Expansion of Hong Kong International Airport into a Three-Runway System

Marine Ecology and Fisheries Enhancement Plan

August 2014
Airport Authority Hong Kong

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Appendix

A – Existing Marine Parks Management Plan

1. Introduction

1.1 Background

1.1.1 The proposed Three-Runway System (3RS) will involve around 650 ha of land formation resulting in direct loss of marine ecology and fisheries habitats / fishing grounds. In particular, the loss of 650 ha of habitat for Chinese White Dolphins (CWD), also known as Indo-Pacific Humpback Dolphin (*Sousa chinensis*), is evaluated to be of high impact to the Hong Kong sub-population of the CWD. A new area of Marine Park (approx. 2,400 ha) is therefore proposed to help mitigate expected marine ecological and fisheries environmental impacts and provide a positive influence on restoration and recovery of marine ecological and fisheries resources in affected waters. The proposed Marine Park will provide critical linkages between the current Sha Chau and Lung Kwu Chau Marine Park (SCLKCMP) with an area of 1,200 ha and the planned Brothers Marine Park (BMP) with an area of 850 ha. Together, all three Marine Parks would make up about 4,450 ha of marine protected area, significantly improving the conservation prospects for the Hong Kong sub-population of CWDs after it is in place by effectively mitigating the impacts of habitat loss, fragmentation, changes in patterns of habitat use, as well as minimising the noise and disturbance from marine traffic, especially high-speed ferries (HSFs). Furthermore, habitat enhancement is expected to occur over time in particular from the expanded matrix of marine protected area, potentially bringing benefits to ecological and fisheries resources.

1.1.2 A management plan for the proposed Marine Park will be formulated, in consultation with AFCD, covering information on the responsible departments for operation and management (O&M) of the Marine Park, as well as the O&M duties of each of the departments involved. The management plan will be submitted to Director of Environmental Protection (DEP) for approval before the commissioning of the 3RS project.

1.1.3 Notwithstanding this, further measures are also recommended to enhance marine ecology (including health and survivability of the CWD) in North and Southwest Lantau waters. Furthermore, the Airport Authority of Hong Kong (AAHK) has noted concerns raised by fishermen during 3RS EIA engagement activities over impacts arising from the proposed 3RS reclamation and it is anticipated that the significant increase in marine protected area (covering both the new Marine Park and the expanded airport marine exclusion zone) may also have negative impacts on some fishermen. To seek to expedite habitat / marine ecology recovery and enhancement and to address the impacts on and concerns of the fishermen (including to provide relief to affected fishermen), a Marine Ecology and Fisheries Enhancement Plan (MEFEP) is proposed to outline a tentative management plan of the new Marine Park for 3RS and to enhance the effectiveness of the new Marine Park with the intention of adding to existing management measures as defined in the Marine Parks Ordinance where feasible and practicable. The MEFEP comes under the Marine Ecology and Fisheries Enhancement Strategy (MEFES), the key concepts of which are presented in Section 13.13 of the EIA report.

1.1.4 It should be noted that the MEFES and associated enhancement and assistance initiatives are not intended to address or directly mitigate impacts as identified in the EIA as these are already addressed through specific construction practices, mitigation measures and monitoring programs also defined in the EIA. The range of measures recommended in the EIA include minimisation of land formation area, use of construction methods with minimal risk/disturbance, consideration of alternative alignment for pipeline diversion with minimal risk/disturbance, consideration of alternative treatment to existing pipelines after diversion, strict enforcement of no-dumping policy,

good construction site practices, water quality mitigation measures, pre-construction phase coral dive survey as precautionary measure, SkyPier HSF speed restrictions and route diversions, dolphin exclusion zones, acoustic decoupling of construction equipment, spill response plans, and construction vessel speed limits and skipper training as well as establishment of the proposed new Marine Park to tie in with the full operation of the 3RS.

1.1.5 The total area of the new Marine Park to be established for this project is approximately 2,400 ha, which is much greater than the loss of marine water habitat of 650 ha. With the full implementation of all of the proposed mitigation, and compensation/enhancement measures in place, it would be expected that there would be no significant residual impacts on the CWD sub-population in Hong Kong. It is considered not necessary to implement other / additional specific mitigation measures for other marine ecological resources, as the proposed establishment of Marine Park and the operation of future HKIAAA will also benefit the conservation of marine ecology.

1.1.6 Nonetheless, it is envisaged that enhancements and support initiatives as proposed in the MEFES will serve to further ensure that during and after the 3RS project a range of practicable actions and measures are taken giving cumulative benefit to marine ecology and fisheries in North Lantau Waters, including to those fishermen impacted by the 3RS development. It is proposed that the MEFES will be supported by AAHK committed funds to ensure key objectives can be achieved. The MEFES intends to achieve the following key objectives:

- Enhancement of habitats for marine ecology and fishery resources;
- Promotion of a sustainable fisheries industry (e.g. assisting fishermen in better coping with changes to their fishing activities resulting from the 3RS project and/or supporting initiatives that can enhance fisheries resources in western Hong Kong waters);
- Encouragement of scientific research and studies; and
- Promotion of environmental education and eco-tourism.

1.1.7 The Framework for MEFES has been developed based on the ecological and fisheries baseline information collected during the course of the 3RS Project EIA study and the on-going public consultation with different stakeholders.

1.1.8 Following this introductory section, the remainder of this Plan is set out as follows:

- Chapter 2 - provides detail on the existing legislative framework for Marine Parks and Marine Reserves;
- Chapter 3 - provides an outline of the tentative management plan for the new Marine Park;
- Chapter 4 - proposes measures to enhance marine ecology during the construction phase of the 3RS;
- Chapter 5 – proposes measures and examples on encouraging scientific research and studies as well as plans to focus additional CWD research on Mainland PRE CWD abundance and population biology in order to develop a conservation strategy framework for the whole PRE CWD population;
- Chapter 6 – introduces the broad approach on the promotion of environmental education and eco-tourism
- Chapter 7 - proposes the broad approach on promoting a sustainable fisheries industry

- Chapter 8 – summarises past and planned future stakeholder engagement activity in relation both to the future marine park designation and fisheries and marine ecology enhancement plans;
- Chapter 9 - provides details of the funding arrangements necessary to implement the MEFEP.

1.1.9 It is intended that the proposed MEFEP would be a dynamic document that is continually updated and developed during the various phases of the 3RS project, including pre-construction, construction, post-construction and operation.

2. Existing Marine Parks and Marine Reserves

2.1 Background

2.1.1 Hong Kong has a total sea area of approximately 1,650 km^2, which contributes to about 60% of the total area of Hong Kong. The distribution and diversity of Hong Kong's marine environment is influenced by various ocean currents and discharges from the Pearl River. It lies within the tropical and subtropical region, and the eastern waters are predominantly oceanic due to the seasonal monsoon currents, which bring warm water to Hong Kong during winter and allow the survival of hard coral species. On the other hand, the western Hong Kong waters are deeply affected by the Pearl River discharge especially during wet season, and is characterised by low salinity but high organic nutrient levels. This supports a rich diversity of marine fauna and flora and provides an essential nursery grounds for many coastal and oceanic fish and shellfish species. Due to the richness in fisheries and prey resources, the western waters of Hong Kong form important habitats for the CWDs.

2.1.2 To protect and conserve Hong Kong's existing marine environment from various anthropogenic threats such as sewage discharge, seabed dredging, dumping, coastal reclamation and destructive fishing, the Marine Parks Ordinance (Cap. 476) was enacted in 1995. It vests the Country and Marine Parks Authority the power to designate, control and manage Marine Parks and Marine Reserves under the advice of the Country and Marine Parks Board. The Marine Parks and Marine Reserves Regulation (Cap. 476A) was enacted in 1996 to prohibit and control certain activities within Marine Parks or Marine Reserve.

2.1.2.1 The Marine Parks Ordinance provides the following key protection to designated Marine Parks and Marine Reserves:

- Vessel speed restrictions to 10 knots;
- No person is allowed to moor or anchor a vessel in a Marine Park or Marine Reserve except under and in accordance with a permit or at mooring buoys or mooring sites provided by the Marine Parks Authority;
- The Marine Parks Authority may, if he considers it necessary in the interests of good management, prohibit or restrict the entry into, or movement within a Marine Park or Marine Reserve or part thereof of any person, vehicle or vessel;
- Commercial and group activities are controlled and require authorisation;
- Prohibition of fishing, hunting, collecting or possessing animals and plants in Marine Park or Marine Reserve, unless with a permit granted;
- Perturbation of the eggs, juvenile, or the nesting sites of any protected marine species is forbidden;
- Possession of destructive fishing devices including trawl nets, spear gun, explosives, chemicals or devices using electric charge is not allowed;
- Water skiing, jet skiing or water scootering are not permitted;
- All mariculture operations are prohibited;
- No person shall within a Marine Park or Marine Reserve deface, injure, soil or defile any notice, marker, buoy, facility or installation erected, used or maintained by the Marine Parks Authority; obstruct or pollute in any way any pool or body of water; or deposit any litter; and

- Damaging any shoreline features on a beach, mudflat, cliff or seabed is not allowed.

2.1.3 Marine Parks are set aside for conservation and recreation purpose, and no new development is allowed without prior approval in writing of the Marine Parks Authority. Furthermore the Country and Marine Parks Authority may, at its discretion, issue permits to conduct controlled activities such as fishing by bona fide fishermen or indigenous villagers, meetings, group activities, sports competitions and commercial activities.

2.1.4 Marine Reserves generally have a smaller area of coverage compared to Marine Parks but have much higher conservation value, controls are much more stringent than in Marine Parks. Activities are firmly restricted to scientific and education study for which prior authorisation has to be obtained. In addition, no swimming, diving and boating are permitted in Marine Reserves.

2.1.5 Wardens patrol the Marine Parks and Marine Reserve on a daily basis by both land and sea, day and night, and at irregular hours to take enforcement action against anyone who infringes the Marine Parks Ordinance or relevant regulations. Any contravention may lead to a fine of HKD 25,000 and one year imprisonment.

2.1.6 There are currently four Marine Parks and one Marine Reserve in Hong Kong. They are Hoi Ha Wan Marine Park, Yan Chau Tong Marine Park, SCLKCMP, Tung Ping Chau Marine Park and Cape D'Aguilar Marine Reserve.

2.1.7 All the Marine Parks in Hong Kong are managed so as to satisfy the needs of different users, while at the same time conserving the marine environment. Zoning Plan is devised as an effective management measure to fulfil the multi-functional purposes of Marine Parks. **Table 2.1** summarises some examples of zoning types in existing Marine Parks. Details of the Management Plan for each Marine Park are provided in **Appendix A.**

2.1.8 On-site notices and signboards are installed at prominent locations to notify visitors about the Marine Park regulations, code of conduct to observe when visiting the Marine Parks, natural setting and ecology of the surrounding area and other informative and education messages.

Table 2.1: Examples of zoning types in existing Marine Parks

Zoning Types	Purpose (and Location)
Anchoring Areas	• The only area in the marine parks where anchoring is allowed. Anchoring area is established to avoid improper anchoring activities which may result in coral damaging. (Hoi Ha Wan Marine Park, Yan Chau Tong Marine Park and Tung Ping Chau Marine Park)
Core Areas	• Core areas are designated to protect corals and other valuable marine lives. All fishing activities are prohibited inside core area. (Tung Ping Chau Marine Park)
Mechanized Vessels Prohibited Zone	• The entry of mechanized vessels in this zone is prohibited. This zone is used to protect the divers and snorkelers from collision by mechanized vessels in coastal area. (Hoi Ha Wan Marine Park)

Zoning Types	Purpose (and Location)
Inboard Vessels Prohibited Zone	• This entry of inboard mechanized vessels in this zone is prohibited. This area is used to protect corals in the shallow coastal area from collision by large inboard mechanized vessels. (Hoi Ha Wan Marine Park)

3. Preliminary Outline of the Marine Park Management and Enhancement Plan for 2,400 ha Marine Park under 3RS EIA

3.1 Background

3.1.1 As detailed in **Section 1.1**, in order to compensate for the 672 ha of seabed habitat and 650 ha of open waters habitat loss associated with the land formation for the 3RS project, the establishment of a new marine park matrix is proposed which would comprise an area of approximately 2,400 ha, which also provide critical linkages between the current SCLKCMP with an area of 1,200 ha and the planned BMP with an area of 850 ha.

3.1.2 A detailed study initiated and led by AAHK will be carried out after approval of the 3RS project to review relevant previous studies and collate available information on the ecological characteristics of the proposed area for Marine Park designation and review available survey data, marine traffic and planned development projects in the vicinity. Based on the results of the ecological study, a management plan for the proposed Marine Park will be formulated, in consultation with AFCD, which will be submitted to EPD for approval before the commissioning of the 3RS project.

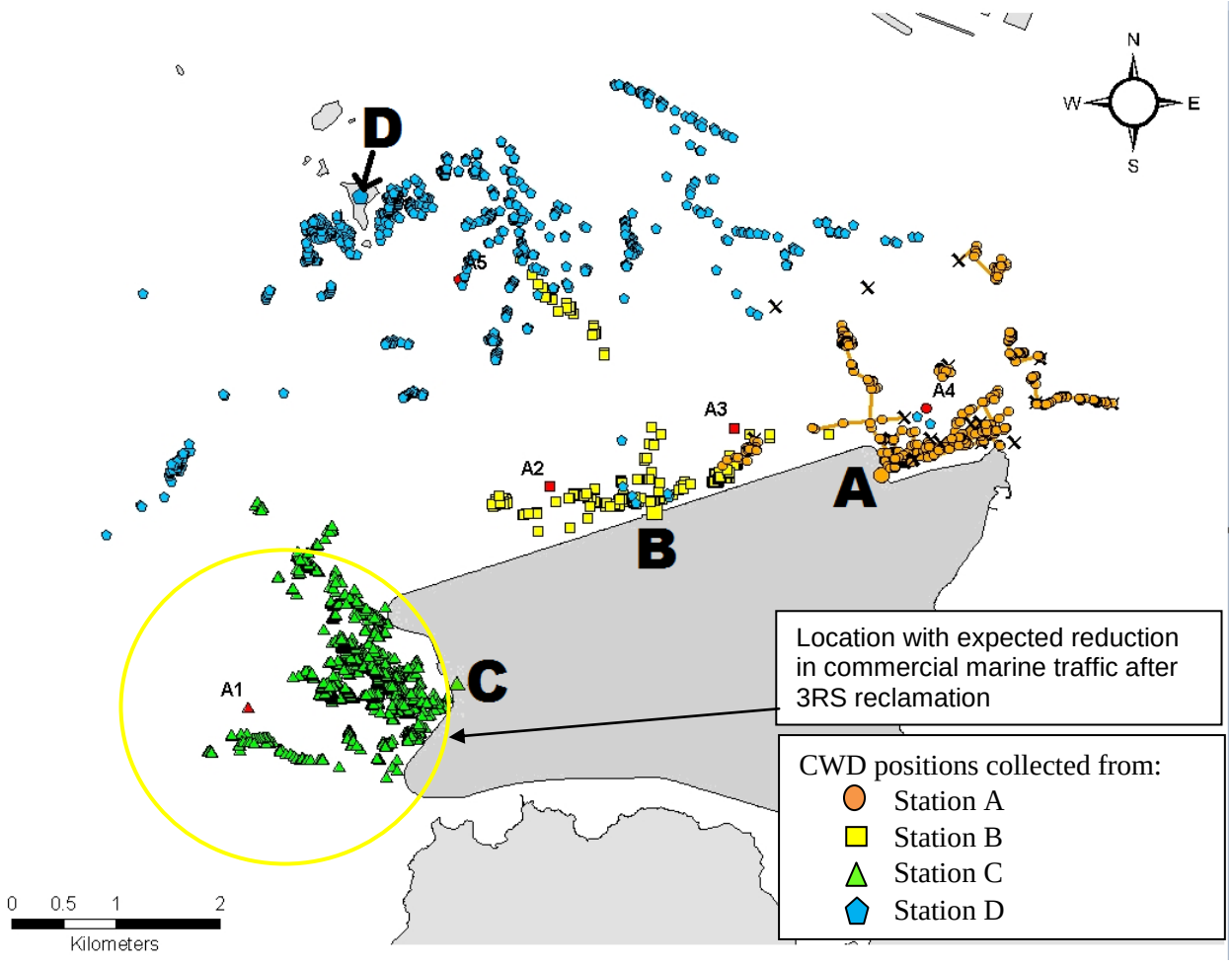
3.1.3 Nevertheless, based on the relevant survey findings as obtained for the 3RS EIA a tentative Marine Park management plan is outlined in this document to present the broad approach to be adopted for establishing the management plan.

3.2 Broad Approach to Setting up the Marine Park Management Plan

3.2.1 From the 3RS EIA survey findings, CWDs use the airport north and airport west survey areas (**Figure 3-1**) as part of their general habitat, with a variety of activities occurring in these areas. The evidence collected appears to point to their major use for travelling areas between feeding habitats to the east, at the Brothers and Sham Shui Kok, and to the west at the SCLKCMP and west Lantau area. The area very close to the western border of the airport seems to be used for at least some feeding, and may be useful for this function. The commercial marine traffic in area to the west of existing airport island (**Figure 3-1**) is anticipated to be low during the operation phase of 3RS. This is because with the airport island extended further to the north and west under the 3RS, a high proportion of marine traffic would be diverted approximately 1 to 1.5 km away from the existing western HKIA shoreline. Furthermore, these areas are adjacent to the critical CWD habitats in West Lantau water. Therefore, with fewer disturbances from the commercial marine traffic and the presence of Hong Kong International Airport Approach Areas (HKIAAAs) which are marine exclusion zones, CWDs may utilize the embayed areas in waters west of HKIA more frequently in future.

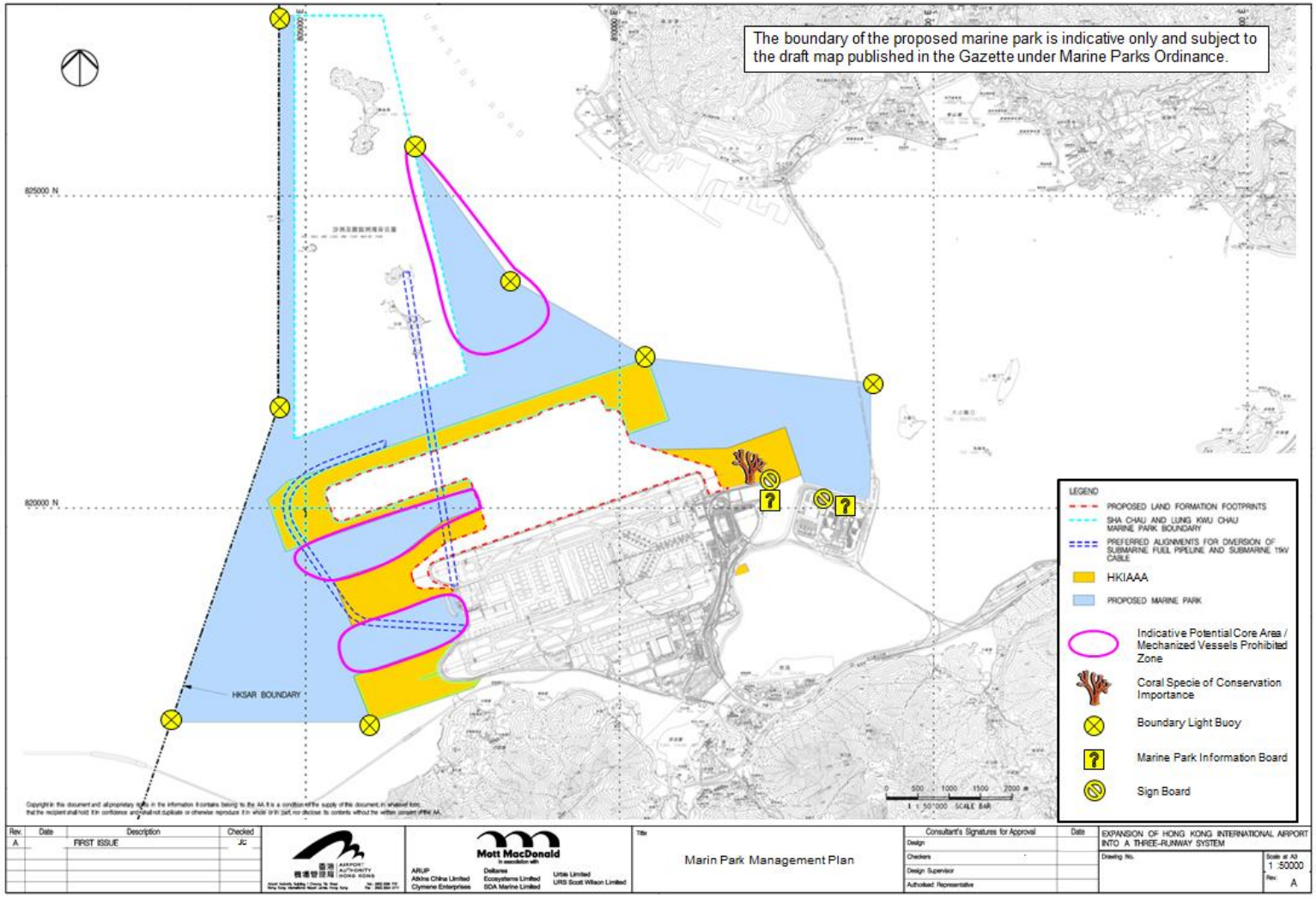
3.2.2 AAHK has in fact continued with the fine scale CWD monitoring of the Airport West area (as well as CWD monitoring in other areas) after completion of the 14 months surveys undertaken for the 3RS EIA in order to allow further observation and study of CWD behaviour over time in this area. This area is considered to have good potential for enhancement within the Marine Ecology and Fisheries Enhancement Plan and will be an important focus for initiatives.

Figure 3-1 Plots of CWD groups acquired from land-based stations



3.2.3 In view of the findings above, it is proposed to focus on waters west of HKIA as habitat enhancement areas. The two areas between the HKIAAA as indicated in **Figure 3-2** are proposed as potential core area or mechanized vessels prohibited zone. According to **Table 2.1,** core areas are designated to protect valuable marine species and all fishing activities are prohibited inside this area; while mechanized vessels prohibited zone can be designated to prevent collision between CWDs and mechanized vessels in coastal area, and is also expected to lead to decrease in fishing activities due to restricted fishing vessel types that can gain entry. It is envisioned that designation of these two areas as either core area or mechanized vessels prohibited zone can serve to protect the CWDs, while the zoning type is subject to detailed design and feasibility study, and consultation with stakeholders. Artificial reefs (AR) deployment and fish fry release may be considered at appropriate locations within the potential core area or mechanized vessels prohibited zone to enhance the marine ecological and fisheries resources, as detailed in **Section 4**. Another potential core area or mechanize vessels prohibited zone is identified outside eastern SCLKCMP, as it is shown to be an area with relatively high CWD density by AFCD Marine Mammal Monitoring Programme.

Figure 3-2 Tentative Marine Park Management



3.2.4 The following proposed marine park management measures will be developed by AAHK and these and potentially other measures would be proposed to AFCD for consideration in the Marine Park Management Plan:

- Core areas where fishing activities are prohibited may also be designated at areas where coral communities or coral species of conservation importance are recorded. These are subject to the findings of the detailed ecological study which will be initiated by AAHK upon after approval of the 3RS project.

- Net ingestion and fishing net entanglement have been cited as causes of death for CWDs in Hong Kong waters. As such, options may be explored to limit the activities of certain fishing gear types (e.g. gill nets) within the proposed Marine Park to reduce the risks of net entanglement that may cause injury to CWDs.

- Boundary light buoy, marine park information board and sign boards may be placed at prominent locations within the proposed Marine Park to demarcate the Marine Park boundary, and to notify users regarding the relevant regulations and control measures.

- Possible imposition of a fishing moratorium within the proposed Marine Park during the peak spawning seasons of several commercial fisheries species (i.e. April to July) as part of the Marine Park management approach.

3.3 Enhancement in the Proposed Marine Park

3.3.1 While a number of the management measures / controls / restrictions in a marine park are the responsibility of the marine parks Authority (i.e. AFCD and the Country and Marine Parks Board) certain initiatives and enhancements can be undertaken by others, if the support of the AFCD is forthcoming – for example initiatives serving to enhance the marine ecology within a marine park. During the development of the management plan, AA intends to explore all opportunities for enhancing the value of the new marine park and will seek assistance from the AFCD for implementing any identified initiatives that may further benefit marine ecology within marine parks, with viable proposals funded under the MEFEP.

3.3.2 After the 3RS Project is completed, the HKIAAA will be increased to approximately 729 ha, this area effectively a larger “fisheries no-take” zone that also has minimal anthropogenic disturbance leading to improved capacity for healthy marine habitat / marine life in this area. As illustrated in **Figure 3-3**, the 2,400-ha Marine Park that is proposed to be established to the North, West and East of the expanded HKIAAA would strengthen ecological connectivity for example between known CWDs hotspots and is also expected to enhance the ecological value of the existing SCLKCMP and the planned BMP (and to some extent the National Chinese White Dolphin Nature Reserve located in Mainland waters) due to the creation of important protected linkage and interconnection of a large total area of marine protected area.

3.3.3 The longer artificial seawall along the expanded Airport island would also provide opportunities for exploring design opportunities for eco-enhancement of the seawall at places where the water current would be optimal and/or the siltation effect would be minimal. Potential seawall eco-enhancement opportunities (see **Figure 3-3**) could involve promoting opportunities for re-

colonisation of marine wildlife including intertidal flora and fauna and especially the gorgonians that are localised in West Hong Kong waters.

3.3.4 Two possible locations (see **Figure 3-3**) are suggested for Artificial Reef (AR) deployment (**Figure 3-4**) within the proposed Marine Park area to promote fisheries resources recovery. These two locations are in the new embayed area that will be formed to the west of the airport expansion area and within the future HKIAAA where hydrodynamic effects and wave action are expected to be less significant and similar to the existing conditions in waters west of HKIA.

3.3.5 ARs could provide hard substrates for recolonisation of marine fauna that are expected to be beneficial to fisheries resources. Based on the AFCD monitoring programme between 2000 and 2006, the existing AR deployment sites to the west of Sha Chau have managed to attract species of high commercial value and rocky/hard habitat species. In the EIA Report for the Hong Kong-Zhuhai-Macau Bridge Hong Kong Boundary Crossing Facilities (HZMB HKBCF), it is also recommended to provide ARs as ecological and fisheries compensation and enhancement measures. Moreover, based on the AR deployment case at Parker Point in the industrial port of Dampier, Western Australia, corals were found to be successfully colonised on the AR although the turbidity was high. Local rocks, recycled concrete sleepers and reef balls have been used for AR construction in the case of Parker Point, and these AR types may also be considered for deployment in western Hong Kong waters. Nevertheless, prior to the AR deployment in the proposed Marine Park, a detailed study will be conducted to investigate and develop the types of AR which would best be suited to the hydrodynamic conditions and water quality within western Hong Kong waters, to ensure their longevity and effectiveness, which will be subject to review by marine mammal and fisheries experts to determine the overall benefits of additional AR deployment to marine ecosystems. If supported and found to be of ecological value, AA would initiate and fund such proposals under the MEFEP.

3.3.6 Restocking of fish fry (**Figure 3-5**) at the new AR sites may also be of value. Fish fry species which may be considered for restocking include those of high commercial value (e.g. Green Grouper and Russell's Snapper) and prey species of CWDs (e.g. Mullet and Yellow Croaker). Details of the proposed fish fry restocking shall be subject to feasibility study during the detailed design stage and again if found to be of ecological value, AA would initiate and fund such initiatives under the MEFEP.

Figure 3-3 Proposed Enhancement Measures for the Marine Park upon its Designation

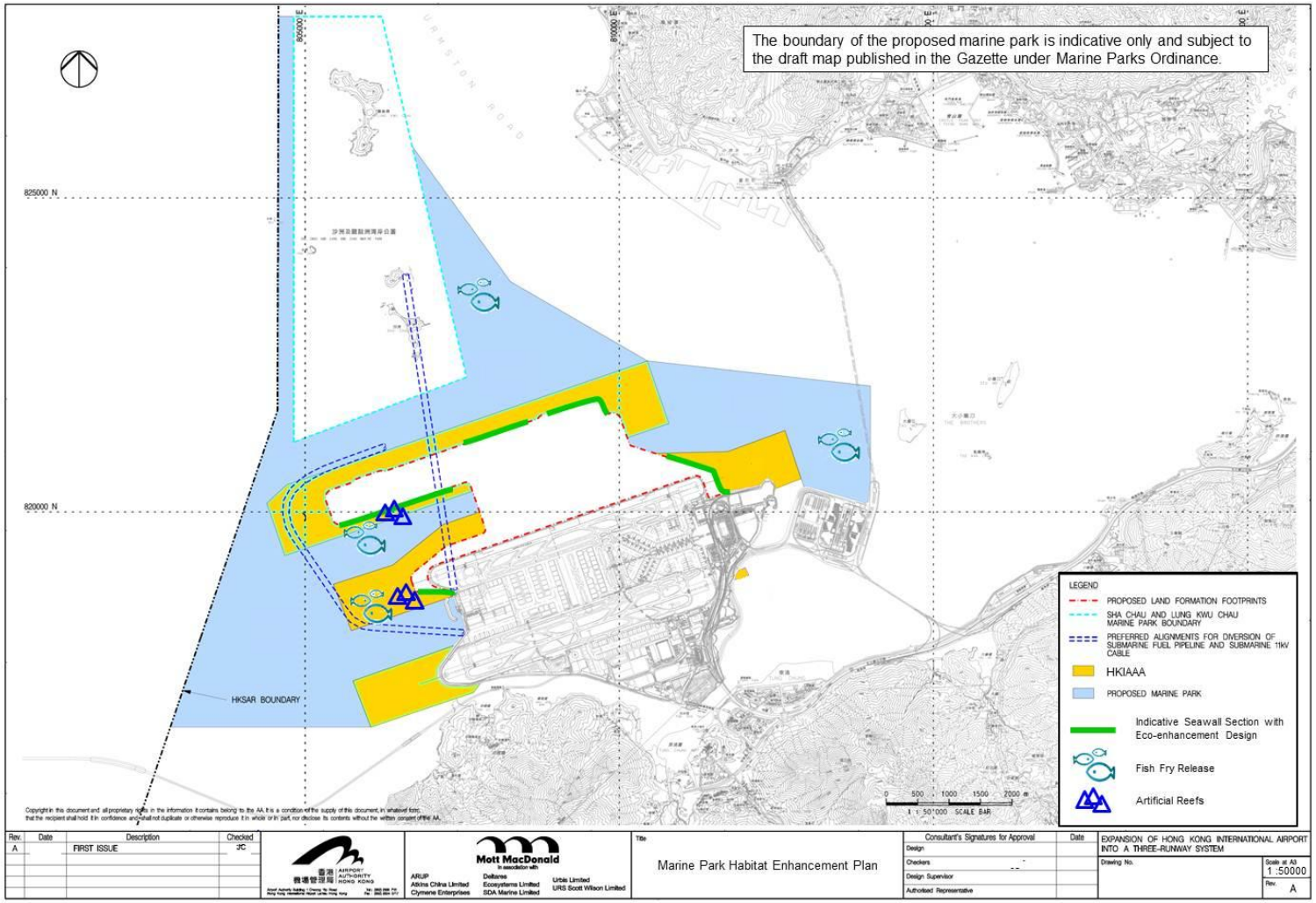


Figure 3-4 Example of artificial reef – reef ball

Figure 3-5 Fish fry restocking (AFCD, 2006)

3.4 Implementation and Timing

3.4.1 The management plan together with the enhancement measures for the proposed Marine Park will be prepared, in consultation with AFCD, covering information on the responsible government departments for O&M of the Marine Park, as well as the O&M duties of each of the departments involved. The management plan together with the enhancement measures will be submitted to EPD before the commissioning of the 3RS project.

4. Additional Enhancement of Marine Habitats During Construction Phase of 3RS Project

4.1 Background

4.1.1 Long-term AFCD studies identify Northwest Lantau waters as important habitat for CWDs. Hotspots of CWDs have been identified in AFCD studies including in the area to the Northeast of HKIA, the waters around Sha Chau and Lung Kwu Chau and at West Lantau waters. The establishment of SCLKCMP for the purpose of providing a protected marine environment for the inhabitation of CWD is successful, however, recent findings from the long-term AFCD monitoring effort have identified a declining trend in CWD numbers in Hong Kong. It is also recognised that high-speed vessels travelling in waters to the north of HKIA may lead to lower usage of such waters by CWDs. In order to enhance the CWD habitats in these waters, especially the existing SCLKCMP and the planned BMP, it is proposed to improve the ecological connectivity among these habitats and to reduce potential disturbance from marine traffic in Northwest Lantau waters. While these issues are not arising from the 3RS project, AA will strive to commit on any initiatives that would bring a better environment for the conservation effort of CWDs in HK.

4.1.2 In the course of the EIA study, marine ecological and fisheries baseline surveys have been conducted within the existing HKIAAAs, where no vessel entry is allowed for security reasons (with the exception of rescue vessels, Marine Police Patrol and a limited number of other vessels with special access permits). Based on survey results, corals and intertidal communities were found along the intertidal and sub-tidal zones of the existing Airport island artificial seawalls. CWDs were also recorded in HKIAAA waters as were fisheries resources with commercial values. Findings suggest that marine protected areas (with suitable substrates and minimum marine traffic disturbance) would be suitable areas for promoting the re-colonization of marine wildlife.

4.2 Early Enhancement Measures Proposed in North Lantau Waters

4.2.1 In addition to the mitigation measures proposed in Section 13.11 of the EIA report, there are areas within North Lantau waters which can be targeted as potential habitat enhancement areas during the construction phase of the 3RS, well in advance of the actual designation of the proposed Marine Park. Certain areas can be identified because they support marine ecological habitat of value and because they are outside the proposed land formation works area are not likely to be directly impacted by construction activities as illustrated in **Figure 4-1**. For example, the waters immediately to the west of HKIA are initially proposed as habitat enhancement areas from the earliest stages of construction because the commercial marine traffic in these waters is anticipated to be low in future. Therefore, measures implemented by AAHK within these identified areas to enhance these habitats are expected to encourage more abundant marine ecology and fisheries resources, which in turn may further attract CWDs to use these areas as a de-facto dolphin protection zone.

The key elements of these early enhancement measures are:

- Restrict SkyPier HSFs and construction vessels from entering these areas under normal circumstances (under exceptional circumstances, SkyPier HSFs and construction vessels

may be permitted to enter, however speeds would be limited to 15 knots or less and 10 knots respectively when in these areas; and

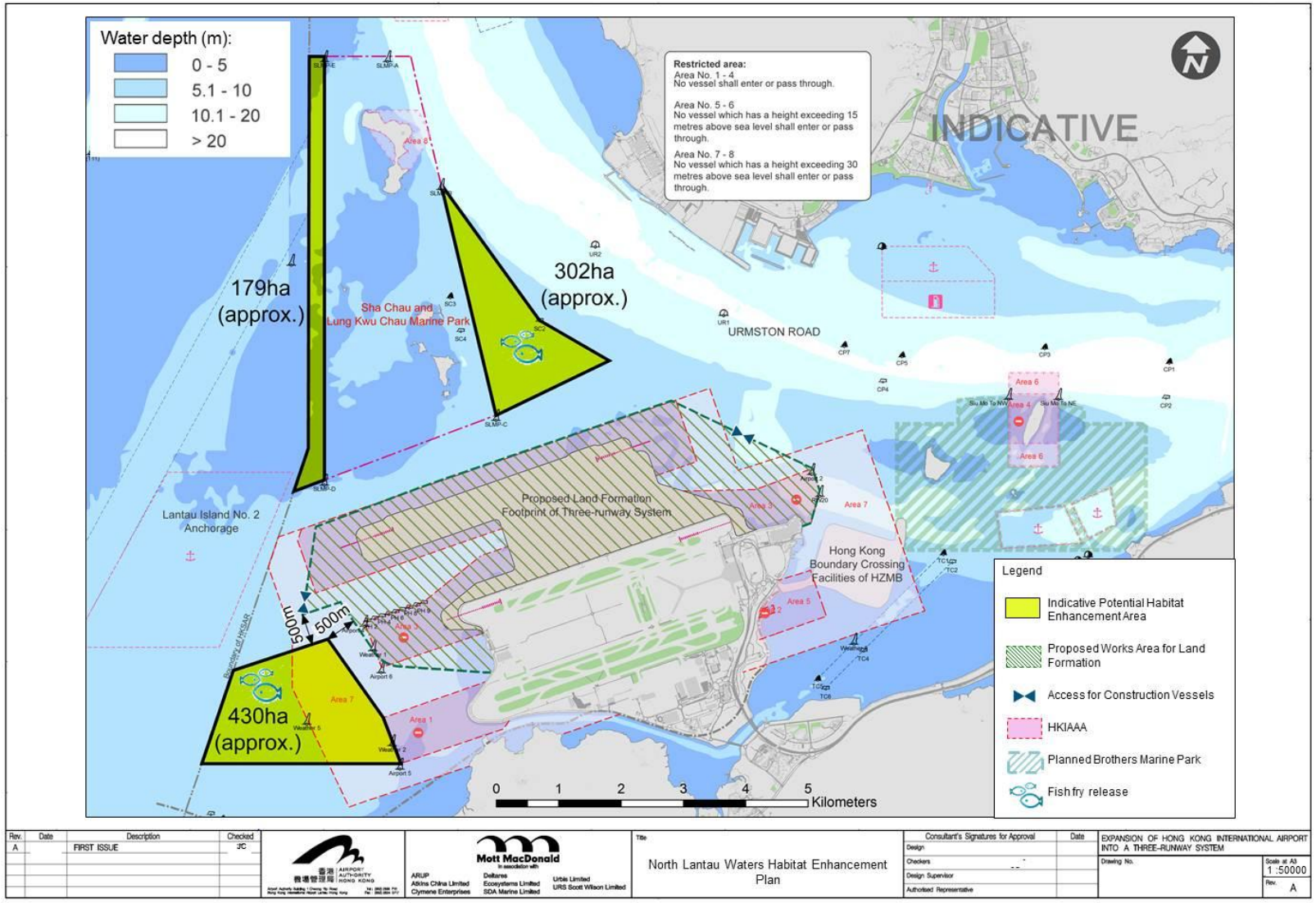
- Develop and work to implement various conservation and fisheries enhancement measures within these areas, e.g., restocking of fish fry at the tentative locations as indicated in **Figure 4-1**, subject to advice from marine mammal and fisheries experts.

As the designation of the marine park is potentially subject to a long statutory and stakeholders engagement process, AAHK's commitment to initiate early enhancement measures during the construction phase of 3RS project is expected to result in early ecological benefits in these areas well in advance of designation to tie in with the commissioning of 3RS project.

4.2.2 Restocking of fish fry has been explored as another possible measure to enhance fish resources in north Lantau waters. Fish fry and shrimp seedling restocking is recommended for the 3RS project in the waters west of HKIA and waters to the east of SCLKCMP (see **Figure 4-1**). This enhancement measure together with the enhancement measures in the planned BMP may provide a synergistic effect for fisheries resources enhancement in north Lantau waters.

4.2.3 Thorough investigation into the feasibility of implementing the above proposed measures will commence after the approval of the 3RS project. AAHK will also explore other potential enhancement measures of value and will consult relevant stakeholders such as fishermen, and discuss and seek support from AFCD prior to the implementation of the proposed measures. The design and implementation of the enhancement measures will be overseen by the Fund Management Committee (see **Section 9**).

Figure 4-1 Potential Habitat Enhancement Areas in North Lantau Waters during Construction of 3RS



4.3 Supporting Protection of CWDs in SCLKCMP

4.3.1 In addition to the construction phase enhancement of marine habitats, there are a number of other potential enhancement measures that can serve to further contribute to territory-wide CWD conservation. While these measures are outside the ambit of 3RS EIA, AA strives to further demonstrate our commitment in enhancing the carrying capacity of the existing CWD hotspots. Apart from the potential habitat enhancement initiatives as described in **Section 4.2** above, it is also proposed to investigate the feasibility of implementing measures to support protection of marine ecology habitats, for example at SCLKCMP during the construction phase of 3RS. One example is the exploration of enhancements within the SCLKC marine park. It is expected that for the duration of the planned 3RS project construction period, CWDs would be able to continue to safely use the SCLKCMP as key habitat, with the MP and adjacent areas continuing to be a healthy habitat and serving as potential shelter areas for CWDs, including those CWDs that may be temporarily displaced by 3RS marine works disturbances.

4.3.2 Successful enforcement of the Regulations as specified in the Marine Parks Ordinance is key in ensuring that a Marine Park is able to serve its function. While it is known that Marine Parks Wardens patrol Marine Parks daily, AAHK proposes additional surveillance on a voluntary basis that can support long-term preservation and protection of the marine environment within the existing SCLKCMP (as well as the proposed Marine Park in future). These measures include:

- Deploy land or vessel-based observers to actively watch out for any non-adherence to Marine Park Regulations (e.g. use of destructive fishing methods or non-compliance with vessel speed restrictions) and report such activities and concerned vessel information to AFCD; and
- Deploy those surveyors who conduct land-based and vessel-based dolphin monitoring surveys for AAHK to also take note and report apparent non-compliance with Marine Park regulations to AFCD.

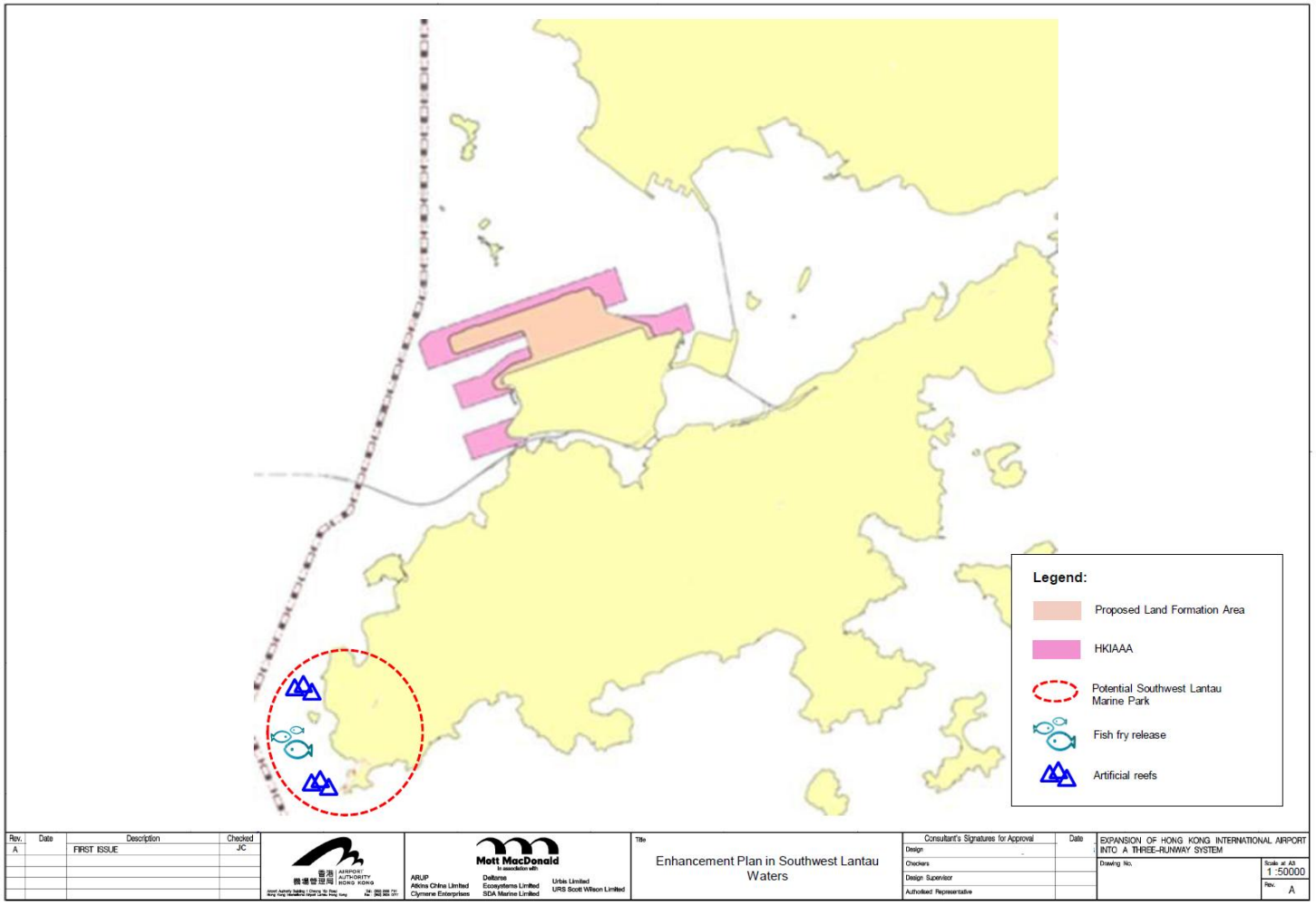
4.3.3 AAHK will liaise with and consult AFCD and the Country and Marine Parks Board on the feasibility of implementing these proposed measures.

4.4 Enhancement in Southwest Lantau Waters

4.4.1 It is suggested to consider implementing enhancement measures for example including AR deployment and fish fry restocking in southwest Lantau waters (see **Figure 4-2**) in order to enhance fisheries resources in southwest Lantau waters during the construction phase of 3RS. Details of the enhancement measures are subject to completion of feasibility studies during the detailed design stage as well as potential stakeholder engagement. Again, while the southwest Lantau waters is far away from the 3RS project area and outside the ambit of 3RS project, and that there is no impact anticipated to this CWD hotspot due to the 3RS works, AA would strive to demonstrate our commitment in enhancing the marine ecology and carrying capacity of this existing CWD hotspot.

4.4.2 AA proposed to fund and support other early initiatives that may lead to enhancement of the marine environment in SW Lantau waters, for example scientific research and study, with potential examples listed in section 5.2.2 as well as initiatives that promote environmental education and eco-tourism, these initiatives potentially leading to improvements in health and survivability of CWDs in Hong Kong.

Figure 4-2 Enhancement of Southwest Lantau Waters during Construction of 3RS



4.5 Dolphin Stranding Response and Education Programme

4.5.1 It is noted that the Ocean Park Conservation Foundation Hong Kong (OPCFHK) has a Stranding Response Team, who collaborates with AFCD to investigate every reported dolphin stranding in Hong Kong waters. To build on this initiative, AAHK proposes to work in collaboration or support OPCFHK in areas concerning the dolphin stranding response and education programme from the commencement of the construction phase of 3RS, with funding from the Marine Ecology Enhancement Fund (MEEF) (see **Section 9**). The programme will tentatively comprise the following key components:

- To take a proactive approach to identify any potential dolphin injury cases through regular patrolling, and to make early reports of dolphin carcasses found such that fresh biopsy samples can be taken to improve understanding of their biology and cause of death;
- To allocate more resources (e.g. manpower and hardware) to shorten the response time to rescue dolphins or to retrieve dolphin strandings upon receipt of reported dolphin stranding cases, and to shorten the transport time of dolphins (alive or dead) back to the care facilities at Ocean Park;
- To support veterinary programme in local tertiary institution and conduct international experience-sharing workshops to gain knowledge on dolphin care and handling, and improve the chances of survival for stranded dolphins;
- To support the setting up of a centralised laboratory which can facilitate the dolphin necropsy and pathological investigations;
- To establish a standardised dolphin necropsy protocol (e.g. toxicology tests and genetic markers) to facilitate assessment of health status of dolphins and causes of death;
- To build up and strengthen the regional marine mammal stranding response network through capacity-building workshops; and
- To promote public awareness on the dolphin stranding response programme and the means to report potential dolphin stranding cases e.g. through the development of a smart phone application to assist in the speedy reporting of stranded marine mammals to support OPCFHK efforts.

4.6 Implementation and Timing

4.6.1 The preliminary study provides the proposed enhancement concepts, examples and the possible location for deployment of such measures. Details of the enhancement measures such as eco-enhancement seawall design, AR deployment and fish fry restocking are subject to additional feasibility studies and further design development after 3RS project approval. It is proposed to implement the various enhancement measures during the construction phase of 3RS.

5. Encourage Scientific Research and Studies

5.1 Background

5.1.1 AFCD has been undertaking a long-term monitoring programme on marine mammals in Hong Kong waters since 1995. This programme has contributed towards understanding of the trends on marine mammals' populations, distribution and behaviour around the Hong Kong waters. However, continuous changes in marine environment as a result of various factors such as climate change, development of marine infrastructures, fish trawl ban and improvement of marine water quality due to Harbour Area Treatment Scheme have led to changes in their abundance and distribution. As such, further scientific researches and studies, utilising existing and new marine mammals monitoring technique, are required to collate more scientific data on marine mammals in both Hong Kong and the Pearl River Estuary (PRE). Information including but not limited to their travelling routes, hotspots, day-time and night-time behaviour are considered as crucial for the development of effective and practicable conservation and protection measures for marine mammals.

5.1.2 While literature review and field surveys conducted for the EIA report had generated a relatively comprehensive marine ecological profile in North and Northwest Lantau, in view of the changing environment and seascapes due to the implementation of different development projects, it is considered necessary to conduct continuous monitoring for marine ecology in Western Hong Kong waters. This will supplement updated baseline information essential for the development of measures to protect and enhance marine fauna and flora in this area. In particular, focus will be given to habitats and species of conservation importance, such as seagrass beds, horseshoe crabs and pipefishes. In addition, the effectiveness of the enhancement measures proposed in **Section 3**, such as the eco-enhancement seawall design and deployment of AR need to be evaluated through the monitoring surveys.

5.1.3 Official up to date information on fisheries resources and operations in Hong Kong is limited. A Port Survey is periodically conducted by AFCD to collect information regarding the fishing operations in Hong Kong; however the last Port Survey was conducted back in 2006. Information on fisheries resources, spawning and nursery grounds for commercial fisheries is still largely derived from results from the Fisheries Resources and Fishing Operations in Hong Kong Waters study, which was commissioned by AFCD in 1996. With the fish trawl ban effective on 31 December 2012, the fishing operations in Hong Kong waters are thought to be changing, with the effect of trawl ban on the fisheries resources best identified via long term monitoring and studies. In general, more scientific research and study of fisheries resources and operations would help to provide necessary and useful data for proper planning and development of a fisheries enhancement strategy for Lantau waters.

5.2 Key Areas for Scientific Research and Study

5.2.1 AA will provide funding support to useful scientific research and studies undertaken for example by NGOs or academics (see section 9) with the aim to:

- Provide long-term monitoring / in-depth understanding of marine ecology/ fisheries resources in Western Hong Kong waters
- Facilitate the development of practices, measures and/or programmes to enhance marine ecology and fisheries resources in Western Hong Kong waters

5.2.2 Examples of such research and studies include:

- Conduct comprehensive cumulative impact assessment of marine anthropogenic activities;
- Develop and hold a workshop(s) on innovative methods of evaluating cumulative impacts from marine development projects on CWDs;
- Analysis of long-term CWD stranding data to better understand the threats and factors affecting fecundity and survivability of CWD including water pollution and toxins at all levels of the food chains;
- Conduct acoustic studies to evaluate noise impacts of marine construction activities;
- Conduct underwater acoustic monitoring of CWD activities and behavioral studies in the Northwest Hong Kong waters;
- Research to better identify sources of pollution in CWD habitats and make recommendations on appropriate mitigation measures;
- Hold skipper workshops for HSF captains to raise the awareness on collision risk with local cetaceans;
- Assist in proactively develop a CWD conservation management plan for Southwest Lantau waters;
- Information sharing on CWD studies and status on both sides of HK / PRE border;
- Promote eco-tourism and support NGOs to conduct education programme;
- Artificial seawall performance monitoring to study the effectiveness of the eco-enhancement seawall design in providing suitable habitats for marine fauna re-colonization.

5.3 Development of Chinese White Dolphin Conservation Strategy Framework for the Pearl River Estuary

5.3.1 Currently, a comprehensive and reliable scientific database on the abundance and population biology of the CWD population in PRE is not available. AAHK is therefore seeking to support (e.g. funding of initiatives as outlined in section 9) the development of a holistic conservation framework for the PRE CWD population together with a leadership role to be taken by a local NGO, for example OPCFHK. The framework comprises the following components:

- Support and organise a workshop(s) to share information on CWD studies and status on both sides of the Hong Kong / Pearl River Estuary Border;
- Complete a planning workshop (tentatively within 2015) to provide the basis for creation of a “Conservation Strategy and Action Plan”;
- Conduct an initial feasibility study to determine the availability of PRE CWD data and to identify data gaps;
- Initiate and commit on a longer term basis to comprehensive and robust on-going PRE CWD survey efforts to develop knowledge concerning the PRE CWD population to deliver critical ecological information necessary to create an effective conservation plan; and
- Support on-going management via the rolling action plan (initially drafted as a 5 year plan from the planning workshop) under the local NGO leadership involving elements of research effort / education / engagement and advocacy.

5.3.2 For the proposed PRE CWD surveys, AAHK is committed to supporting (with appropriate funding – per arrangements detailed in section 9) a long-term and detailed research project to determine the true population and habitat use of CWDs in the PRE. Appropriate CWD survey / monitoring

methods will be used and these may be applied to Hong Kong as well as in broader Chinese waters. A scientific steering committee, consisting of CWD experts in HK and elsewhere, will be established to oversee this aspect and derive an assessment that matches international standards. A team of experienced surveyors shall be deployed to undertake the surveys.

5.3.3 The non-exhaustive list of research topics provided in **Section 5.2.2** may also be applied to the PRE CWD population where applicable.

5.3.4 The overall goal of the conservation framework is to develop and implement a long-term and integrated CWD conservation and management plan for the PRE.

5.3.5 Ultimately, an extensive and updated database for both Hong Kong and PRE CWD populations will be generated, which will facilitate a comprehensive and internationally-recognised cumulative impact assessment of anthropogenic activities on CWDs in the PRE. Recommendations with strong scientific basis can then be made on action plans to curtail and potentially reverse the decline of CWDs in Hong Kong and (if a decline is identified) in PRE waters in the form of a conservation strategy.

5.4 Implementation and Timing

5.4.1 It is proposed that the management arrangements, funding amounts and fund allocation mechanisms for supporting the aforementioned research and studies will be established after 3RS project approval and in advance of commencement of the construction phase of the 3RS project. AAHK will continue to engage with academic institutes, green NGOs and other stakeholder groups so that their concerns and suggestions on marine ecology and fisheries resources enhancement can be taken into consideration where appropriate during the planning stage.

6. Promotion of Environmental Education and Eco-tourism

6.1 Background

6.1.1 The North Lantau coast and Northwest Lantau waters are rich in marine ecological and fisheries resources, which could provide good opportunities for raising the general public's awareness on the importance of protecting these valuable resources. The mudflat, mangrove and seagrass habitats at Tai Ho Stream Site of Special Scientific Interest (SSSI), Tung Chung Bay, San Tau Beach SSSI and Sha Lo Wan are nursery and spawning grounds for horseshoe crabs, while pipefishes are also recorded at estuarine regions at the North Lantau coasts. The existing footpaths along the North Lantau coasts provide an opportunity for the public to gain access to these natural habitats to appreciate these natural resources.

6.1.2 Based on the AFCD CWD stranding database and evidence from injuries and scars on photo-identified CWDs, vessel collision is cited as the most common cause of injury and death for Hong Kong CWDs. Although many CWDs seemingly survive such encounters, there is good reason to believe that some incidences are fatal. As such, vessel operators need to be educated about local cetaceans, and existing guidelines for safe vessel operations in the presence of CWDs could benefit from better promulgation and possibly an update.

6.2 Broad Approach to Promote Environmental Education and Eco-tourism

6.2.1 AA proposed to fund and support initiatives in promoting environmental education and eco-tourism in relation to the marine ecological and fisheries resources in the North Lantau coast and Northwest Lantau waters. Examples of such initiatives include:

- Support AFCD / NGOs to conduct training programmes for frontline protection staff as capacity building on dolphin conservation;
- Develop and conduct skipper workshops to alert HSF captains / drivers (from both SkyPier and Central Ferry Piers) on the risk of collisions with CWDs and Finless Porpoises, and ways of reducing such risks;
- Establishment of education programme or eco-trails with displays introducing the conservation of terrestrial / marine ecology and fisheries resources of North Lantau and surrounding waters;
- Promotion of eco-tourism in the Marine Protected Areas with valid permits and daily quota (e.g., dolphin watching adhering to dolphin watching codes of conduct;
- Collaborations with AFCD and non-governmental organisations (NGOs) to provide training to local dolphin watching tour operators (for example at Tai O) with brochures for visitors to educate them on the code of conduct to be observed during dolphin watching and CWD conservation;
- Development of eco-tourism to raise public awareness on sustainable fishing operations (e.g. development of fisheries museum, arrangement of guided tour for experiencing of fishing operation);
- Organisation of campaigns for cleaning of sandy shores at the SCLKCMP, San Tau Beach SSSI, etc.; and
- Horseshoe crabs breeding and release programme at North Lantau soft shores.

6.3 Implementation and Timing

6.3.1 It is proposed that details of the aforementioned measures, associated management arrangements, funding amounts and fund allocation mechanisms will be established prior to commencement of the construction phase of the 3RS project. AAHK will continue to engage with academic institutes, green NGOs and other stakeholder groups so that their concerns and suggestions on the measures can be taken into consideration where appropriate during the planning stage.

7. Promotion of Sustainable Fisheries Industry

7.1 Background

7.1.1 The 3RS Project would inevitably result in loss of fisheries habitats and fishing grounds that may affect the fishermen operating in the North Lantau waters. Under the government's current policy, there would be Ex-gratia Allowance (EGA) payments to compensate the affected fishermen for any loss in fishing grounds due to the 3RS Project.

7.1.2 As described in **Sections 3** and **4**, the enlarged HKIAAAs and proposed Marine Park together with suitable seawall design for eco-enhancement seawall and possible deployment of artificial reefs (AR) would facilitate the promotion of fisheries resources within the areas. In the long term, these habitat enhancement measures would also bring benefits to the fisheries resources in the adjacent fishing grounds (outside the HKIAAAs and the proposed Marine Park). However, the HKIAAAs and Marine Park will pose restrictions to fishermen's operation and no EGA payments would normally be required for establishment of the HKIAAAs or Marine Parks.

7.2 Broad Approach to Promote Sustainable Fisheries Industry

7.2.1 During the course of the EIA study, the major homeports that operate around the Northern Lantau waters had been visited. Fisheries interview surveys have been conducted to collect background information for facilitating fisheries impact assessment and to establish this fisheries enhancement strategy framework. In order to provide extra assistance to the fishermen or fishing communities who would be affected by the 3RS Project, it is proposed to provide the following incentives through the proposed Fisheries Enhancement Fund (see **Section 9**) to help achieve sustainable fisheries operation:

7.2.2 Support and enhance ongoing fisheries operations, examples include:

- Support fishermen in purchasing new fishing vessel engines or upgrading vessel engines to achieve better environmental performance for reducing the running cost in long term operation (e.g., reduced exhaust emissions, quieter engines, improved energy efficiency)
- Support fishermen in purchasing new fishing equipment/ tools or upgrading the equipment/ tools to improve operational efficiencies
- Support fishermen in shifting mode of fishing operation in Hong Kong waters (e.g., from shrimp trawling/hang trawling to purse-seining, gill netting) and provide training to assist employment opportunities
- Re-stocking or release of appropriate fish fry at suitable locations within the HKIAAAs and/or Marine Park to promote resilience of fisheries resources and benefit to the adjacent fishing grounds

7.2.3 Support measures that aim to improve mariculture, fishing technologies and techniques, examples include:

- Development of more advanced technologies or professional techniques to improve fisheries production
- Provide training to enhance fishermen's technical skills as well as knowledge on the importance and good practices in protecting marine environment

- Support mariculturists in purchasing new formula of fish feed for the enhancement of feed efficiency as well as fish health
- Advise fish farmers on good husbandry techniques and disease prevention measures to improve fisheries production
- Provide assistance in disease diagnosis and appropriate treatment measures to minimize the death rate of the fish

7.2.4 Support the promotion and enhancement of fisheries-related business opportunities, examples include:

- Provide suitable training for fishermen in operating different types of fishing vessels, equipment and/or tools to assist employment opportunity
- Development of eco-tourism with guided tour by local fishermen to share about their livelihood (e.g. arrangement of guided tour for experiencing of fishing operation, establishment of fisheries museum) and in raising the public awareness on sustainable fishing operations and fisheries resources
- Provide suitable training for fishermen in operating dolphin watch tourism at designated route in an environmentally sustainable manner

7.3 Implementation and Timing

7.3.1 It is proposed that details of the aforementioned measures, associated management arrangements, funding amounts and fund allocation mechanisms will be established prior to commencement of the construction phase of the 3RS project. AAHK will continue to engage with a range of fisheries and other stakeholder groups so that their concerns and suggestions on fisheries and other potential marine ecological enhancement measures can be taken into consideration where appropriate during the formulation and implementation of the enhancement measures.

8. Public Consultation / Stakeholder Engagement Plan

8.1 Past Stakeholder Engagement Activities during EIA

8.1.1 Consultation with the stakeholders in particular the fishermen, marine industry including the high-speed ferry operators, advisory bodies and relevant Government departments / parties has been conducted during the EIA process to inform and seek their views on the initial boundary of the proposed marine park as presented in the EIA. Feedback from the stakeholders has been received and will be taken into consideration during the preparatory works for designation of the proposed marine park as well as the formulation of other initiatives such as the Marine Ecology and Fisheries Enhancement Strategy. **Table 8.1** summarises the major engagement activities conducted for the proposed marine park during the EIA process.

Table 8.1 Major Engagement Activities conducted for the Proposed Marine Park during the EIA Process

Fishermen Briefing Sessions	
25 Sep 2013	Hong Kong Fishermen Consortium (香港漁民團體聯會)
7 Oct 2013	Hong Kong Fishery Alliance (香港漁業聯盟)
28 Jul 2014	Hong Kong Fishermen Consortium (香港漁民團體聯會)
4 Aug 2014	Hong Kong Fishery Alliance (香港漁業聯盟)
15 Aug 2014	Hong Kong Fishermen Consortium (香港漁民團體聯會) and Hong Kong Fishery Alliance (香港漁業聯盟)
Marine Industry Consultation Workshop	
5 Jun 2014	with Committee members from: Local Vessels Advisory Committee (本地船隻諮詢委員會); Pilotage Advisory Committee (領港事務諮詢委員會); Port Operations Committee (港口行動事務委員會); and High Speed Craft Consultative Committee (高速船諮詢委員會)
Advisory Bodies	
3 Jul 2014	Country and Marine Parks Board
3 Jul 2014	Marine Mammal Conservation Working Group
7 Aug 2014	Capture Fisheries Sub-committee under the Advisory Committee on Agriculture and Fisheries

8.2 Future Stakeholder Engagement Plan for the Proposed Marine Park

8.2.1 The consultation would be a continuous process rather than a one-off exercise. Further consultation with the relevant stakeholders will be undertaken as part of the preparatory works for designation of the proposed marine park, which will be commenced as early as possible after project approval. A Public Consultation Proposal will be prepared which shall include,

- Review of concerns of the community and stakeholders, in particular the fishermen/ fishermen groups, NGOs and academics;
- Identification of public relation events to address the identified concerns; and
- Consultation strategy plan and programme for conducting the public consultation exercise.

8.2.2 The public consultation exercise should cover at least two stages to seek public views on the proposed marine park during the preparatory works for designation of the proposed marine park.

The initial stage shall solicit comments / views from the community, relevant stakeholders and advisory bodies on the location and extent of the proposed marine park, the impact of the proposed marine park, ecological and fisheries enhancement measures, the marine park management plan and resolve outstanding issues with relevant Government departments / parties in taking forward the proposal. The final stage shall present the detailed design of the proposed marine park, marine park management plan, ecological and fisheries enhancement programme proposals to the community, relevant stakeholders, advisory bodies, relevant Government departments / parties in order to finalise the details and complete the statutory procedures for the establishment of the proposed marine park under Cap. 476 Marine Parks Ordinance.

9. Proposed Funding Arrangement

9.1.1 The Administration has made a firm commitment to seek to designate the proposed marine park of approximately 2,400 ha in the waters north of the 3RS project in accordance with the statutory process stipulated in the Marine Parks Ordinance, as a mitigation measure for the permanent habitat loss arising from the 3RS project. AAHK will seek to assist in completing the designation tentatively around 2023 to tie in with the full operation of the 3RS.

9.1.2 In order to achieve the MEFEP and hence facilitating the conservation of marine ecology and sustainable fisheries in the Northwest Lantau waters, it is proposed to establish two environmental enhancement funds namely:

- Fisheries Enhancement Fund (FEF)
- Marine Ecology Enhancement Fund (MEEF)

9.1.3 The above two funding will be used to support the four key aspects as proposed in this Plan (see **Sections 3** to **8**) as illustrated in **Table 9.1**.

Table 9.1: Key Areas Supported by the Fisheries Enhancement Fund and Marine Ecology Enhancement Fund

Key Areas	Fisheries Enhancement Fund (FEF)	Marine Ecology Enhancement Fund (MEEF)
a. Enhancement of Habitats for Marine Ecology and Fisheries Resources	• Deployment of AR at appropriate locations to promote fisheries recruitment	• Support government in designating the proposed Marine Park to enhance ecological connectivity among various CWDs hotspots • Support practicable habitat restoration and enhancement initiatives • Dolphin stranding response and education programme
b. Promotion of Sustainable Fisheries Industry	• Support and enhance on-going fisheries operations • Support measures that aim to improve mariculture, fishing technologies and techniques • Support the promotion and enhancement of fisheries-related business opportunities	• --
c. Encouragement of Scientific Researches and Studies	--	Support researches and studies that aim to: • Provide long-term monitoring or in-depth understanding of the marine ecology/ fisheries resources Facilitate the development of practices, measures and/or programmes for enhancement of marine ecology and fisheries resources
d. Promotion of Environmental Education and Eco-tourism	• Support initiatives in promoting eco-tourism in relation to sustainable fisheries operation	• Support initiatives in promoting environmental education and eco-tourism in relation to the marine ecological and fisheries resources in the North Lantau coast and Northwest Lantau waters

9.1.4 The preliminary budget estimate for the aforementioned two Funds would be totally in the order of HK$200 - 300 million, subject to approval from the Board of AAHK. It is tentatively proposed to establish the FEF and MEEF after approval of the 3RS project.

9.1.5 AAHK proposes to establish separate Fund Management Committee for each of FEF and MEEF, chaired by AAHK with representatives including academics, fishermen's associations, and NGOs. The Committees will advise on the management of the FEF and MEEF, including issues concerning applications for available funding and fund approval and allocation. Details of the mode of operation of the Committee, such as terms of reference, secretariat and technical support, staffing arrangements, appropriate programmes and mechanisms under the MEFEP as well as procedures for allocating and awarding funding, will be devised in consultation with relevant stakeholders upon obtaining the Environmental Permit/ statutory approval for 3RS project and in any case before commencement of construction if practicable.

Appendix A – Existing Marine Parks Management Plan

Figure 1 Sha Chau and Lung Kwu Chau Marine Park Management Plan

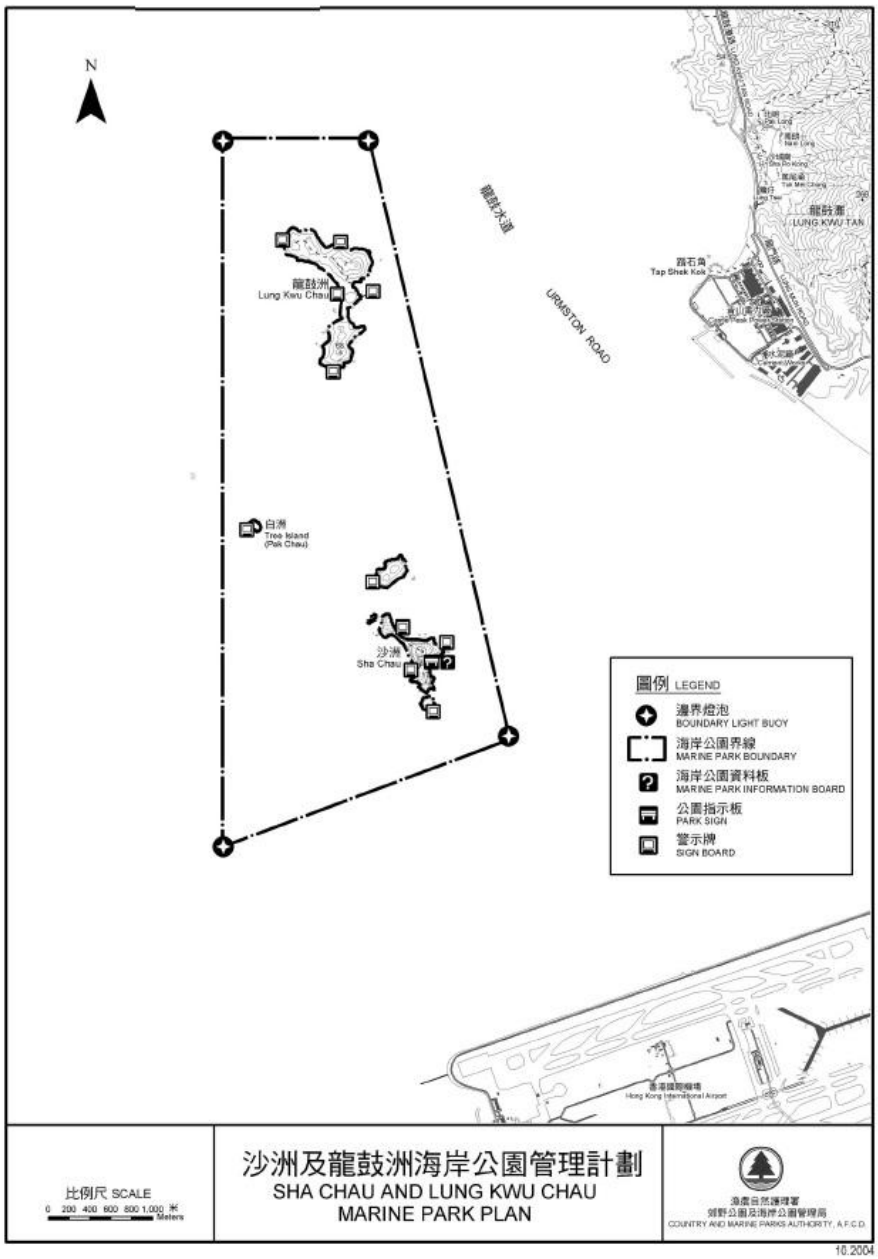


Figure 2 Tung Ping Chau Marine Park Management Plan

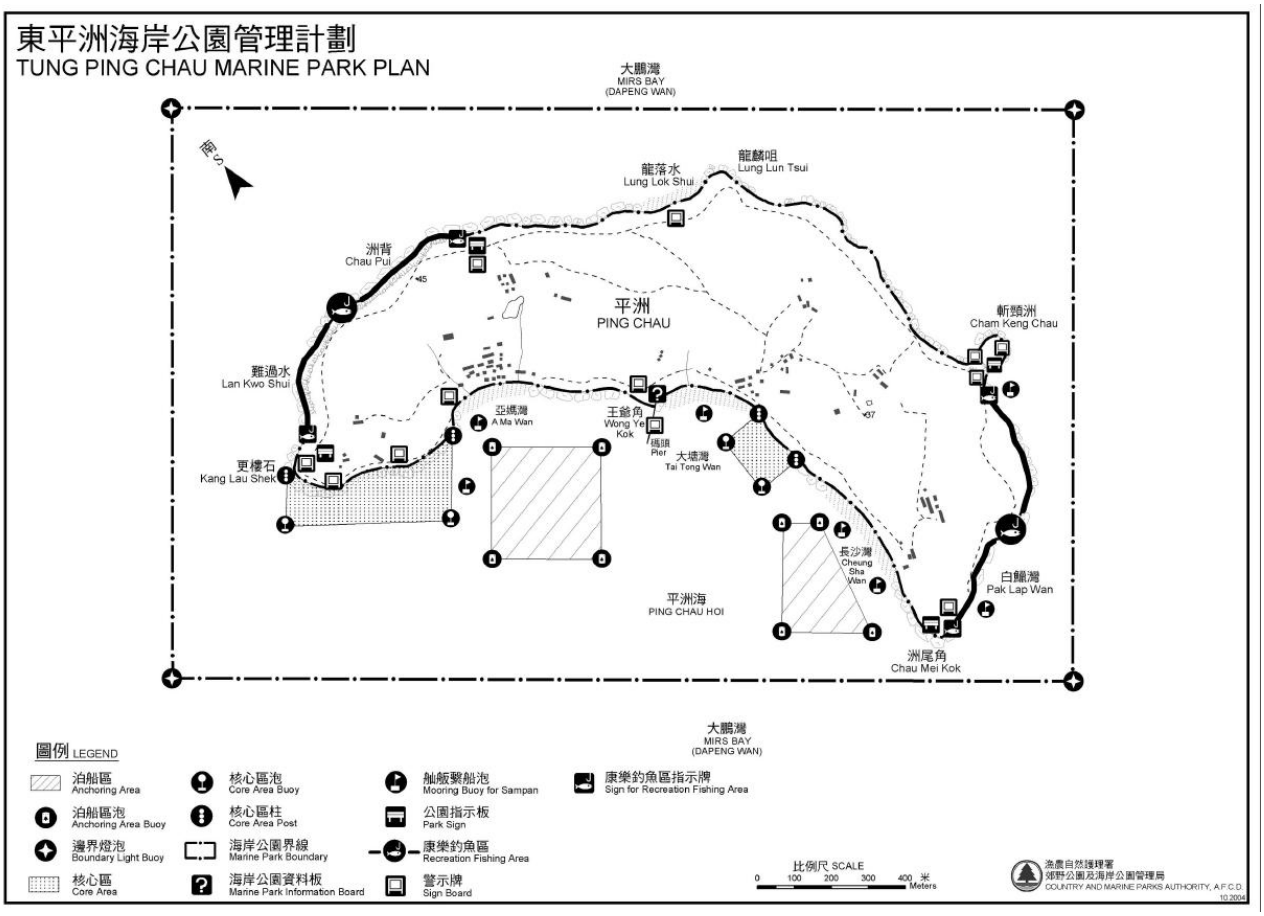


Figure 3 Yan Chau Tong Marine Park Management Plan

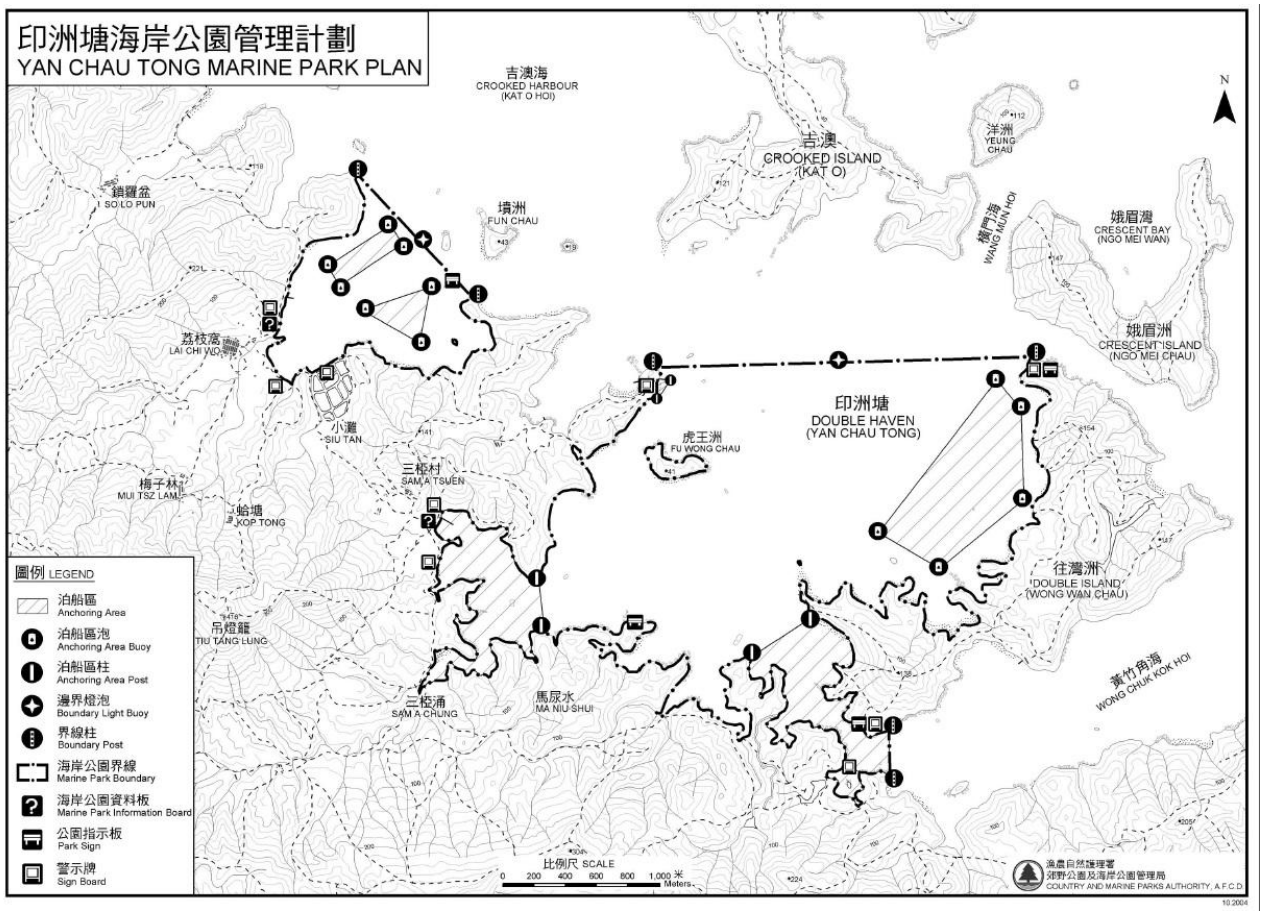
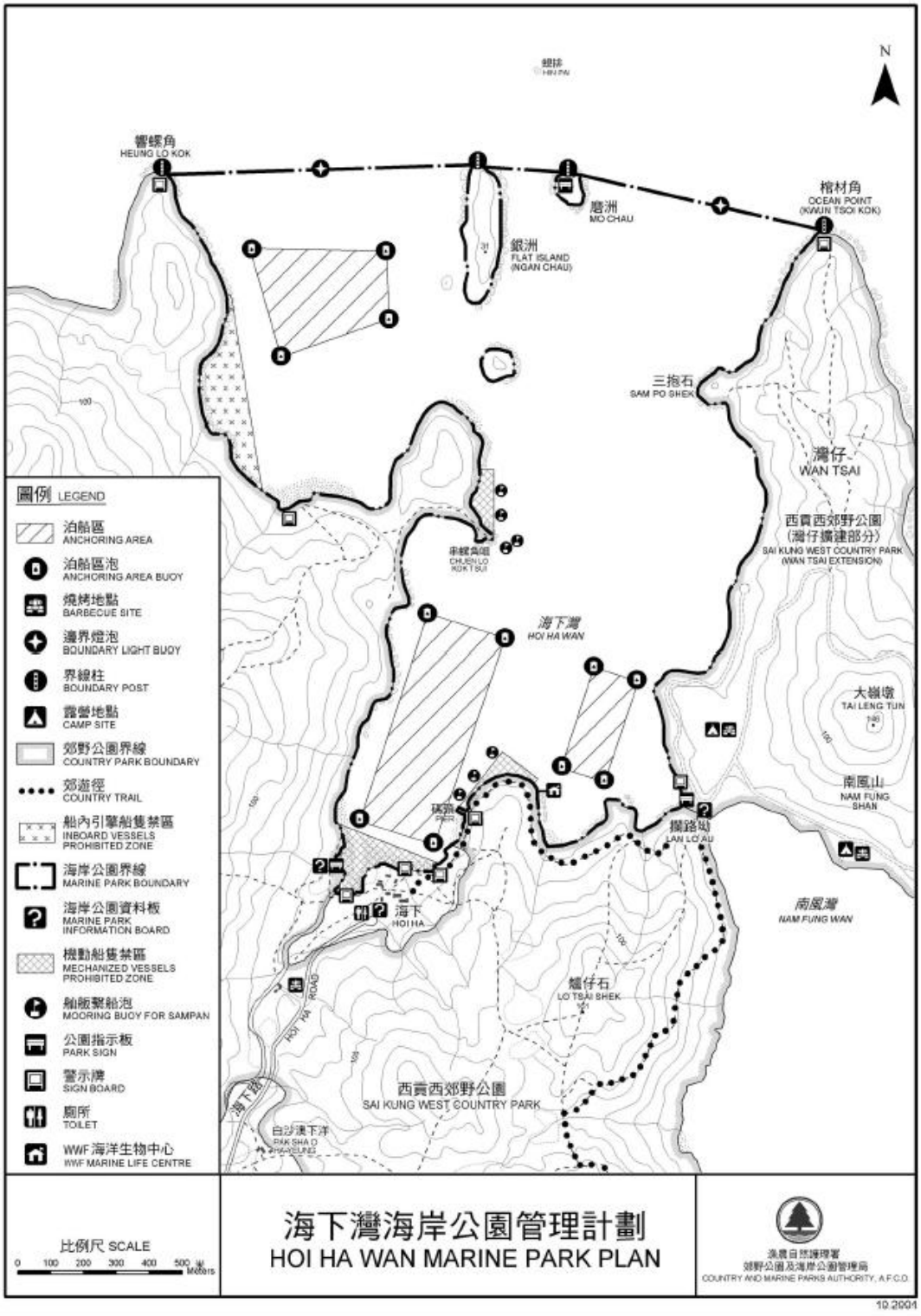



Figure 4 Hoi Ha Wan Marine Park Management Plan