

**For Discussion  
on 27 May 2005**

**Legislative Council Panel on Transport**

**Hong Kong – Zhuhai – Macao Bridge  
and North Lantau Highway Connection**

**Purpose**

This paper updates Members on the progress of the advance work for the Hong Kong – Zhuhai – Macao Bridge (HZMB) and the North Lantau Highway Connection (NLHC), and seeks Members' support for a funding application to be made to the Public Works Subcommittee/Finance Committee (PWSC/FC) for the conceptual design of and advance technical studies for the HZMB.

**Background**

**Hong Kong – Zhuhai – Macao Bridge**

2. At the meeting of the Panel on 29 September 2003, we briefed Members on the arrangement for taking forward the advance work for the HZMB. We informed Members that the HZMB Advance Work Co-ordination Group (AWCG) had been set up by the governments of the Hong Kong Special Administrative Region (HKSAR), Guangdong Province and the Macao Special Administrative Region (Macao SAR) to proceed with the advance work for the HZMB as quickly as possible. On 24 October 2003, we further informed Members of the justification for the HZMB and the possible locations of its landing point in Northwest Lantau. On 25 June 2004, we briefed Members on AWCG's appointment of China Highway Planning and Design Institute (HPDI) to conduct a full engineering feasibility study (the feasibility study) for the HZMB. We also informed Members of the setting up of a Project Office in Guangzhou to monitor the conduct of the feasibility study.

**North Lantau Highway Connection**

3. At the meeting of the Panel on 29 September 2003, we sought

Members' support for a funding application to be made to the PWSC and FC for an investigation and preliminary design (I&PD) study for the Hong Kong section of the HZMB as well as the NLHC for connection to the local road network. On 25 June 2004, we briefed Members on the commissioning of the I&PD study for the Hong Kong section of the HZMB and the NLHC in March 2004 after securing funding approval from the FC.

## Latest Developments

### Hong Kong – Zhuhai – Macao Bridge

4. The various topical studies under the feasibility study covering a wide range of topics such as hydrology, environment, landscape, marine, ship impact protection, traffic and wind speed assessment have been substantially completed. Expert panel meetings have been held to solicit comments and suggestions from experts from the Mainland, Hong Kong and Macao. The HPDI has submitted a draft feasibility study report to the three governments for consideration. The AWCG is coordinating and compiling comments from the three governments on the draft report.

5. Various alignment options have been put forward by the HPDI for evaluation. They can be broadly classified into three categories – Northern Alignment<sup>1</sup>, Southern Alignment<sup>2</sup> and Extreme Southern Alignment<sup>3</sup> – as shown in Annex A. The landing points in the east and west banks of the Pearl River Estuary under consideration are San Shek Wan in Northwest Lantau of the HKSAR, A Pérola in the Macao SAR and either Gongbei or Hengqin in Zhuhai. Of the three categories of alignments, the Southern Option and the Extreme Southern Option will give rise to a number of environmental problems. Under the Southern Option, the bridge will run along the existing natural shoreline of West

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<sup>1</sup> The bridge alignment starts from the east bank landing point of San Shek Wan at Northwest Lantau, crosses the Pearl River Estuary in a bridge-cum-tunnel form to connect to an artificial island for the Boundary Crossing Facilities near A Pérola of Macao, and then connects to either Gongbei / A Pérola or Hengqin / A Pérola.

<sup>2</sup> The bridge alignment starts from the east bank landing point of San Shek Wan at Northwest Lantau and runs along the shoreline to Tai O where the airport height restriction is less stringent before crossing the Pearl River Estuary in the form of a full bridge to connect to an artificial island for the Boundary Crossing Facilities near A Pérola of Macao, and finally connects to either Gongbei / A Pérola or Hengqin / A Pérola.

<sup>3</sup> The main element of this option is that Hengqin will be the landing point at the west bank. The bridge alignment will pass through the two islands of Niu Tou Dao (牛頭島) and San Jiao Dao (三角島) in the Pearl River estuary. From the south of Lantau, it will either run along the western Lantau shoreline to land at San Shek Wan or pass through the Lantau Island in the form of a tunnel towards the North Lantau Highway.

Lantau from Tai O to San Shek Wan. This option will lead to significant visual impacts. As regards the Extreme Southern Option, there are two alternatives: the first one will require opening a hole on the slope above the natural coastline of South Lantau and tunnelling through the Lantau South and Lantau North Country Parks; and the second alignment will run along the existing natural coastline from South Lantau to North Lantau, encroaching upon a proposed marine park at Fan Lau in Southwest Lantau. Comparatively speaking, the Northern Option will cause the least disturbance to the natural shoreline of Lantau. In fact, the bridge structure in the form of a viaduct thereat will not touch any land area of Lantau upon “landing”; it will span across the San Shek Wan headland.

6. The alignment options were examined and discussed in detail by experts from the Mainland, Hong Kong and Macao during an Expert Panel Meeting on the HZMB Alignment organized by the National Development and Reform Commission and held in Zhuhai on 1 and 2 April 2005. The Expert Panel Meeting recommended the Northern bridge-cum-tunnel Alignment with landings at San Shek Wan, Gongbei and A Pérola for consideration by the three governments. The Meeting also recommended that the HPDI should look into further refining the Northern bridge-cum-tunnel Alignment including shifting it northwards to minimize its impacts on the navigation and anchorage areas, and further examine other measures that may reduce the construction cost.

7. The HPDI will further revise the draft feasibility study report taking into account the recommendations of the Expert Panel Meeting on the HZMB Alignment and the feedback from the three governments. The finalized feasibility study report will be submitted to the AWCG for endorsement before its submission to the Central Government for consideration. It is anticipated that the Central Government will require a few months to examine the feasibility study report.

8. Our intention is that the HZMB project should now proceed to the conceptual design stage covering the main bridge, boundary crossing facilities and the connecting road links. This will help define clearly the detailed requirements and scope of the HZMB project, and facilitate the AWCG’s assessment of how best it should be funded and how the relevant documents should be drawn up.

9. Meanwhile, a number of follow-up technical studies have been recommended by various Expert Panels to supplement the topical studies

carried out under the feasibility study. These include a study to refine the northern alignment and studies that are necessary to pave the way for the subsequent work including risk analyses and assessment of pricing for construction works in oceanic condition. The AWCG is considering advancing these studies in the interest of a smoother implementation programme for the HZMB in the future.

10. The AWCG's intention is to involve private sector participation in funding and operating the HZMB. In order to test the interest in the market and solicit views from the market on possible arrangements, the AWCG is making preparations to invite expressions of interest. Subject to the response and the findings of the conceptual design, the exact scope of the project can be clearly defined and drawn up for discussion with interested parties.

11. We intend to make a funding application to the PWSC in June 2005 for the conceptual design and certain essential technical studies at an estimated cost of \$26.8 million (HKSAR's share) for employing consultants. The cost of the conceptual design for the HZMB and advance technical studies, estimated to be RMB 45.0 million and RMB 27.8 million respectively, should be shared by the three sides on an equal basis as in line with the cost-sharing for the feasibility study carried out by the HPDI. The funding and cash-flow requirements are set out in **Annex B**.

### **North Lantau Highway Connection**

12. The I&PD study requires input from the feasibility study for the HZMB, particularly with regard to its landing points and alignment which will affect the development of the alignment for the NLHC. Various alignment options for the NLHC have been investigated for connecting the HZMB to the existing road network, as shown in **Annex C**. For the section of the alignment west of the airport, some options are not recommended in the light of the constraints of airport height restriction or adverse environmental impacts. Preliminary assessment reveals that the option in the form of a viaduct along the Airport Channel will have less environmental impacts than the other options. It will also be compatible with the preferred Hong Kong landing point of the HZMB at San Shek Wan. For the eastern section of the NLHC, out of the alignments

studied, four alignment options<sup>4</sup> are worthy of further exploration. All of those options can be linked to the proposed San Shek Wan landing point. Each of these options has its relative merits, as set out in **Annex D**.

13. We plan to consult the Islands District Council on the alignment options after the meeting of the Panel on 27 May 2005.

14. We have earmarked funds for the NLHC project, with an estimated cost of \$9,715 million. The NLHC project will be completed to tie in with the programme for the HZMB. According to the current project programme, we will seek FC's funding approval for the detailed design and the construction works for the NLHC in end 2005/early 2006 and early 2007 respectively for works to commence in mid-2007.

### **Advice Sought**

15. Members are invited to note the contents of this paper and indicate support for the funding submission on the conceptual design and essential technical studies for the HZMB.

**Environment, Transport and Works Bureau**  
**20 May 2005**

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<sup>4</sup> The options are :

- (a) an alignment passing through Scenic Road/Scenic Hill onto an offshore viaduct seaward of Tung Chung, connecting to North Lantau Highway at Tai Ho;
- (b) an alignment passing through Scenic Hill onto an offshore tunnel seaward of Tung Chung, connecting to North Lantau Highway at Tai Ho;
- (c) an alignment with direct connection to North Lantau Highway at Tung Chung New Town; and
- (d) an alignment with tunnel passing through the Wong Nai Uk Hill in Tung Chung Central and south of Tung Chung new town, connecting to North Lantau Highway near Kei Tau Kok



**Funding and Cash-flow Requirements  
of Conceptual Design  
and Certain Essential Technical Studies for HZMB**

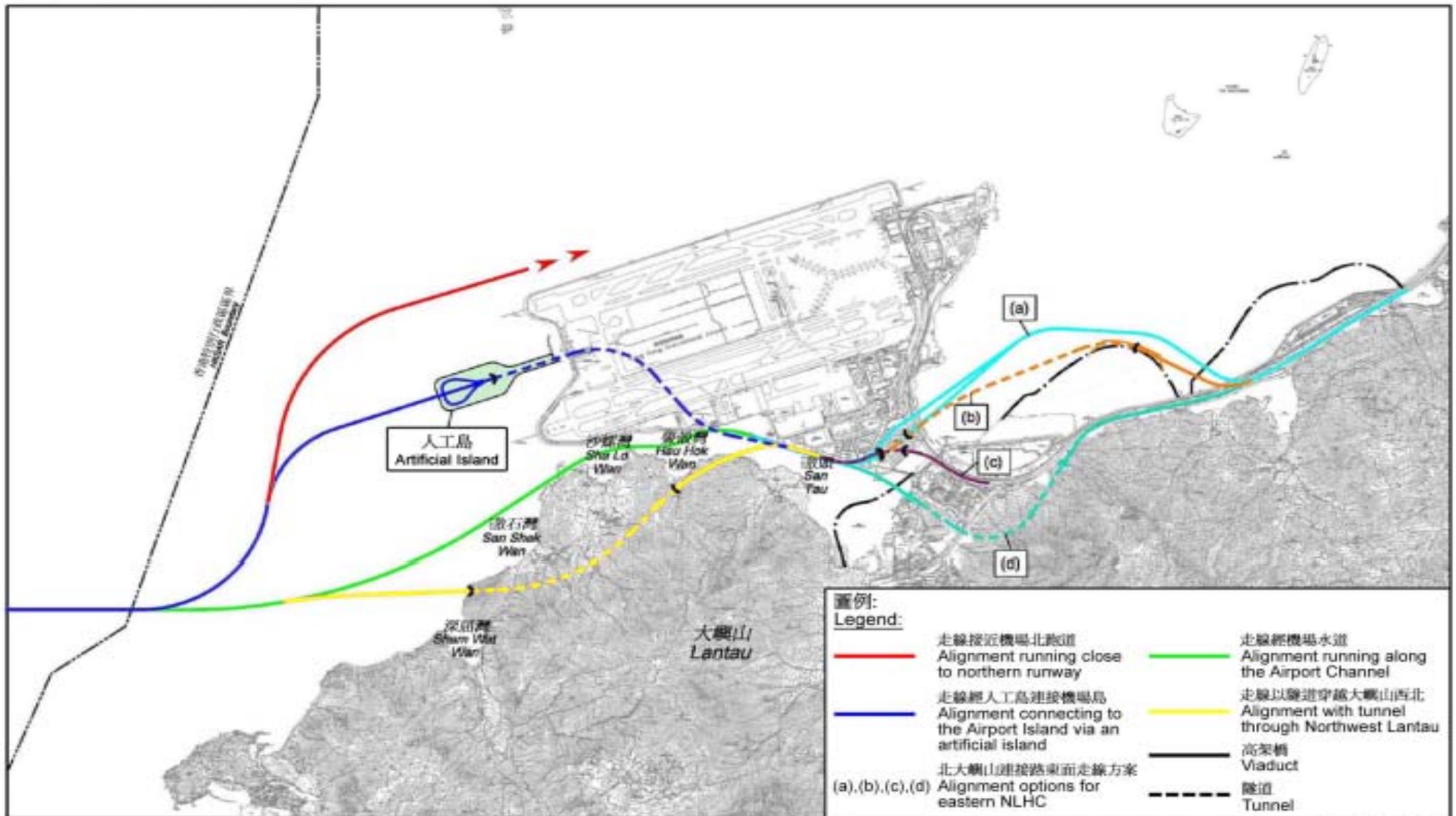
The estimated cost is \$26.8 million in MOD prices, made up as follows –

	<b>\$ million</b>	
(a) Conceptual design	15.0	
(b) Advance technical studies (compilation of technical specifications, collection of wind and sea wave data, cross-boundary management, etc.)	9.3	
(c) Contingencies	2.4	
Sub-total	26.7	(in September 2004 prices)
(d) Provision for price adjustment	0.1	
Total:	26.8	(in MOD prices)

2. The expenditure will be phased as follows –

	<b>\$ million</b>	<b>Price Adjustment Factor</b>	<b>\$ million</b>
<b>Year</b>	<b>(Sep 2004)</b>		<b>(MOD)</b>
2005 – 2006	23.0	1.00450	23.1
2006 – 2007	3.7	1.00576	3.7
	26.7		26.8

3. We have derived the MOD estimate on the basis of the Government's forecast of trend rate of change in the prices of public sector building and construction output for the period 2005 to 2007. The three governments will employ consultants to undertake the conceptual design of and advance technical studies for the HZMB on a lump-sum basis without provision for price adjustment as the duration of the consultancies will not exceed 12 months.



**圖例:**  
**Legend:**

	走線接近機場北跑道 Alignment running close to northern runway		走線經機場水道 Alignment running along the Airport Channel
	走線經人工島連接機場島 Alignment connecting to the Airport Island via an artificial island		走線以隧道穿越大嶼山西北 Alignment with tunnel through Northwest Lantau
	北大嶼山連接路東面走線方案 Alignment options for eastern NLHC		高架橋 Viaduct
			隧道 Tunnel

### Comparison of Alignment Options on the Eastern Side of NLHC

Alignment Options	Pros	Cons
(a)	<ul style="list-style-type: none"> <li>• farthest away from Tung Chung and thus less environmental impacts on the existing residential developments thereat</li> <li>• an open highway is a more favourable option from the constructability, usage, operation and maintenance points of view</li> </ul>	<ul style="list-style-type: none"> <li>• some impact on sea view from Tung Chung (though some distance away)</li> </ul>
(b)	<ul style="list-style-type: none"> <li>• this will be in tunnel form in the sea, and there will be no impact on sea view from Tung Chung</li> </ul>	<ul style="list-style-type: none"> <li>• significant settlement risk for the tunnel due to cavities found in the seabed of the eastern waters</li> <li>• a tunnel structure is less favourable from the constructability, usage, operation and maintenance points of view</li> </ul>
(c)	<ul style="list-style-type: none"> <li>• shortest in length and least costly</li> </ul>	<ul style="list-style-type: none"> <li>• closest to Tung Chung residents and hence relatively the environmental impacts on them will be higher</li> <li>• the link road connection to NLH will take up the space of two existing slip roads at Tung Chung New Town, which will need to be closed</li> </ul>
(d)	<ul style="list-style-type: none"> <li>• will avoid impact on sea view from Tung Chung</li> </ul>	<ul style="list-style-type: none"> <li>• a tunnel structure is less favourable from the constructability, usage, operation and maintenance points of view</li> <li>• will affect a pavilion and graves at the hillside of Wong Nai Uk</li> <li>• will affect a planned town park</li> </ul>