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**ACE-EIA Paper 9/2009**
***For advice***

# Environmental Impact Assessment Ordinance (Cap. 499)
# Environmental Impact Assessment Report
# Hong Kong-Zhuhai-Macao Bridge Hong Kong Link Road

## PURPOSE

This paper presents the key findings and recommendations of the Environmental Impact Assessment (EIA) report for the Hong Kong-Zhuhai-Macao Bridge (HZMB) Hong Kong Link Road (HKLR)[1] (hereafter known as "the Project"), submitted under section 6(2) of the Environmental Impact Assessment Ordinance (EIAO) (Application No. EIA-172/2009). The Highways Department (the applicant) and their consultants will make a presentation at the EIA Subcommittee meeting if necessary. Comments from the public and the Advisory Council on the Environment will be taken into account by the Director of Environmental Protection in deciding on the approval of the EIA report under the EIAO.

## ADVICE SOUGHT

2. Members' views are sought on the findings and recommendations of the EIA report.

[1] The Project is formerly known as "Hong Kong-Zhuhai-Macao Bridge Hong Kong Section and North Lantau Highway Connection".

## NEED FOR THE PROJECT

3. The proposed HZMB straddles the waters of Lingdingyang of the Pearl River Estuary. It is a large sea-crossing linking the Hong Kong Special Administrative Region (HKSAR), Zhuhai City of Guangdong Province and the Macao Special Administrative Region, as well as a transport construction project included in "National High Speed Road Network Planning" (國家高速公路網規劃). The scope of the large sea-crossing includes the HZMB Main Bridge, Hong Kong Boundary Crossing Facilities (HKBCF), Zhuhai BCF, Macao BCF, and the link roads connection between the HZMB Main Bridge and the respective BCFs, in accordance with the agreement made by the three governments on the concept of "separate locations of BCF mode".

4. The HKSAR Government is required to construct and operate the link (i.e. HKLR) between the HZMB Main Bridge and HKBCF.

## DESCRIPTION OF THE PROJECT

5. The Project comprises a dual-3 carriageway with hard shoulder of about 12 km in length between the HZMB Main Bridge at the HKSAR boundary and the HKBCF. It includes –

(i) about 7.3 km of sea viaduct from the HKSAR boundary to the landing point on Airport Island near South Perimeter Road;

(ii) about 2.1 km of land viaduct from the landing point on Airport Island to the western tunnel portal at Scenic Hill;

(iii) about 1.0 km of tunnel from the western portal at Scenic Hill to the eastern portal on reclamation at eastern waters of the Airport Island; and

(iv) about 1.6 km of at-grade road from the eastern tunnel portal to the HKBCF.

Reclamation of about 23 ha is required along the eastern coast of Airport Island to provide land for the tunnel portal to daylight and the at-grade road. The Project location is shown in the attached **figure**.

6. The Project constitutes a designated project under –

(i) Item A.1, Part I, Schedule 2 of the EIAO: *"A road which is an expressway, trunk road, primary distributor road or district distributor road"*;

(ii) Item C.1, Part I, Schedule 2 of the EIAO: "*Reclamation works (including associated dredging works) more than 5 ha in size*"; and

(iii) Item C.12, Part I, Schedule 2 of the EIAO: "*A dredging operation exceeding 500,000 $m^3$*".

## CONSIDERATION OF ALTERNATIVE OPTIONS

7. The EIA has considered various options for the bridge alignments and different built forms for the Project, taken into account environmental factors as well as other considerations like geographical and geological considerations, airport height restrictions, site constraints, constructability and safety. The preferred alignment option for the Project has been selected interactively with the site search exercise for the preferred HKBCF location. In addition, the road section at the south-eastern coast of the Airport Island originally run in a viaduct has been changed to a tunnel-cum-at grade road to minimize the visual intrusion of an elevated viaduct structure to the Tung Chung residents.

## SPECIFIC ENVIRONMENTAL ASPECTS TO HIGHLIGHT

Air Quality Impact

8. An air quality impact assessment has been conducted for both the construction and operational phases. The fugitive dust assessment for the construction phase has concluded that 8 times/day watering in all works areas would be required to control the fugitive dust impact. For the assessment of operational phase air quality, sensitivity tests have been undertaken to identify the highest emission scenario from the combinations of vehicular emission factors and the projected traffic flow at different years of operation of the Project. The effect of emission from portals and ventilation buildings including those of the HZMB Main

Bridge has been modelled, taking the length of each tunnel and its ventilation scheme into account. The results show that the predicted cumulative pollution concentrations at all identified air sensitive receptors will comply with the Air Quality Objectives.

Noise impact

9. Construction noise assessment has been conducted. Results indicate that the construction noise impacts would comply with the stipulated noise criteria after the implementation of good site practices, quiet construction plant and other mitigation measures (e.g., temporary noise barriers). Operational cumulative road traffic noise impact on neighbouring noise sensitive receivers has been assessed and found to comply with the requirements.

Sediment Quality and Waste Management

10. The EIA indicates that the current engineering design for the reclamation of the Project has reduced the amount of dredged materials as far as possible. As a result, only a total of 5.95 $Mm^3$ bulk volume of marine sediment will be dredged under the Project.

11. To minimize off-site disposal of dredged marine sediment, the EIA proposes to redeposit the dredged contaminated marine sediment (classified Category Mf in accordance with ETWB TC (Works) No. 34/2002) within the HKLR reclamation site. Such redeposition work will be surrounded by sheet piles and silt curtains to avoid any adverse water quality impacts. For disposal of the dredged uncontaminated marine sediment, the EIA proposes cross-boundary disposal in the Mainland in accordance with existing established practice.

12. The EIA has estimated the quantity and timing for the generation and re-use of construction and demolition (C&D) materials required in the reclamation and infrastructural works of the Project. Various means to minimize the generation and to maximize the reuse of C&D materials and other surplus materials have been proposed.

Water Quality Impact

13. The EIA has identified and assessed the possible worst case scenario when the construction of the seawalls for the eastern and western artificial islands and the dredging works of the tunnel trench for the HZMB Main Bridge might be carried out concurrently with the dredging and filling activities of the Project, HKBCF and the Tuen Mun-Chek Lap Kok Link (TMCLKL).

14. Modelling results indicate that with the implementation of a series of mitigation measures, the water quality impacts during construction of the Project from the dredging and filling activities at the key sensitive receivers including the Sha Chau and Lung Kwu Chau Marine Park, Tai Ho Site of Special Scientific Interest (SSSI), San Tau SSSI, Butterfly beach and Ma Wan Fish culture zone could be controlled to within the established criteria. These mitigation measures include formation of seawall for enclosing the site area before reclamation, installation of temporary sheet piles and silt curtains, application of enhanced cage type silt curtain around all grab dredgers and controlled dredging and filling rates.

15. For the operation phase of the Project, the main concern is the hydrodynamic impact on Tai Ho Bay and the Airport Channel. The hydrodynamic study confirms that there would be insignificant impact on Tai Ho Bay while the changes in hydrodynamic patterns in the Airport Channel would not cause unacceptable ecological impacts. The changes in the sedimentation and erosion patterns in the Airport Channel are also predicted to be insignificant, and all water quality parameters in the Airport Channel would comply with the Water Quality Objectives.

Ecological Impact

16. Disturbance to terrestrial ecology would be insignificant owing to the large distance separation between the Project sites and natural habitats in North Lantau. Nonetheless, good site practices during land-based construction of the Project would avoid most of the potential impacts on the Romer's Tree Frog habitat in Scenic Hill.

17. The waters to the west of Airport currently feature two areas of dolphin-conservation importance, viz the Sha Chau/Lung Kwu Chau Marine Park, and

the waters near Tai O Peninsula to Fan Lau. The alignment of the Project has avoided areas of high dolphin density in these two areas. The EIA indicates insignificant impacts on the Chinese White Dolphin (CWD) along the southern edge of the Airport Island and inside the Airport Channel, as there have been no sightings of the CWD in the Airport Channel, and there is no evidence to indicate that the channel is currently used by the CWD or any other cetaceans.

18. The proposed reclamation along the east coast of Airport Island is situated at a very low-density area of CWD and with very low coverage of common gorgonians. As a result, potential impacts on the CWD in this area would be much less significant. Dolphins monitoring during construction will be thoroughly implemented.

Fisheries Impact

19. The area to be reclaimed under the Project is not of high fisheries production rates. The EIA indicates that the construction and operation of the Project would cause insignificant loss of fishing ground. When compared with the available fishing ground in Hong Kong waters, the cumulative permanent loss due to the Project, HKBCF and other concurrent projects would also be insignificant. With the implementation of mitigation measures recommended in the EIA report, all relevant Water Quality Objectives will be met.

Cultural Heritage Impact

20. There are two temples, namely Hung Shing Temple and Tin Hau Temple, an Earth Shrine and some graves at the Sha Lo Wan area. The proposed bridge structure will span over Sha Lo Wan but all proposed bridge structures will totally avoid the archaeological site. No mitigation measure is required but as a precautionary measure, storage of construction equipment at the archaeological site is not allowed and periodic monitoring will be conducted during construction stage to ensure the avoidance of any impacts on the archaeological site.

Hazard to Life

21. The potential hazard posed to future users of the Project by both the existing and new extension sections of the airport fuel tank farm have been identified

and assessed. A full range of tank hazards have been evaluated including the remote possibility of a major bund overtopping with drainage down the Scenic Road and the surrounding area towards the Project. The EIA concludes that the risks lie well within the acceptable criteria of Annex 4 of the Technical Memorandum on EIA Process with a significant wide margin, primarily because of the large distance of separation between the tank farm and the Project. No mitigation measure is considered necessary or justified during both the construction and operation phases.

Loss of Natural Shoreline/Landscape and Visual Impact

22. The applicant has adopted the "tunnel plus at-grade road" scheme for the section of the Project from Scenic Hill to the HKBCF along the east coast of the Airport Island, as opposed to the "low-level bridge" alternative. The main reason is to address the objections from the residents of the Tung Chung waterfront premises on the ground of visual intrusion from the bridge structures. However, the at-grade road option will permanently remove a section of the natural shoreline, zoned Coastal Protection Area (CPA) in the Chek Lap Kok Outline Zoning Plan.

23. To address the permanent removal of a section of the natural shoreline, the EIA proposes measures to enhance the naturalness of the proposed seawall for the reclamation so that its visual quality will be comparable to that of the existing CPA. The enhancement measures include the re-use of natural rocks at the existing shorelines and natural rock armour in forming the new shorelines, together with introduction of native seashore planting at suitable locations.

**ENVIRONMENTAL MONITORING AND AUDIT**

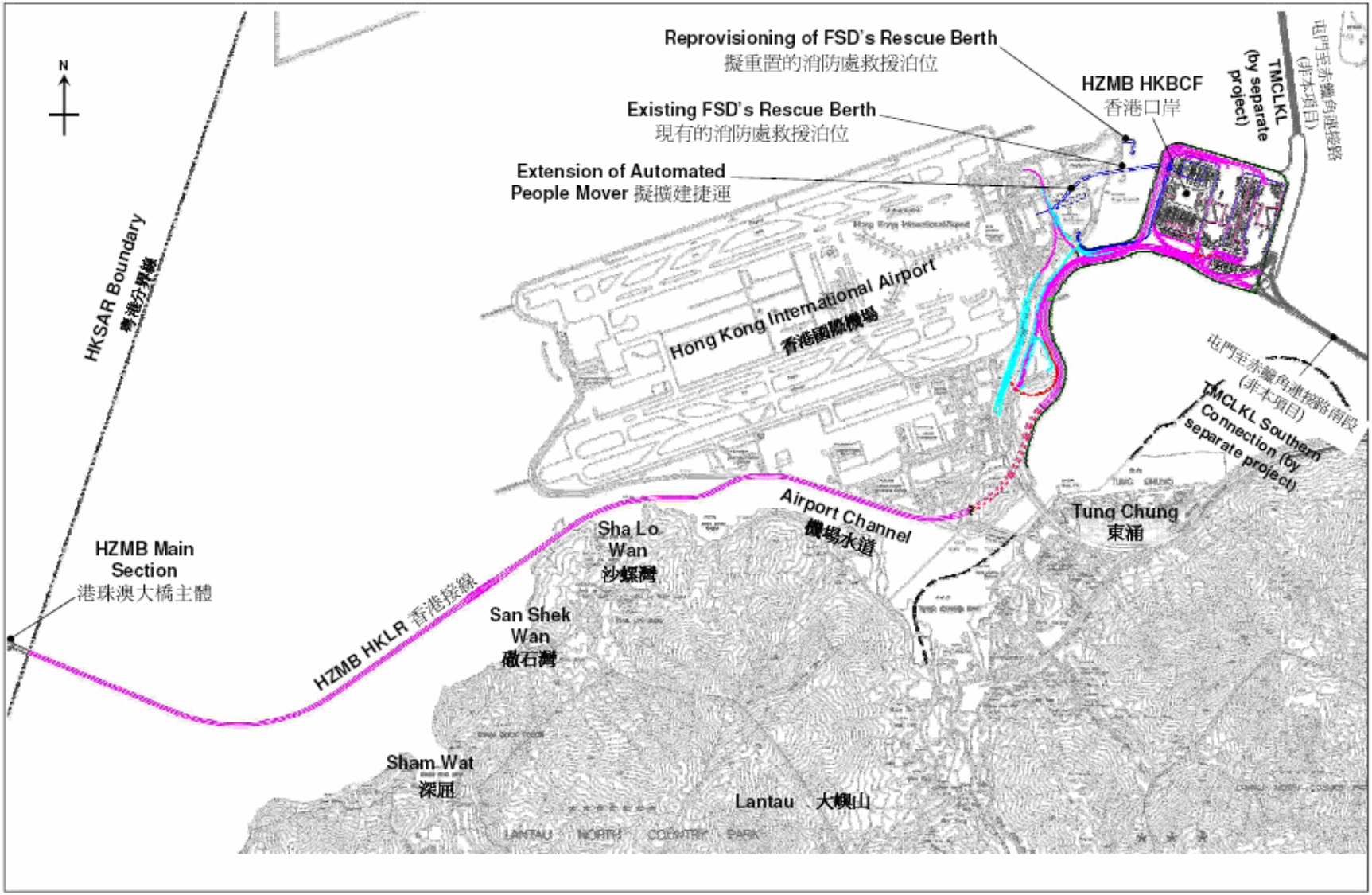
24. The EIA report includes an Environmental Monitoring and Audit (EM&A) Manual which recommends an EM&A programme during both the construction and operation phases of the Project.

25. Given that the Project, HKBCF and TMCLKL will be implemented concurrently, an Environmental Project Office will be established by the applicant during the construction of these projects to oversee the cumulative construction impacts in the North Lantau Area.

## PUBLIC CONSULTATION

26. The applicant has made the EIA report, EM&A Manual and Executive Summary available for the public to comment under the EIAO from 14 August 2009 to 12 September 2009. Members will be briefed on any public comments received at the meeting.

**August 2009**
**Environmental Assessment Division**
**Environmental Protection Department**

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| 路政署 HIGHWAYS DEPARTMENT 港珠澳大橋香港工程管理處 Hong Kong - Zhuhai - Macao Bridge Hong Kong Project Management Office | ARUP 奧雅納工程顧問 Ove Arup & Partners Hong Kong Limited | Drawing Title: Overall Layout of HKLR and HKBCF 香港接線和香港口岸整體方案 | Drawing No.: Figure |