

13 ECOLOGY IMPACT

13.1 Introduction

- 13.1.1 In accordance with the EIA findings of this Project, the Project would not result in adverse impact on terrestrial ecological resources during both construction and operation phases. All directly impacted habitats under this Project are considered of having very low to low ecological values. Only removal of individual trees of common species would be resulted and such impact would be mitigated by compensatory planting. Potential disturbance impact to the nearby habitats and associated wildlife during construction phase is considered temporary and minimal in nature. As only minor impacts on terrestrial ecology are identified in the impact assessment, no monitoring programme specific for terrestrial ecology is required under this Project.
- 13.1.2 The marine ecological impact assessment conducted for this Project concluded that impacts from the proposed marine works were mainly associated with the direct loss of marine habitats and associated marine life due to dredging activities at the Kowloon Bay. To avoid direct loss or damage to any species of conservation importance, translocation of the existing coral colonies within the proposed dredging areas that would be directly affected by proposed dredging works was recommended in the assessment. In terms of ecological importance, the assessment indicated that the affected habitats were considered as generally very low in ecological values and direct impact on some isolated coral colonies would be mitigated by coral translocation. Thus no significant adverse direct impact on marine ecological resources is expected to occur.
- 13.1.3 Other indirect impacts on marine ecology arising from this Project are considered temporary and minor in nature. With the implementation of appropriate mitigation measures (e.g. water quality and noise control measures, coral translocation and re-construction of new artificial seawalls), it was concluded that ecological impact on marine life and species of conservation importance such as corals would be minor and acceptable under this Project.

13.2 Mitigation Measures for Corals

Measure for direct coral impacts

- 13.2.1 Recent coral surveys revealed that coral colonies that would be directly affected by the proposed dredging works was low in species diversity (only one species) and coverage (1 – 5%)¹, generally small in size and only included a single species of common hard coral. The subtidal habitat was therefore considered as low ecological value. Nevertheless, as most of the coral colonies recorded in the Project area are attached on rocks and boulders and the recorded species is not competitive and aggressive in nature, they are considered as suitable for coral translocation. Coral translocation exercise has been successfully carried out in other part of Hong Kong water in the past² and post-translocation monitoring showed that no adverse impacts on the transplanted coral were resulted from the translocation exercises.

1. Estimated percentage of coral cover area within 100 m x 2 m REA survey area according to the seven standard ranked categories in REA as specified in DeVantier, L.M., G. De'ath, T.J. Done and Turak, E. (1998). *Ecological Assessment of a Complex Natural System: A Case Study from the Great Barrier Reef. Ecological Applications* 8:480-496.

2. Black & Veatch. (2005). Proposed Extension of Public Golf Course at Kau Sai Chau Island, Sai Kung EIA report.

- 13.2.2 In this Project, the assessment recommended to translocate the potential directly affected coral colonies 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. To maximize the successfulness of this translocation exercise, the coral recipient sites should be as near as possible to the existing coral site and with similar healthy coral communities of the same species as well as similar hydrographic condition such as Junk Bay. In addition, 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). The translocation exercise should be conducted before the commencement of construction phase of the Project.
- 13.2.3 Separate but adjacent recipient sites are proposed for corals identified in the Cruise Terminal dredging area and coral identified in the runway gap dredging area. See **Figure 13.1** for the location of the two proposed recipient sites.
- 13.2.4 Translocation work should meet the following criteria in order to increase the effectiveness of this mitigation measure:
- Proposed recipient site should compose of healthy coral communities of same species and similar hydrographic condition
 - The translocation process should be completed as quick as possible to minimize stress on transplanted corals during the transportation to recipient site
 - Coral colonies should be moved with lifting bags underwater and submerged in seawater with aeration onboard
 - Coral colonies should be transplanted at similar depth and orientation as the existing coral site
- 13.2.5 General steps for the whole coral translocation exercise are suggested below and should be followed:
- Locate a suitable recipient site for transplanted corals before commencement of coral translocation works;
 - Collect baseline information (e.g. total number of coral colonies to be translocated, health status, attached boulder size, etc.) of transplanted coral colonies in pre-translocation survey before commencement of coral translocation works;
 - Tag the transplanted coral colonies one by one in the pre-translocation survey;
 - Record the size, depth and orientation of each tagged coral colonies in the pre-translocation survey;
 - Move boulders with transplanted coral colonies from sea bottom to ship/boat with lifting bag;
 - Submerge transplanted coral colonies in large plastic bucket filled with seawater with aeration onboard;
 - Transport coral colonies to recipient site as quick as possible;
 - Place the transplanted coral colonies in the recipient site in similar depth and orientation as the existing coral site;
 - Record information (e.g. health status, translocated location of tagged coral, etc) of transplanted coral colonies upon the completion of translocation works; and
 - Carry out post-translocation monitoring on transplanted coral colonies every three months for a year after completion of coral translocation works.

- 13.2.6 A detailed translocation plan (including identification of recipient site, pre-translocation survey, translocation methodology, monitoring of transplanted corals, etc.) should be drafted during the detailed design stage of the Project. The translocation plan should be proposed by the ET in agreement with the IEC and should be approved by AFCD prior to the commencement of coral translocation exercise and monitoring programme. All coral survey, translocation and monitoring exercises should be carried by qualified marine specialist who has suitable coral knowledge and sound experience in identifying corals in field situation, and to be approved by AFCD as well.

Measure for indirect coral impacts

- 13.2.7 During dredging operations, a number of mitigation measures to control water quality would be adopted to confine sediment plume within proposed dredging area and to minimize indirect impact to the nearby coral colonies outside the proposed dredging areas. Possible mitigation measures include the following:

- Installation of silt curtains during dredging activities.
- Use of tightly-closed grab dredger.

- 13.2.8 These mitigation measures are expected to result in no substantial changes in water quality, and only minimal ecological impacts on marine environment and associated wildlife would be resulted. The recorded coral species within the Project area is very common and widespread in Hong Kong marine waters and in view of its special tolerance to extreme environment such as turbid water, indirect impact of change of water quality on those existing coral colonies caused from the dredging works is expected to be minor and acceptable.

13.3 Coral Monitoring Requirement

- 13.3.1 Although adverse impact on coral colonies within the Project area was not predicted to occur after implementation of the suggested mitigation measures, post-translocation coral monitoring was proposed in the EIA report as an additional measure to verify the effectiveness of the suggested mitigation measures.

Pre-translocation Survey

- 13.3.2 Prior to the commencement of coral translocation, baseline survey of corals should be conducted within the direct impact area (**Figure 13.2**). All the potential directly impacted coral colonies should be tagged. For each tagged coral, specific detailed information should be collected including location, size, depth, attached rock/boulder size and general condition of their immediate surroundings. Tagged coral colonies should also be identified to the highest taxonomic resolution as far as practicable. The condition of each tagged coral colony should also be recorded by taking a photograph from an angle that best represents the entire colony.

- 13.3.3 The health status of each tagged coral colony should be carefully recorded. For hard corals, this should include information on existing surface area with partial mortality and bleached area. Two categories of bleached area should be recorded:

- Blanched (i.e. paled)
- Bleached (i.e. bleached white)

- 13.3.4 Blanched coral tissue would appear pale due a loss of zooxanthallae or photosynthetic pigments. In contrast, bleached areas would appear white due to the white colouration of the skeleton visible through the transparent coral tissue. This bleaching would occur due to total loss of zooxanthellae. The coral tissue would still be present. It is possible that the lower portions of the coral tissue remain unbleached and would therefore help in differentiating bleached areas as opposed to partial mortality areas where the coral tissue would be absent.
- 13.3.5 For each tagged hard coral colony, sediment cover should be recorded including percentage cover, colouration, texture and approximate thickness of sediment on the colony itself and on adjacent hard substrate. Any contiguous patches of sediment cover >10% should be counted. To aid percentage cover estimates, a 50 cm x 50 cm quadrat equipped with 10cm spaced string grid should be used.

Coral post-translocation monitoring

- 13.3.6 After translocation, the transplanted coral colonies should be regularly checked by qualified marine ecologist(s) to be approved by AFCD quarterly for one year after translocation. Dive surveys for post-translocation monitoring should collect the same information for tagged corals as the baseline survey. Information gathered during each post-translocation monitoring surveys should include observations on the presence, survival, and health conditions of the transplanted coral colonies and growth of the transplanted coral colonies. *Oulastrea crispata* is not expected to grow significantly over the one year monitoring period but previous study³ 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.
- 13.3.7 It should also include condition of the surrounding environment as well as weather, visibility, sea and tidal conditions. Each tagged coral should be photographed as far as possible maintaining the same aspect and orientation as photographs taken for the baseline survey. Detailed monitoring proposal should be drafted during the detailed design phase of the Project and be approved by AFCD prior to the commencement of coral translocation.
- 13.3.8 All tags should be removed / retrieved after the monitoring programme is completed.

Reporting

- 13.3.9 A baseline survey report should be submitted to AFCD prior to the commencement of coral translocation exercise.
- 13.3.10 Post-translocation monitoring report should be submitted to AFCD within 2 weeks after the completion of coral translocation and each quarterly monitoring survey. The results of the post-translocation monitoring surveys should be reviewed with reference to the baseline survey results and findings of the condition of surrounding environment.

3. Lam, K.K.Y. (2000). Early growth of a pioneer recruited coral *Oulastrea crispata* (Scleractinia, Faviidae) on PFA-concrete blocks in a marine park of Hong Kong, China. Marine Ecology Progress Series 205: 113-121.