Country and Marine Parks Board Special Meeting

Environmental Impact Assessment for the Expansion of HKIA into a Three-Runway System

Purpose

1. This paper provides an overview on the findings of the Environmental Impact Assessment ("EIA") for the Expansion of Hong Kong International Airport ("HKIA") into a Three-Runway System ("3RS") with particular focus on ecology including the Chinese White Dolphins (CWD) and proposed avoidance, minimization, mitigation and compensation measures as detailed in the EIA.

2. The opportunity is taken to provide follow up information at **Annex 1** on questions received previously after the 1 November 2013 presentation to the Marine Parks Committee on the diversion of the submarine aviation fuel pipelines between Sha Chau and HKIA.

Background

3. Since opening in 1998, Hong Kong International Airport (HKIA) has experienced tremendous traffic growth. HKIA is now the world's busiest cargo airport, and the third busiest international passenger airport. In 2013, HKIA handled about 60 million passengers, 4.13 million tonnes of cargo, and 372,000 air traffic movements; all double the traffic of that in 1998.

4. In terms of demand, the latest traffic forecasts show that by 2030, annual demand for passenger traffic will reach around 102.3 million, cargo at 8.9 million tonnes, and air traffic movements at 607,000. According to the latest projection, it is likely that the existing two runways would reach their full capacity of 420,000 air traffic movements per annum in a few years' time. Faster-than-forecast air traffic demand at HKIA aside, Hong Kong is facing intensifying competition from neighboring airports in light of their committed/ planned airport expansion plans. While various facilities upgrading/ expansion plans are underway to meet the medium-term demand, there is an urgent need for 3RS to meet the long-term air traffic demand at HKIA and to maintain Hong Kong's status as an important regional and international aviation hub and economic competitiveness.

5. With the Executive Council's in-principle approval given in March 2012 for the Airport Authority Hong Kong (AAHK) to adopt 3RS as the future development option for HKIA for planning purpose, AAHK proceeded with the

relevant planning work including the statutory environmental impact assessment (EIA) and the associated 3RS scheme designs.

6. The 3RS project broadly comprises the following major works:

(a) Formation of approximately 650 hectares of land;

(b) Construction of the Third Runway and the Third Runway Concourse (TRC);

(c) Construction of apron, taxiways, areas for airport support facilities and utilities;

(d) Expansion of Terminal 2 (T2) and construction of associated road network;

(e) Provision of a new Automated People Mover System and maintenance depot; and

(f) Provision of a new Baggage Handling System to serve T2 and TRC.

7. The layout of the 3RS is at **Appendix A**.

Tentative 3RS Project Programme

8. AAHK submitted the 3RS EIA Report to the Environmental Protection Department (EPD) on 17 April 2014. The report is now available for review by the general public for 30 days in accordance with the EIA Ordinance over the period 20 June to 19 July 2014[1]. Thereafter, the Advisory Council on the Environment will be consulted. Subject to the necessary Government approvals, the completion of relevant statutory procedures and the availability of the necessary resources, the current plan is to commence the reclamation works of the 3RS in 2016 for commissioning in 2023 to provide capacity sufficient to meet traffic demand at least up to 2030.

Statutory EIA

9. The 3RS EIA Study has been conducted in a comprehensive and professional manner, covering 12 environmental aspects including marine ecology (including Chinese White Dolphins - CWDs), fisheries, aircraft noise, air quality, and health impacts arising from aircraft noise and emissions. AAHK has engaged both local and overseas consultants and experts to conduct the EIA.

[1] For review of the 3RS EIA Report, please visit the following website http://www.epd.gov.hk/eia/

10. The EIA process provides a means of identifying, assessing and reporting on the environmental impacts of the project. It is an iterative process that has been followed in parallel with the design process to identify the potential environmental effects of various design options, and develop alternatives as well as mitigation measures to be incorporated into the design, construction and operation of the airport expansion. AAHK has considered and incorporated the feedback and advice obtained from numerous stakeholder engagement activities into the EIA process where appropriate.

11. AAHK has formulated over 250 initiatives that will help to avoid, minimise or mitigate / compensate identified environmental impacts to acceptable levels. With the implementation of the various mitigation and other measures as committed in the EIA Report, environmental concerns and potential impacts arising from 3RS project will be avoided, minimised, mitigated and/or compensated in full compliance with the EIA Study Brief requirements.

12. With the full EIA report now available for public inspection, the following serves as a summary of EIA outcomes from the Ecology assessments, in particular the key mitigation and enhancement commitments as set out in the EIA Report:

Marine Ecology including CWDs and Fisheries

13. The EIA has made a thorough assessment on the environmental impacts on ecology in the study area at both the construction and project operation stages.

14. A number of major environmental impact avoidance and minimization measures are therefore proposed for 3RS land formation and construction phase works in the EIA. These commitments are expected to result in significant reductions in potential impacts including marine ecology impacts. These measures include:

- The use of non-dredge methods for land formation;
- the adoption of deep cement mixing for improving ground conditions in the contaminated mud pit area beneath the land formation area;
- Use of the horizontal directional drilling (HDD) method and water jetting method for placement of pipelines and undersea cables respectively to minimize disturbance to water quality and marine ecology including CWDs

15. During the 3RS construction stage, a number of controls and mitigation measures are proposed, including:

- Speed restrictions / route diversions of all high speed ferries (HSF) operating between SkyPier and Macau / Zhuhai since the commencement of reclamation (**Appendix B**);
- Marine traffic controls such as construction vessel speed limits / skipper training, use of pre-defined routes inside and outside the marine works area;
- Establishment of Dolphin Exclusion Zones for land formation and other marine works during both daytime and nighttime to ensure cessation of works if dolphins are sighted inside the works exclusion zone;
- Acoustic decoupling of noisy equipment on marine works barges (e.g. via rubber mountings) to minimize noise disturbance to CWDs;
- Bored piling activities restricted to avoid CWD peak calving season of March to June (note – 3RS works involve only limited bored piling) ;
- Ensuring an adequate leading edge of seawall is in place prior to marine filling activities within the land formation area to reduce impacts on water quality;
- Use of silt curtains around marine filling activities to reduce impacts on water quality;
- Conducting a pre-construction phase coral dive survey to review the feasibility of coral translocation as a precautionary measure;
- Adopting an environmental monitoring and audit (EM&A) programme for pre-construction, construction, post-construction and operation phases of the project.

16. For 3RS operations, recommended controls and mitigations include:

- The designation of approximately 2,400 hectares of a new marine park to connect HKIAAA (within which very limited vessel access is allowed) and the existing Sha Chau and Lung Kwu Chau (SCLKC) Marine Park and the planned Brothers Marine Park under the Hong Kong-Zhuhai-Macao Bridge – Hong Kong Boundary Crossing Facilities project. The total combined area of marine protection area will be around 5,200 hectares, effectively linking major habitats of CWD in Hong Kong western waters (**Appendix B**);
- Route diversion of all HSF operating between SkyPier and Macau / Zhuhai to travel North of Lung Kwu Chau instead of between HKIA and Sha Chau. In addition, AAHK will restrict these SkyPier HSFs to a

speed limit of 15 knots when they are navigating through high CWD abundance areas close to the waters north of SCLKC Marine Park;

- The implementation of a Fisheries Enhancement Strategy with associated funding from the 3RS project is proposed both to assist fishermen in better coping with changes to their fishing activities resulting from 3RS project and to enhance fisheries resources in Hong Kong western waters;
- A Marine Ecology Enhancement Strategy with associated funding is also proposed to focus specifically on enhancing marine ecology (including health and survivability of the CWD) in northern Lantau waters;

17. The proposed new marine park is adequate in size as mitigation/compensation for identified environmental impacts and is expected to significantly improve the conservation prospects for the Hong Kong sub-population of CWDs by mitigating the operation stage impacts of habitat loss, habitat fragmentation, changes in patterns of habitat use as well as minimizing noise and disturbance from marine traffic. It is noteworthy that the combined area of marine protected area in northern Lantau waters after the 3RS project marine park is designated will be around 5,200 hectares and this proposed matrix of protected areas is expected to provide a positive step towards maintaining and enhancing the ecology of CWDs in Hong Kong. The Administration has made a firm commitment to designating the proposed marine park in accordance with the statutory process stipulated in the Marine Parks Ordinance. AAHK will seek to assist in completing the designation tentatively around 2023 to tie in with the full operation of the 3RS.

18. Given the significance of Marine Park establishment as a key mitigation measure, the successful establishment of the proposed Marine Park is of key importance. It is not practicable to seek to designate the proposed new areas of Marine Park while construction activities for the 3RS project are ongoing. But as SkyPier HSF activities are identified as the most significant marine traffic impact during the construction stage, a key and effective construction stage mitigation will be the early re-routing of all SkyPier HSF operating between SkyPier and Macau / Zhuhai away from the proposed marine park area from commencement of reclamation works as mentioned earlier.

19. With all recommended mitigation and compensation measures in place, predicted impacts are expected to be reduced to acceptable levels and residual impacts are expected to be acceptable, in compliance with the requirements of the Technical Memorandum on Environmental Impact Assessment Process and the EIA Study Brief.

Terrestrial Ecology

20. The EIA identifies that impacts to terrestrial habitats, flora and fauna during project construction and operation phases are largely low or negligible. However, a moderate construction phase impact is identified relating to the submarine aviation fuel pipelines daylighting on Sheung Sha Chau Island. The advance works of aviation fuel pipelines diversion by HDD will commence in mid 2015. Although the HDD works are carried out from the airport island through rock stratum deep beneath the seabed, the daylighting works may potentially affect the Sha Chau egretry and mitigation is required in order to protect breeding/roosting *ardeids* (e.g. egrets) at Sheung Sha Chau Island. Mitigations include scheduling all construction works on Sheung Sha Chau Island outside the *ardeid* breeding season and not allowing night-time construction work on Sheung Sha Chau Island during all seasons.

21. The potential impact to the Sha Chau egretry (and the SCLKCMP) relating to the pipelines diversion was discussed previously in the Marine Parks Committee Meeting dated 1st November 2013. Follow up additional information on this aspect is included at **Annex 1**.

Next Steps

22. The EIA is available for public inspection until 19 July 2014. Thereafter, ACE will have 60 days to consider the EIA Report as well as the public comments received on the 3RS EIA. AAHK expects a decision on the 3RS EIA approval within the fourth quarter of 2014.

Annex 1 Follow up on issues raised at 1st November 2013 MPC meeting relating to diversion of Sha Chau to HKIA Aviation Fuel Pipelines

Background

1. The potential impact to the SCLKCMP in relation to the pipelines diversion has been discussed in the Marine Parks Committee Meeting dated 1st November 2013. The main issue discussed was that the proposed 3RS land formation footprint would encroach over a section of the existing submarine aviation fuel pipelines that connect between Sha Chau and HKIA.

2. In order to ensure a continuous supply of aviation fuel to the HKIA, diversion of the Sha Chau fuel pipelines is essential. At the 1 November meeting, considerations on proposed diversion options and the associated environmental impact (including both terrestrial and marine ecology) were presented and discussed. Several comments were raised by Committee members and now is an appropriate time for the AAHK to follow up.

Consideration of Alternative Alignment for Pipeline Diversion with Minimal Risk/Disturbance

3. The outcome of AAHK's evaluation of aviation fuel pipeline options was presented in the 1 November 2013 meeting along with explanation on the rationale for adoption of the Horizontal Directional Drilling (HDD) method. A member raised a question on if the HDD alignment could be re-routed so as to further reduce the alignments for the new pipelines within the bed rock levels of SCLKCMP. AAHK has considered this. By adopting an alternative alignment to Option 2 as far as possible, the HDD horizontal alignment close to Sha Chau would be as shown in yellow (**Appendix C**) (note: the preferred alignment is shown in red).

4. This alternative alignment involves both additional drilling distance and the introduction of a compound radius curve (combined horizontal and vertical curve) with a compound radius in the order of 700m. Both of these changes from the preferred alignment will substantially increase the construction risk associated with the HDD works and in particular the ability to day light at the selected location on the island close to the Aviation Fuel Receiving Facility. The layout of the compound curve means that any misalignment would be virtually impossible to adjust given the very hard rock conditions and the day lighting has the potential to occur in the water to the north of the island. It is therefore concluded that this alignment is not a viable alignment.

Significance of Underwater Noise Generated from the HDD Method

5. The HDD method involves drilling through bedrock from a launching site located on the west side of the airport island and connecting to a day-lighting point on land adjacent to the Aviation Fuel Receiving Facility at Sha Chau. Two holes will be drilled through the deep rock stratum at depths of 90-120 m below the seabed. Underwater noise generated by HDD and associated vibrations may potentially impact CWDs given that they are acoustically sensitive. However, noise from HDD tends to be a less intensive continuous noise, rather than the pulsed high power sounds emitted through percussive piling and it is anticipated that negligible noise will enter the water due to the depth of drilling below the seabed. The sound transmitted from the rock stratum to the marine environment is not expected to be significant as a large proportion of the sound energy is likely to be absorbed or reflected due to the thick layer of marine mud between the seabed and water interface.

Treatment of existing pipelines after diversion

6. The proposal was that after diversion is completed and the existing pipelines become redundant the two ends of each out of service pipeline could be capped. Additional consideration has been given to options that minimize or reduce to zero any environmental risk associated with leaving the pipelines in place once they are no longer in use. There are significant challenges of some alternatives that have been considered.

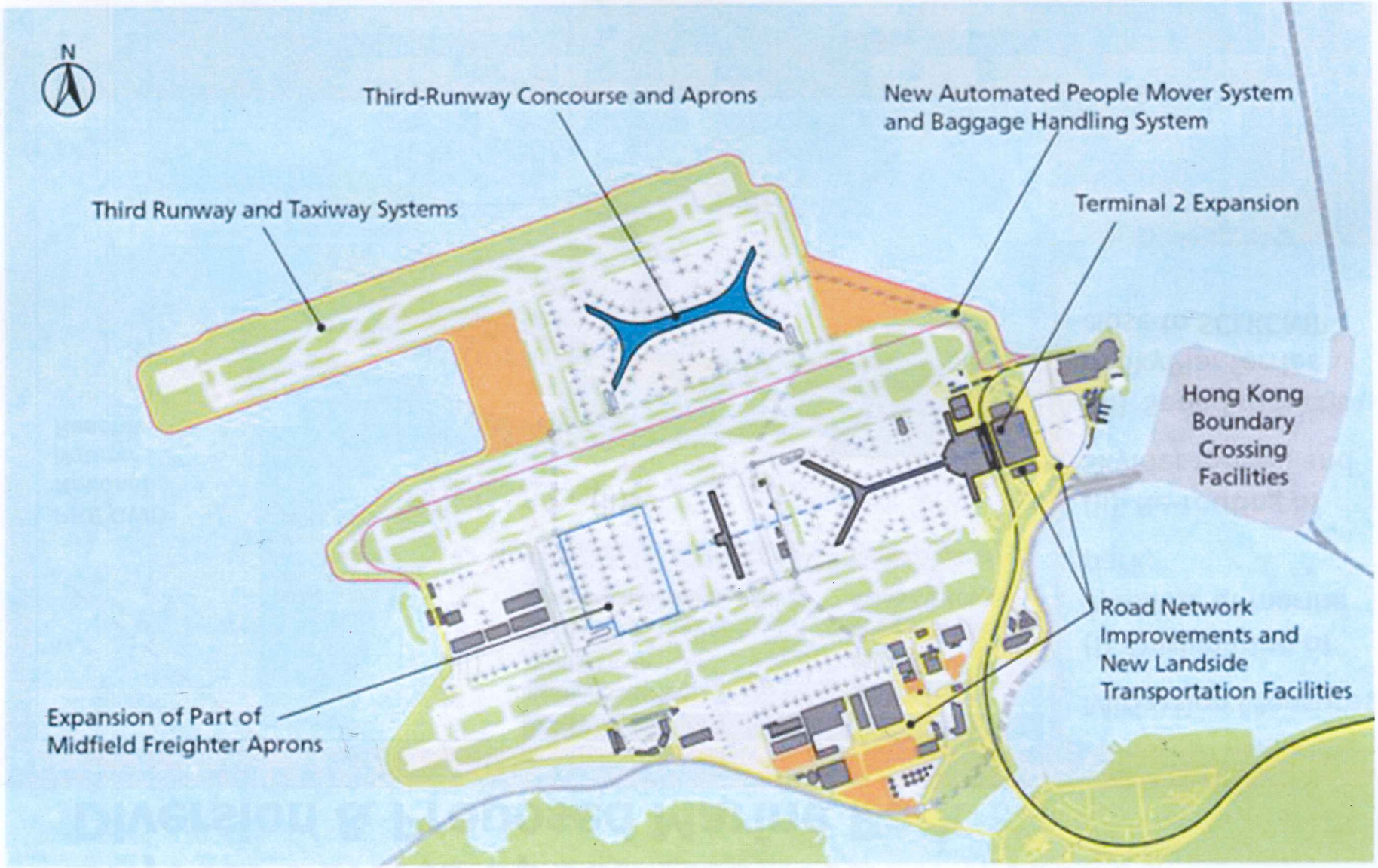
7. If the whole length of the two pipelines is to be filled with cement grout, difficulties are expected if grouting is introduced into pipelines from both ends (i.e. from the end at the airport island and the end at Sha Chau). This would require significant additional works within the SCLKCMP and would involve the handling of additional cement grout at the works area within the marine park. Due to the long length of the pipelines and the curved alignment, the complete filling of the pipelines could not be guaranteed.

8. For these reasons and taking into account the significant depth of the pipelines below the seabed and the rock armour protection above them, it has been reasonably concluded that filling the whole length of the pipelines with cement grouting is not necessary and is unlikely to result in any environmental benefit. It should be noted that the existing pipelines will be completely flushed in order to remove any aviation fuel inside the pipelines after the pipelines are retired from use. Residues will be flushed and treated / disposed of in accordance with all relevant Hong Kong requirements. Also, pipeline pigging would be deployed to further ensure removal of any remaining fuel residues that may have adhered to the inner walls of the pipelines. Then the

preferred approach of capping at the two ends would take place. Therefore, the decommissioned pipelines would not cause any adverse environmental impact even if they are only capped and sealed at each end. If necessary, the pipelines can be filled with seawater before being capped and sealed.

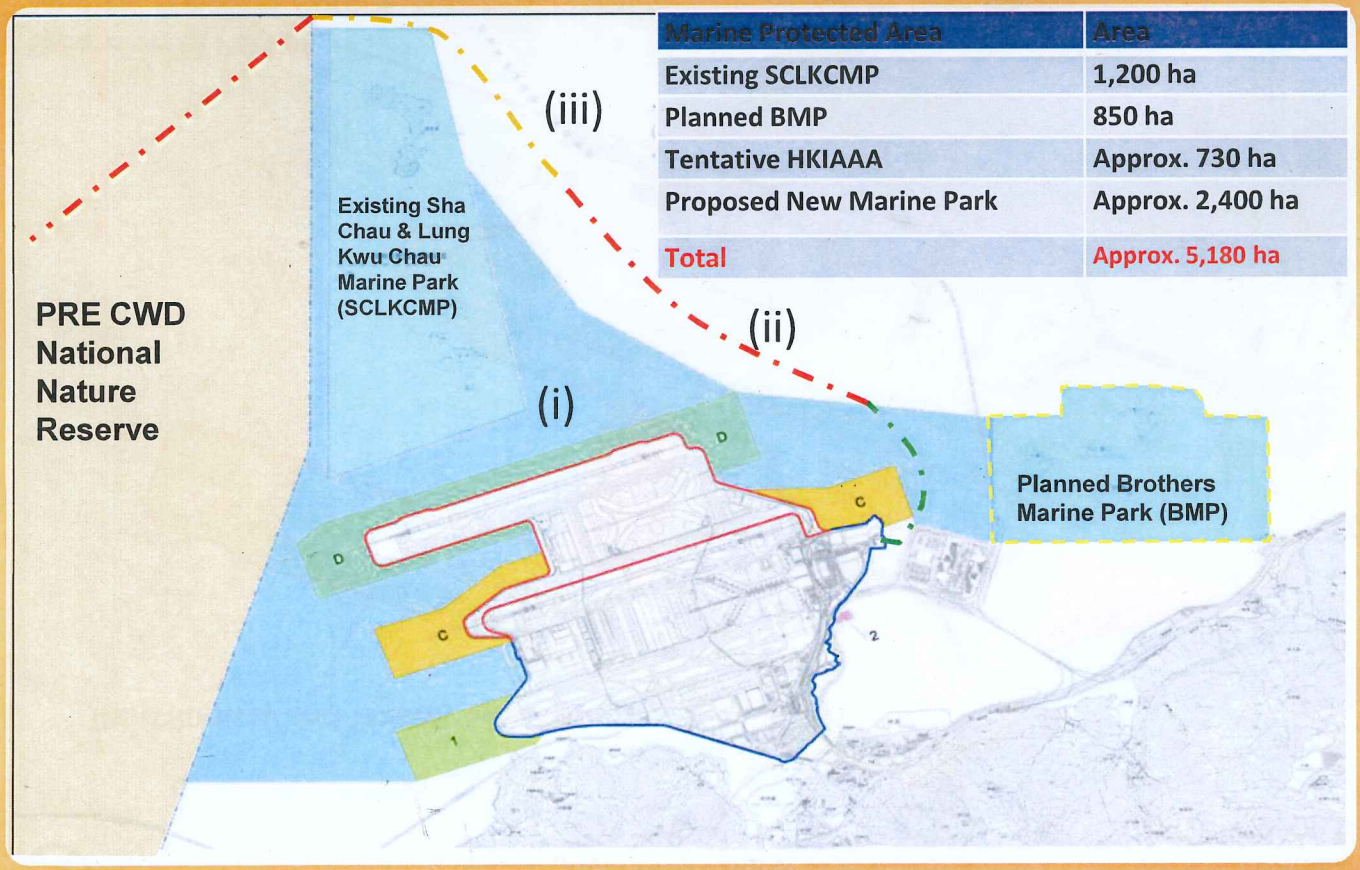
Planned Three-Runway System Layout

Appendix A



Appendix B

SkyPier Ferries Speed Restriction / Route Diversion & Proposed Marine Park



Marine Protected Area	Area
Existing SCLKCMP	1,200 ha
Planned BMP	850 ha
Tentative HKIAAA	Approx. 730 ha
Proposed New Marine Park	Approx. 2,400 ha
Total	Approx. 5,180 ha

Mitigation Measures

(i) Designation of 2,400 ha of marine park;

(ii) Re-routing of SkyPier ferries; and

(iii) Speed reduction of SkyPier ferries close to SCLKCMP

Note: The boundary of the proposed marine park is indicative only and subject to the draft map published in the Gazette under Marine Parks Ordinance.

Appendix C

Alternative Alignment for Aviation Fuel Pipeline Diversion