal fauna. Degree of toxic level depends on a number of factors e.g. species tolerance, contaminant levels, water flow rate, etc.
- 14.6.27 In-vitro laboratory assessment of sediment samples indicated that the concentrations of cadmium, copper, nickel, mercury, unionised ammonia and total inorganic nitrogen contaminants exceeded the assessment criteria. However the laboratory tests do not take into account the dilution factor after the contaminants are released into the water column. Water quality modelling results predict that levels of contaminants would be much lower than the relevant standards at monitoring sites nearby the source. This is because any contaminants released during dredging are immediately diluted by the large volume of marine water within the dredging site. Thus, it is considered that long-term off-site marine water quality impact will not occur and any local water quality impact will be transient.

- 14.6.28 As subtidal fauna like fish and crab are mobile, it is likely that they would avoid the dredging area and re-colonise after the marine works. Furthermore, similar refuge habitat was available in the nearby coastal waters for the affected fauna. Thus, major impact due to release of contaminant on subtidal organisms is not expected.

Increased Level of Nutrients and Decrease in Dissolved Oxygen (DO)

- 14.6.29 Nutrient level (inorganic nitrogen and phosphorous) may also increase during dredging activities. High levels of nutrients in seawater can cause rapid increases in phytoplankton often to the point where an algal bloom occurs. An intense bloom of algae can lead to sharp decreases in the levels of DO in the water as dead algae fall through the water column and decompose on the bottom. Anoxic conditions may result if DO concentration is already low or is not replenished. This may result in mortality to marine organisms due to oxygen deprivation.
- 14.6.30 Based on results of the water quality modelling as presented in the approved EIA Report on Dredging Works for Proposed Cruise Terminal at Kai Tak, the possible concurrent dredging activities would cause a maximum DO depletion of less than 0.02 mg/l in the Victoria Harbour as compared to the WQO of 4 mg/l and 2mg/l for depth-averaged and bottom DO respectively. The water quality impact assessment also predicted that the maximum elevation of total inorganic nitrogen and unionized ammonia caused by the proposed dredging works would fully comply with the WQO of 0.4mg/l and 0.021mg/l respectively at the receiving water near to the Project site. Therefore, the Project would not contribute any off-site DO and nutrient impacts.
- 14.6.31 As discussed above, the soft bottom benthic habitats and the associated benthic and subtidal communities in the Project area are of relatively low ecological significance (very low to low value), so impact due to elevation of nutrients level and DO depletion on the associated marine fauna is not expected to be significant.

Maintenance Dredging for Cruise Terminal

- 14.6.32 Maintenance dredging will be required during operation of the proposed cruise terminal at a frequency of about once every 5 to 10 years. The frequency of maintenance dredging and the volume of dredged material would be much lower than during capital dredging for the cruise terminal. With reference to the approved EIA Report on Dredging Works for Proposed Cruise Terminal at Kai Tak, maintenance dredging is not expected to have any adverse effect on marine ecological resources with the implementation of the water quality mitigation measures recommended for capital dredging.

Sediment Treatment/Bioremediation of Kai Tak Approach Channel

- 14.6.33 Based on a pilot scale field test carried out in the KTAC in 2006, no significant adverse impact on water quality is expected from sediment treatment/bioremediation works at the KTAC (see Section 8.7.21 – 8.7.22).

Overall impact

- 14.6.34 Based upon the foregoing discussion, the terrestrial and marine ecological impacts associated with the Project are considered to be minor. A summary of impact evaluation is presented in **Tables 14.4 and 14.5**.

Table 14.4 Evaluation of Ecological Impacts on Terrestrial Resources

Criteria	Direct Impact to Habitats and Associated Vegetation	Indirect Disturbance Impact to Nearby Habitat and Fauna	Potential Impact to Waterbirds due to Reduced Food Availability
Impacted habitat	Wasteland, Plantation/grassland mosaic, Watercourse and Artificial coastline	Developed Area	Artificial coastline
Habitat quality	Very low to low	Very low	Low
Species	No rare, protected or other flora species of conservation importance would be directly affected.	No rare, protected or other species of conservation importance would be affected.	A total of 8 avifaunal species of conservation importance may be affected
Size / Abundance	Permanent loss of 202.7 ha wasteland and 15.8 ha plantation/grassland mosaic. Permanent loss of 0.7 km and temporary loss of 1.6 km artificial coastline. Temporarily direct impact to 1.5 km watercourse. About 2250 scattered tree individuals would be removed.	Large in size (614.8 ha) but low in abundance	Moderate in size (15.7 km) but moderate in abundance
Duration	Wasteland and Plantation/grassland mosaic – long term. Artificial coastline – long term / short term. Watercourse – short term.	Short term	Short term
Reversibility	Wasteland and Plantation/grassland mosaic – permanent and irreversible. Artificial coastline – permanent and irreversible / temporary and reversible. Watercourse – temporary and reversible.	Temporary and reversible.	Temporary and reversible.
Magnitude	Minor	Minor	Minor
Overall impact	Very Low	Very low	Very low

Table 14.5 Evaluation of Ecological Impacts on Marine Resources

Criteria	Habitat loss	Change in water quality
Impacted habitat	Benthic, subtidal and intertidal (artificial) habitats	Subtidal and intertidal habitats
Habitat quality	Very low to low	Very low to low
Species	Only small and isolated colonies of single hard coral species would be affected	Only small and isolated colonies of single hard coral species would be affected
Size / Abundance	<p>Permanent loss of 0.7 km of artificial seawall habitat and temporary loss of 0.5 km of artificial seawall habitat and 2 ha of seabed due to opening of a runway gap.</p> <p>Temporary loss of 57.6 ha seabed habitat as well as 1.1 km artificial seawall habitat as a result of construction of cruise ship terminal and public landing steps cum fireboat berth</p> <p>Temporary loss of 1.4 ha, 4.1 ha and 0.3 ha seabed habitat due to construction of submersed CKR, Road T2 and reconstructed section of Kwun Tong submarine outfall, respectively.</p> <p>Temporary loss of 9 ha seabed habitat due to localised maintenance dredging at KTAC as part of KTAC odour remediation works</p>	Moderate in size
Duration	Long term and short term	Short term
Reversibility	Permanent and irreversible / temporary and reversible.	Temporary and reversible.
Magnitude	Minor	Minor
Overall impact	Low (with mitigation measures)	Low (with mitigation measures)

14.7 Mitigation of Environmental Impacts

14.7.1 According to EIAO-TM Annex 16, ecological impacts on habitats and the associated wildlife, especially on those important habitat and species of conservation importance, caused by the proposed works should be mitigated to the maximum practical extent. Following EIAO-TM Annex 16 and EIAO Guidance Note No. 3/2002, mitigation measures are discussed in this section to avoid, minimize, and compensate for the identified ecological impacts, in the order of priority.

Terrestrial Ecology

14.7.2 As far as possible, it is recommended that implementation of compensatory planting of similar composition of native trees and vegetation within the Project area should be provided after the construction works. The compensatory ratio should be not less than 1:1 in terms of quality and quantity. Under the Recommended Outline Development Plan (RODP) of the Project (**Figure 1.1**), a total of approximately 127 ha areas within the Project area are designed as open spaces, including a 24 ha Metro Park at the northern runway area (Site 4A), where the recommended compensatory planting would be provided. According to the Landscape and Visual Impact Assessment Section (S.13.11.2 refers), it is estimated that these open spaces would provide sufficient planting area for about 6000 trees.

Marine Ecology

Avoidance

- 14.7.3 The dredging areas on seabed and seawalls are proposed to be as minimal as possible in order to avoid extensive direct impact on existing benthic and intertidal resources within the Project area.

Minimization

- 14.7.4 Recent dive surveys revealed that coral colonies that would be directly affected by the proposed dredging works for the cruise terminal and dredging works associated with the opening of the runway gap were low in species diversity (only one species) and coverage (1 – 5%), with generally small-sized colonies and common species recorded. The subtidal habitat was therefore considered as low ecological value. Nevertheless, to avoid and minimize any direct loss or damage to this fauna of conservation importance, it is recommended to translocate the potential directly affected coral colonies within the dredging sites (**Figure 14.3**) attached on small rocks and boulders that are manually movable by a diver underwater (possibly longest dimension less than 50 cm) as far as practical to the nearby suitable habitats such as Junk Bay where similar hydrographic condition and healthy coral community of the same coral species were recorded. The translocation exercise should be conducted before the commencement of construction phase of the Project and in winter season (from November to March) in order to avoid disturbance to the transplanted colonies during the spawning period (i.e. July to October). A detailed translocation plan (including pre-translocation coral survey, translocation methodology, monitoring of transplanted corals, etc.) should be prepared during the detailed design stage of the Project and approved by AFCD prior to translocation. All the translocation exercises should be conducted by experienced marine ecologist(s) who is/are approved by AFCD prior to commencement of coral translocation.
- 14.7.5 The mitigation measures for coral colonies to be implemented for the dredging works for the proposed cruise terminal are detailed in the approved EIA Report and Environmental Monitoring and Audit (EM&A) Manual on Dredging Works for Proposed Cruise Terminal at Kai Tak. The proposed coral recipient site for the translocation of coral associated with the dredging works for the proposed cruise terminal is indicated in the approved EIA Report on Dredging Works for Proposed Cruise Terminal at Kai Tak (see **Figure 14.4** in this report).
- 14.7.6 During dredging operations, a number of mitigation measures to control water quality impacts would be adopted to confine sediment plume within the proposed dredging areas and to minimize indirect impact to the nearby intertidal and subtidal flora and fauna. Recommended mitigation measures include the following:
- Installation of silt curtains around the dredgers, where appropriate, during dredging activities; and
 - Use of closed grab dredger.
- 14.7.7 These proposed water quality control measures are expected to prevent substantial changes in water quality, and only minimal ecological impacts on marine environment and associated wildlife would result. As the recorded coral species found within the Project area are in very low coverage and abundance, and it can tolerate more turbid water and high sedimentation, indirect impact on existing coral colonies due to change of water quality during the dredging activities would be considered as minor and insignificant.
- 14.7.8 As recommended under the water quality impact assessment of the approved EIA Report on Dredging Works for Proposed Cruise Terminal at Kai Tak, the maintenance dredging for the proposed cruise terminal should not be programmed in wet seasons (April to September) to minimize the potential water quality impacts. .

Other Measures

- 14.7.9 As described previously, impact of loss of artificial seawall habitats within the proposed dredging areas would largely be recovered since the re-construction of new seawalls would provide large area of hard substrata for settlement and recruitment of intertidal and subtidal assemblages similar to those previously recorded from existing habitats. As *Oulastrea crispata* is regarded as pioneer species and opportunistic in nature, it is very likely that coral recruitment and settlement of this species would be established rapidly within the Project area after the proposed marine works.

14.8 Evaluation of Residual Environmental Impacts

Terrestrial Impact

- 14.8.1 Residual impacts include net loss of 202.7 ha wasteland, 15.8 ha plantation/grassland mosaic and 0.7 km artificial coastline habitats. These habitats are considered to have limited ecological importance and upon completion of the Project most of these habitats would be replaced by new vegetated habitats in the proposed open space areas including the Metro Park under the Project. With proper designs (e.g. large vegetation cover, inclusion of native plant species bearing berries) and elements (e.g. lakes, nest boxes), the park would provide more diverse habitats for the uses of fauna assemblage currently utilising the existing habitats. Additionally, planting of native large trees of *Ficus microcarpa* would be provided along waterfront areas of the Project area that are favoured by waterbirds for roosting/nesting purpose. *Ficus microcarpa* is one of the common communal roosting / nesting plants for ardeids (HKBWS, 2005). This design would further improve the habitat quality in the future, as compared to the current condition. Residual impacts on terrestrial ecology caused from the Project are therefore considered as very minor and acceptable.

Marine Impact

- 14.8.2 With the effective implementation of mitigation measures proposed in **Section 14.7** above, residual impacts to marine ecology are expected to be relatively minor. The loss of artificial intertidal habitats would be largely recovered through the provision of the new seawall, which would provide suitable conditions for recolonisation by intertidal and subtidal flora and fauna. The translocation of those directly affected corals that are attached on movable boulders would minimise impacts to this species of conservation importance potentially affected by the proposed marine works. The most substantial residual impact would therefore be the loss of soft bottom benthic habitat, which is unavoidable. However, this habitat and the associated fauna are not considered of particular importance in terms of ecological value. Therefore, residual impacts resulting from the proposed marine works are considered as minimal and acceptable.

14.9 Evaluation of Cumulative Environmental Impacts

Terrestrial Impact

- 14.9.1 Potential cumulative impact on terrestrial ecological resources would be the cumulative disturbance impact to the nearby habitat (i.e. developed area) and the associate wildlife, especially birds arising from the increased level of human activities and noise during the construction and operation phases of the concurrent construction projects in the vicinity. Taking into account the highly developed nature and existing high level of disturbance in the Assessment Area, no unacceptable cumulative impact would be anticipated.

Marine Impact

- 14.9.2 There are a number of possible concurrent construction projects involving dredging and marine works that would be conducted in the vicinity of the Project area that may have cumulative effects on the deterioration of water quality in the Victoria Harbour and other far field sites. Water quality modelling conducted as part of the approved EIA on Dredging Works for Proposed Cruise Terminal at Kai Tak has modelled worst case scenarios that include all possible concurrent projects. The water quality modelling results indicate that the dredging and marine works undertaken for these possible concurrent projects would only result in a minor exceedance of WQO at Cape Collision Coral Area under the sensitivity test for the Gas Main Construction. However there was compliance over 99% of the time. No other exceedances of WQO's were predicted under any of the assessment scenarios. With the implementation of the mitigation measures recommended in the approved EIA Report on Dredging Works for Proposed Cruise Terminal at Kai Tak, the cumulative impact on change of water quality in the Project area would be effectively minimized and is expected to be acceptable.

14.10 Environmental Monitoring and Audit

Terrestrial Ecology

- 14.10.1 As only minor impacts on terrestrial ecology are identified in this assessment, no monitoring programme specific for terrestrial ecology is required under this Project.

Marine Ecology

- 14.10.2 To avoid and minimise potential loss of small and sparsely distributed coral colonies found in the Project area, it is recommended to translocate the directly affected corals within the Project area, as far as practicable, to the nearby suitable habitat such as Junk Bay where similar hydrographic condition and healthy coral communities of the same coral species were recorded. Coral translocation should be carried out during the winter season (November-March) in order to avoid disturbance to the transplanted colonies during the spawning period (i.e. July to October). A detailed translocation plan (including pre-translocation coral survey, translocation methodology and monitoring of transplanted corals) should be prepared during the detailed design stage of the Project. Pre-translocation survey on coral within the proposed dredging area(s) would be focused on identifying and mapping of coral colonies that would be directly impacted by the proposed dredging and investigating the translocation feasibility of these coral colonies (e.g. health status of coral colony). The detailed translocation plan (including pre-translocation coral survey, translocation methodology and monitoring proposal) and ecologist involved in coral translocation and monitoring should be approved by AFCD prior to commencement of the translocation exercises. It is also important to ensure that the proposed relocation of the coral colonies will not affect any private / public marine uses / rights at the recipient site.
- 14.10.3 It is recommended to implement monitoring of the transplanted corals after translocation, every 3 months for one year (this follows previous examples of post-translocation monitoring methodology, proposed in the EM&A Manual for Dredging Work for Proposed Cruise Terminal at Kai Tak). Information gathered during each post-translocation monitoring survey should include observations on the presence, survival, health condition and growth of the transplanted coral colonies. *Oulastrea crispata* is not expected to grow significantly over the one year monitoring period but previous study (Lam, 2000) has shown it to have a growth rate of 0.9-1.04 mm per month and thus, growth should be detectable over the 12 month post-translocation monitoring period. These parameters should then be compared with the baseline results collected from the pre-translocation survey.

14.10.4 The mitigation measures for coral colonies to be implemented for the dredging works for the proposed cruise terminal are detailed in the approved EIA Report and Environmental Monitoring and Audit (EM&A) Manual on Dredging Works for Proposed Cruise Terminal at Kai Tak.

14.11 Summary

Terrestrial Ecology

14.11.1 Literature review and recent reconnaissance surveys identified five habitat types within the Assessment Areas of this Project, including developed area, wasteland, plantation/grassland mosaic, watercourse and artificial coastline. Considering their highly artificial and disturbed nature, all the identified habitats are considered of very low to low in ecological values.

14.11.2 No area of conservation importance is located within the Assessment Area. However, nine bird species of conservation importance, including Little Egret, Great Egret, Cattle Egret, Grey Heron, Black-crowned Night Heron, Chinese Pond Heron, Great Cormorant, Black Kite and Greater Coucal were recorded in the Assessment Areas during the recent surveys. All the recorded species of conservation importance are common and widespread in Hong Kong.

14.11.3 Permanent loss of 202.7 ha of wasteland, 15.8 ha of plantation/grassland mosaic and 0.7 km artificial coastline in the former Kai Tak Airport would be resulted under the Project. These habitats were ranked as very low to low in ecological values and supported floral and faunal communities of low diversity with common and widespread species. In addition, provision of about 127 ha open space area, including a 24 ha Metro Park, with planting of native tree and vegetation species after the construction of the Project would provide more diverse and suitable habitats for the uses of existing fauna assemblages. The impact of habitat loss under this Project is therefore considered as very minor in nature.

14.11.4 Other impact of the Project would be the removal of about 2250 existing trees within the Project area. However, as all of the affected trees are common and widespread species of low ecological importance, potential impact to the vegetation was considered low. No protected species or other flora of conservation importance would be affected under this Project. To mitigate such impact, it is recommended that, as far as possible, compensatory planting should be provided in a ratio not less than 1:1 in terms of quality and quantity after the construction works.

14.11.5 Other potential impacts arising from the Project would be mostly temporary and recovered after the completion of the Project. Overall, no significant and unacceptable impact on terrestrial ecological resources was expected under this Project.

Marine Ecology

14.11.6 Literature reviews of existing information with supplement findings from recent field surveys indicated that identified marine habitats within the Project area are of generally very low ecological value. There are no ecological sensitive receivers, such as SSSIs, Fish Culture Zones and Marine Parks and / or Reserves and other areas of ecological importance or conservation interest, in and within the immediate vicinity of the Project area.

- 14.11.7 Marine habitats within the Project area include soft bottom seabed, artificial seawalls and subtidal habitats. All the identified habitats are considered to have a generally very low ecological value due to their highly artificial and disturbed nature. Species diversity and abundance in these habitats were low and no rare or restricted species was recorded. The species of conservation importance recorded within the Project area only include a single species of common hard coral (*Oulastrea crispata*) (but all colonies found are small in size, sparsely distributed and in very low coverage). All these species of conservation importance recorded within the Project area are common and widespread in other Hong Kong waters.
- 14.11.8 Direct and indirect ecological impacts arising from the Project were identified and evaluated. The Project will result in the temporary loss of approximately 74.4 hectares of soft bottom benthic and subtidal habitats, temporary loss of about 1.6 km long of artificial intertidal habitat and permanent loss of about 0.7 km long of artificial intertidal habitat. Considering that the benthic, subtidal and intertidal habitats within the affected areas are of generally very low ecological value and direct impact on some isolated coral colonies would largely be mitigated by translocation, no significant adverse impact is expected.
- 14.11.9 Other indirect impacts arising from the Project would be temporary and minimised with implementation of proper mitigation measures. Overall, no significant and unacceptable ecological impact on marine resource is anticipated in this assessment.

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