

Supplemental Agreement No. 1
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Wan Chai Development Phase II Planning and Engineering Review

**REPORT ON
COGENT AND CONVINCING MATERIALS
TO DEMONSTRATE
COMPLIANCE WITH THE OVERRIDING PUBLIC NEED TEST**

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MAUNSELL CONSULTANTS ASIA LTD

**SA1 to Agreement No. CE54/2001 (CE)
WAN CHAI DEVELOPMENT PHASE II
PLANNING AND ENGINEERING REVIEW**

**COURT OF FINAL APPEAL RULING ON
THE PRESUMPTION AGAINST RECLAMATION IN
THE PROTECTION OF THE HARBOUR ORDINANCE:**

**COGENT AND CONVINCING MATERIALS
TO DEMONSTRATE
COMPLIANCE WITH THE OVERRIDING PUBLIC NEED TEST**

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1 INTRODUCTION

1.1 Background

- 1.1.1 Wan Chai Development Phase II (WDII) is the conclusion of a number of planning studies commissioned by Government, covering transport infrastructure and development along the shoreline of Central and Wan Chai, that date back to the early 1980s. The WDII project is undergoing a process of statutory town planning procedures and public consultation, in which there has been thorough public discussion on matters including the scale of reclamation and the usage of the land to be made available by the project.
- 1.1.2 The need for the Central and Wan Chai Reclamation was first identified in the strategic study on “Harbour Reclamations and Urban Growth” undertaken between March 1982 and October 1983. The need was further confirmed in various planning studies, including the Territorial Development Strategy of 1984, the Port and Airport Development Strategy 1989, Metroplan 1991, and the Territorial Development Strategy Review of 1996. The whole Central and Wan Chai Reclamation project forms land for the construction of, among other things, strategic transport links, associated surface road networks, the Airport Railway and its Hong Kong Station and the Hong Kong Convention and Exhibition Centre Extension. The Central Reclamation Phases I, II and the Wan Chai Reclamation Phase I were completed in 1997 to 1998. Central Reclamation Phase III (CRIII) is currently under construction. WDII is the final phase, and an integral part, of the Central and Wan Chai Reclamation.
- 1.1.3 The Wan Chai Development Phase II Comprehensive Feasibility Study (the WDIICFS) was commissioned by the then Territory Development Department in June 1999. The main purpose of that assignment was to make provision for key transport infrastructure and facilities along the north shore of Hong Kong Island, in Wan Chai and Causeway Bay. Under the WDIICFS, a layout of the Trunk Road was derived, comprising the Central-Wan Chai Bypass (CWB) running along the Wan

Chai shoreline in tunnel, and the Island Eastern Corridor Link (IECL) running behind the Causeway Bay Typhoon Shelter on elevated roadway, connecting to the existing elevated Island Eastern Corridor (IEC). New land was proposed along the Wan Chai and Causeway Bay shoreline, primarily for the construction of the Trunk Road and other key infrastructure, and also to provide an attractive waterfront with a new public promenade. A total reclamation area of some 28.5 ha along the existing Wan Chai and Causeway Bay shorelines was envisaged under the WDIICFS, from the interface with the CRIII project on the west side of the Hong Kong Convention and Exhibition Centre (HKCEC) Extension, to the east of the Causeway Bay Typhoon Shelter.

- 1.1.4 The Trunk Road and the associated land use proposals for the WDII project were incorporated in a draft Wan Chai North Outline Zoning Plan No. S/H25/1 (the draft OZP), which was gazetted under the Town Planning Ordinance on 19 April 2002.¹ At the same time, the road works and reclamation proposed under the WDII project were gazetted under the Roads (Works, Use and Compensation) Ordinance and Foreshore and Sea-bed (Reclamations) Ordinance respectively. A copy of the Wan Chai North OZP, which shows the WDIICFS proposals, is attached at **Annex A**, for reference.
- 1.1.5 Objections to the draft OZP were received and considered by the Town Planning Board, which decided to propose amendments to the draft OZP to meet or partially meet some of the objections after giving preliminary consideration and further consideration to the objections on 6 September 2002, and 29 November 2002 and 6 December 2002, respectively; and after giving consideration to further objections on 14 February 2003.
- 1.1.6 In February 2003, the Society for the Protection of the Harbour Limited sought a judicial review of the decisions of the Town Planning Board made on 6 December 2002 and 14 February

¹ *The draft Wan Chai North OZP No. S/H25/1 excludes the area between the HKCEC Extension and the CRIII works; this area falls within the approved Central District (Extension) OZP No. S/H24/6. The area of reclamation proposed under the gazetted draft Wan Chai North OZP was 26ha, rather than the 28.5ha proposed under the WDIICFS. The reclamation area proposed in the Wan Chai North OZP included the Harbour Park at the Causeway Bay Typhoon Shelter breakwater.*

2003 in connection with the draft OZP and its compliance with the Protection of the Harbour Ordinance (PHO). The High Court handed down its judgment on 8 July 2003, whereby the decisions of the Town Planning Board made on 6 December 2002 and 14 February 2003 in respect of the draft OZP were quashed. According to the High Court judgment, the purpose and extent of each proposed reclamation ought to be individually assessed by reference to the three tests of (1) compelling, overriding and present need, (2) no viable alternative and (3) minimum impairment (the “Three Tests”). The Court also ordered the Town Planning Board to reconsider the draft OZP and the objections thereto. As this interpretation of the PHO would apply to all future planning of harbour front areas which included reclamation, and due to the great general and public importance of the case, the Town Planning Board appealed directly to the Court of Final Appeal (CFA).

- 1.1.7 Objections were also received for the WDII road works and reclamation schemes gazetted under the Roads (Works, Use and Compensation) Ordinance and Foreshore and Sea-bed (Reclamations) Ordinance respectively. In the light of the on-going legal proceedings, it was considered not appropriate to submit the road works and reclamation schemes to the Chief Executive in Council for consideration. The above gazettals lapsed on 18 and 19 September 2003 respectively. The WDII project will have to be re-gazetted under the relevant ordinances at an appropriate time.
- 1.1.8 In October 2003, the Town Planning Board considered the findings of a preliminary planning assessment on the draft OZP conducted by Planning Department according to the High Court’s judgment on the judicial review quashing its decisions related to the draft OZP, and requested Government to conduct a comprehensive review of the planning and engineering proposals of the WDII project and draw up a minimum reclamation option for Wan Chai North that would comply with the law. The Town Planning Board will reconsider the draft OZP and the objections according to the provisions of the Town Planning Ordinance upon completion of the review.

- 1.1.9 On 9 January 2004, the CFA handed down its judgment on the judicial review. The CFA ruled that the presumption against reclamation in the PHO can only be rebutted by establishing an overriding public need for reclamation (the “Overriding Public Need Test”), and that there must be cogent and convincing materials available to enable the decision-maker to be satisfied that the test is fulfilled for rebutting the presumption against reclamation.
- 1.1.10 Following the Town Planning Board’s request for a review of the WDII proposals in October 2003 and in the light of the CFA judgment handed down in January 2004, Government has undertaken to conduct a comprehensive planning and engineering review of the development and reclamation proposals for the WDII project (the WDII Review). The WDII Review commenced in March 2004.

1.2 The CFA Judgment and the PHO

The Protection of the Harbour Ordinance

- 1.2.1 The PHO was enacted to protect and preserve the harbour by establishing a presumption against reclamation in the harbour. Section 3 of the Ordinance provides:

- “(1) The harbour is to be protected and preserved as a special public asset and a natural heritage of Hong Kong people, and for that purpose there shall be a presumption against reclamation in the harbour.
- (2) All public officers and public bodies shall have regard to the principle stated in subsection (1) for guidance in the exercise of any powers vested in them.”

The Court of Final Appeal Judgment

- 1.2.2 The CFA handed down its judgment on 9 January 2004 in respect of the judicial review on the Draft Wan Chai North OZP (No. S/H25/1). A copy of the CFA judgment is enclosed for reference at **Annex B**. The following is extracted from the

summary of the judgment given by the Chief Justice as the unanimous judgment of the CFA, prepared by the Judiciary.

Overriding public need

- 1.2.3 In order to implement the strong and vigorous statutory principle of protection and preservation, the presumption must be interpreted in such a way that it can only be rebutted by establishing an overriding public need for reclamation (“the overriding public need test”). The statute, in conferring on the harbour a unique legal status, recognises the strong public need to protect and preserve it. The statute envisages that irreversible loss to the extent of the reclamation would only be justified where there is a much stronger public need to override the statutory principle of protection and preservation.
- 1.2.4 Public needs would of course be community needs. They would include the economic, environmental and social needs of the community.
- 1.2.5 A need should only be regarded as overriding if it is a compelling and present need.
- 1.2.6 A compelling and present need goes far beyond something which is “nice to have”, desirable, preferable or beneficial. But on the other hand, it would be going much too far to describe it as something in the nature of the last resort, or something which the public cannot do without. A present need takes into account the timescale of planning exercises, and that the need would arise within a definite and reasonable time frame.
- 1.2.7 Where there is a reasonable alternative to reclamation, an overriding need for reclamation would not be made out. All circumstances should be considered, including the economic, environmental and social implications of each alternative. The cost as well as the time and delay involved would be relevant. The extent of the proposed reclamation should not go beyond the minimum of that which is required by the overriding need. Each area proposed to be reclaimed must be justified.

- 1.2.8 The overriding public need test should be regarded as a single test and is a demanding one.

Cogent and convincing materials

- 1.2.9 To enable a public officer or body to be satisfied that the overriding public need test has been met, the materials in the case in question must be cogent and convincing.

1.3 WDII Review Objective

- 1.3.1 The main purpose of the WDII project is to provide land within the WDII project area for the construction of the Trunk Road (comprising the CWB which runs from Rumsey Street Flyover and the Central Interchange in Central Reclamation Phase I through the CRIII and WDII project areas, and the IECL which provides connection from the eastern portal of the CWB to the IEC), and other key transport infrastructure including the necessary ground level roads for connection to the Trunk Road and to cater for through traffic from Central to Wan Chai and Causeway Bay.
- 1.3.2 Rail infrastructure that would be accommodated by the WDII project includes the Hong Kong Island section of the Shatin to Central Link (SCL) and the future Mass Transit Railway (MTR) North Hong Kong Island Line (NIL). However, it is expected that the SCL and NIL can be accommodated within existing land and any land that may be formed for the Trunk Road, without further reclamation. In the event that additional reclamation is required for the SCL and NIL, then that reclamation will have to be justified by the SCL and NIL projects.
- 1.3.3 The land formed for the above transport infrastructure will provide opportunities for the development of an attractive waterfront promenade of international standard for the enjoyment of the public.
- 1.3.4 The WDII Review seeks to assess individually the purpose and extent of each proposed reclamation by reference to the Overriding Public Need Test and, if needed, to make

recommendations on the revised alignment for the Trunk Road and at-grade roads, extent of reclamation and/or the land uses for the review area covered by the assignment. Cogent and convincing materials are required for justifying the conclusion of the WDII Review.

1.4 Harbour-Front Enhancement Review

1.4.1 The Harbour-front Enhancement Committee (HEC) was established in May 2004 to advise Government, through the Secretary for Housing, Planning and Lands, on the planning, land uses and developments along the existing and new harbour-front of Victoria Harbour. As guidance for the planning, development and management of the Victoria Harbour and the harbour-front areas, the HEC has established harbour planning principles which should be followed when examining transport infrastructure, including the Trunk Road, and harbour-front enhancement schemes. These are:

- preserving Victoria Harbour
- stakeholder engagement
- sustainable development
- integrated planning
- proactive harbour enhancement
- vibrant harbour
- accessible harbour
- public enjoyment.

1.4.2 The HEC has set up a Sub-committee, namely the Sub-committee on WDII Review, to advise on the WDII Review. Government has accepted the recommendation by the Sub-committee on WDII Review that enhanced participation should be a key element of the Review. To achieve this, a public engagement exercise, namely the “Harbour-front Enhancement Review – Wan Chai, Causeway Bay and Adjoining Areas” (HER), is being carried out under the steer of the Sub-committee on WDII Review. Results of the HER project will provide inputs to the WDII Review.

1.4.3 In order to achieve a better understanding of the opportunities for waterfront enhancement and to ensure a high degree of community support for the future draft OZPs and the draft Recommended Outline Development Plan (RODP), a 3-stage public engagement strategy has been formulated so as to enable a more structured approach to be adopted to the HER public engagement activities:

- (i) “Envisioning Stage” Public to provide their visions, wishes and concepts, as well as to compile Sustainability Principles and Indicators as a basis for the development of the Concept Plan
- (ii) “Realization Stage” Public to evaluate the Concept Plan to arrive at consensus
- (iii) “Detailed Planning Stage” Ensure draft OZPs and RODP reflect the consensus.

1.4.4 The Envisioning Stage was formally launched on 22 May 2005, with a wide range of public engagement activities taking place over a two-month public engagement period. The envisioning exercise was to engage the public in identifying the key issues and establishing principles in terms of improving the waterfront. The concept of sustainable development underpins the whole HER project. A list of sustainability principles and indicators has been prepared and agreed through the public consultation process; these agreed sustainability principles and indicators will be used to evaluate the Concept Plan that is developed in the Realization Stage.

1.4.5 As part of the Envisioning Stage public engagement activities, the HEC Sub-committee on WDII Review convened an “Expert Panel Forum on Sustainable Transport Planning and Central-Wan Chai Bypass”, to explore sustainable transport along the northern shore of Hong Kong Island and to deliberate on whether the CWB (ie the Trunk Road) is needed – one of the key issues of the project.

- 1.4.6 The HEC Sub-committee on WDII Review convened a “Envisioning Stage – Consolidation Forum” to conclude the Envisioning Stage of the HER project, on 12 November 2005. The aim of the forum was to share with the public the comments and proposals received during the public engagement activities held from May to July 2005 for the Envisioning Stage of HER, and to involve the public in consolidating these views before proceeding with the preparation of the Concept Plans for the development and enhancement of the harbour-front of Wan Chai, Causeway Bay and the adjoining areas. Following the Consolidation Forum, the various issues that were raised by participants during the public engagement process, particularly in respect of Trunk Road alignments and harbour-front enhancement ideas, were extensively considered and addressed by the Sub-committee on WDII Review as part of the process of consolidating harbour-front and Trunk Road ideas. The outcomes of this process then formed the basis of the preparation of the Concept Plan in the Realization Stage.
- 1.4.7 A Concept Plan, for the development and enhancement of the harbour-front under the ambit of the WDII Review, has been prepared for evaluation and consensus building by the public, using the HEC’s harbour planning principles and the sustainability principles and indicators that have been developed during the Envisioning Stage. At a Consensus Building Town Hall meeting on 16 December 2006, there was general agreement with the proposals put forward by the Concept Plan, in respect of the Trunk Road proposal and the envisaged land uses, although there was some discussion on various detailed aspects of the harbour-front enhancement schemes.
- 1.4.8 On the basis of consensus on the Concept Plan, detailed planning, engineering and environmental assessments will be carried out for the derivation of the relevant OZPs and the RODP, which will reflect the consensus on the Concept Plan.
- 1.4.9 Hong Kong Island District Councils, Legislative Council, as well as statutory, advisory and professional bodies have been widely consulted throughout the process of the HER project.

1.5 Approach to Demonstrating Compliance with the CFA Judgment

- 1.5.1 Whilst the emphasis of the HER is on the planning of the harbour-front with a view to protecting the Harbour and improving accessibility, utilisation and vibrancy of the harbour-front areas, a holistic approach must be taken in integrating the harbour-front development with essential transport infrastructure required under the WDII project, this being mainly the need to complete a long-planned strategic road link along the north shore of Hong Kong Island, ie the Trunk Road connecting Rumsey Street Flyover in Central and the IEC to the east of Causeway Bay. Any land that may be formed along the shoreline to facilitate the Trunk Road construction will then provide further opportunity for harbour-front improvement.
- 1.5.2 It is the Trunk Road which forms the basis of the WDII project proposals and which ultimately determines the form of the waterfront along this part of the north shore of Hong Kong Island. The Trunk Road must, itself, pass the Overriding Public Need Test, such that it satisfies the CFA's ruling on compliance with the PHO.
- 1.5.3 A step by step approach is taken to ensure that the project satisfies the CFA's judgment.
- 1.5.4 The first step is to confirm that there is an overriding and present need for the whole Trunk Road in the first place. In Chapter 2, this need is demonstrated through a district traffic study and confirmed by a panel of independent local and overseas experts in their relevant fields: the "Expert Panel on Sustainable Transport Planning and Central-Wan Chai Bypass".
- 1.5.5 Having established the need for the Trunk Road, the next step is to identify any reasonable alternative to reclamation (ie "no-reclamation" options) in its implementation. If there is a feasible "no reclamation" option, then it should be pursued. Chapter 3 addresses this issue, including ideas put forward by the public, with the emphasis on minimising, if not eliminating, the extent of reclamation, while meeting the public need for the

project, and finds that there are, in fact, no feasible “no reclamation” options.

- 1.5.6 Having established that there is no reasonable alternative to reclamation, the third step is to ensure that reclamation is restricted to only the minimum amount necessary to meet the overriding public need. Chapter 4 examines in more detail feasible and reasonable options in respect of the degree to which they serve to meet the overriding public need, and in terms of their extent of reclamation.
- 1.5.7 Public views on the need for the Trunk Road and the associated reclamation proposals are an essential part of the process of achieving consensus on the selection of the preferred scheme. Chapter 5 highlights the feedback from the extensive public engagement process.
- 1.5.8 In Chapter 6, the scheme that meets the overriding public need and that has the minimum extent of reclamation required by the overriding need is recommended as the preferred Trunk Road scheme. For this scheme, the associated ground level road network and requirements for re-provisioning of affected facilities are examined to determine if any additional reclamation, over and above that required for the Trunk Road itself, is necessary. If so, then the overriding public need for that additional reclamation must be satisfied. The public’s proposed harbour-front enhancement ideas are taken on board in the development of a Concept Plan, based on the preferred Trunk Road scheme. Any additional reclamation requirements arising from the implementation of the Concept Plan are identified.
- 1.5.9 In Chapter 7, the reclamation requirements of the preferred scheme are defined more precisely and examined in detail to demonstrate that the extent of reclamation is indeed the minimum required by the overriding need.
- 1.5.10 Finally, Chapter 8 summarises the conclusions of the compliance with the overriding public need test.

1.6 Purpose of this Report

- 1.6.1 This Report sets out the process by which the Trunk Road scheme and its associated reclamation has been derived, in response to the CFA judgment handed down on 9 January 2004 in respect of the judicial review of the Draft Wan Chai North OZP (No. S/H25/1).
- 1.6.2 The report presents cogent and convincing materials to demonstrate the compliance with the Overriding Public Need Test.
- 1.6.3 The report has been prepared with reference to the requirements of Housing, Planning and Lands Bureau (HPLB) and Environment, Transport and Works Bureau (ETWB) Circular No. 1/04 on Protection of the Harbour Ordinance, for the consideration of the reclamation proposals of the WDII project.

2 THE NEED FOR THE TRUNK ROAD

2.1 Introduction

- 2.1.1 The basis of the WDII project and the core transport infrastructure for which the project provides is the Trunk Road. The Trunk Road is defined from the connection with the existing Rumsey Street Flyover and the Central Interchange in Central, through to a connection with the existing IEC to the east of the Causeway Bay Typhoon Shelter. At the Rumsey Street Flyover connection, a Central Interchange will provide connections into the Central area, and then the Trunk Road will drop down into tunnel and run along the Central shoreline, through CRIII, to the WDII project area. In WDII, the Trunk Road will continue in tunnel until it needs to rise onto elevated flyover structure to connect with the elevated IEC. The section of the Trunk Road that runs in tunnel through CRIII and WDII is also known as the CWB, whilst the section of the Trunk Road on flyover, for the connection with the IEC, is also known as the IECL.
- 2.1.2 The Trunk Road will form an east-west strategic route through Central and Wan Chai. The Trunk Road is an essential element of Government's strategic transport planning for Hong Kong; it is the "missing link" in the strategic highway running along the northern part of Hong Kong Island. The Trunk Road is required to provide relief to the existing main east-west route (Connaught Road Central – Harcourt Road – Gloucester Road).
- 2.1.3 The Trunk Road was originally proposed under the Central and Wanchai Reclamation Feasibility Study, completed in 1989, where its feasibility was established. The need for the Trunk Road was reaffirmed in the WDIICFS, completed in 2001, which demonstrated an urgent need for the link to be put in place in order to relieve the existing and growing congestion along the east-west corridor of Hong Kong Island North. A number of strategic traffic studies have also confirmed the need to improve the flow of the east-west traffic through Central and Wan Chai, including the Long Term Road Study completed in 1968 and the First, Second and Third Comprehensive Transport

Studies (CTS) completed in 1976, 1989 and 1999 respectively. A recent rerun of the CTS-3 transport model also confirmed the need for the CWB despite changes in land use planning assumptions and population projections.

- 2.1.4 Following the 9 January 2004 CFA ruling on compliance with the PHO, the compelling and present need for the Trunk Road to meet the transport needs of the community within a reasonable and definite planning time frame, and to meet the social and economic needs of the community, was established under the CRIII project, and is presented in “A Review of Central Reclamation Phase III by applying the Court of Final Appeal’s “Overriding Public Need Test” April 2004”. A full copy of this report is available for viewing on the HPLB website at: <http://www.hplb.gov.hk/reclamation/images/review02apr04.pdf>.
- 2.1.5 Under the WDII project, the need for the Trunk Road has also been confirmed. This is the essential first step in complying with the CFA ruling on establishing an overriding public need for reclamation, ie that there must be a compelling and present need for the Trunk Road in the first place.

2.2 Existing Situation

Existing Road Network

- 2.2.1 The Central Business District (CBD) is currently served by the east-west Connaught Road Central / Harcourt Road / Gloucester Road Corridor (the Corridor). This Corridor is primarily a dual four-lane urban trunk road serving as a key east-west link for Hong Kong Island North. At the same time, it also serves as a distributor road providing north-south connections to various districts.
- 2.2.2 The Corridor is currently serving as an “Urban Trunk Road”, which bears the responsibility of carrying the long-haul traffic between east and west of Hong Kong Island. It is also serving as a “Distributor Road” providing key accesses to its adjacent areas with very short connecting roads. The Corridor is over-saturated and too heavily used by the traffic towards its adjacent

areas to discharge its intended function as an Urban Trunk Road. Furthermore, the Corridor has many junctions with side roads, underpasses and flyovers creating substantial weaving and merging movements. Traffic queues from any bottlenecks at its side roads or its main section result in blockage of other movements and rapid deterioration of traffic conditions. A minor accident or incident occurring along or in the vicinity of the Corridor often results in serious congestion and delay on the road network, and, in some more serious cases, gridlock of the whole CBD and complete blockage of the Corridor. These are clear indications that the stability and reliability of both the strategic road network and the Central and Wan Chai local road network are in an unsatisfactory state.

Existing Traffic Pattern

- 2.2.3 The existing Corridor is already operating beyond its design capacity. Congestion along the Corridor is not limited to the typical morning and evening peak hours. Regular traffic congestion can be observed between 8am and 8pm during weekdays. Eastbound traffic heading for the CBD often queues back to the Western Harbour Tunnel approach along the Rumsey Street Flyover and also the at-grade Connaught Road Central. Traffic westbound to the CBD often tails back to the Wan Chai Sports Ground along Gloucester Road.
- 2.2.4 Regular traffic queues along the Corridor are also found in the direction of the Cross Harbour Tunnel, the Aberdeen Tunnel and the Causeway Bay area. These regular traffic queues use up the valuable road spaces of the Corridor, rendering unnecessary delay to the through traffic between the eastern and western parts of Hong Kong Island.
- 2.2.5 **Annex C** illustrates the existing traffic situation in terms of the extent of traffic queues when the Corridor is blocked.

The “Missing Link”

- 2.2.6 The need to provide a strategic trunk road along the northern shore of Hong Kong Island has long been identified. The Trunk Road is the missing link required to complete this strategic

route (**Annex D**). The Trunk Road is needed to divert through traffic away from the CBD and from the Corridor. It is also needed to cater for the anticipated natural growth of traffic and to alleviate the already existing congestion on the road networks. Without the Trunk Road, there will not be sufficient capacity to serve the heavy demands at both the strategic and local levels. The Trunk Road is needed to ensure the provision of a functional and balanced road network on Hong Kong Island and, to do this, the Trunk Road also needs to have adequate intermediate access points to serve the CBD so as to alleviate the burden of the Corridor.

2.3 Traffic Forecasts

2.3.1 Traffic studies have long predicted the consequences of continued traffic growth on the Corridor without the implementation of the Trunk Road. Recent traffic studies have confirmed the need for the Trunk Road after taking into account the latest land use planning assumptions and population projections, to ensure that traffic forecasts are in line with current strategic and local planning intentions. The Third Comprehensive Transport Study and a District Traffic Study have examined traffic conditions at these strategic and local levels, for the cases with and without the implementation of the Trunk Road.

The Third Comprehensive Transport Study

2.3.2 The Comprehensive Transport Study (CTS) model is based on reasonable assumptions and parameters on land use planning, population, employment, economic growth, vehicle fleet size, rail and road network information and is calibrated regularly using field traffic survey data.

2.3.3 The Third Comprehensive Transport Study (CTS-3) model rerun predicted that the peak-hour traffic demand along the Corridor will increase by about 30% from 2004 to 2016, which will result in longer queue lengths and longer periods of traffic congestion every day in the Corridor. Without the Trunk Road, travelling along the 4-km Corridor will take about 45 minutes at a speed of 5km/hr in 2011. The stagnant traffic will have a spill

over effect leading to congestion in the neighbouring roads in Central and Wan Chai, and complete gridlock in the road network may easily occur. With the completion of the Trunk Road, traffic congestion along critical sections of the Corridor can be relieved.

- 2.3.4 In order to test the effects of different growth rates of the four key planning inputs on population, employment, Gross Domestic Product and vehicle fleet size, sensitivity tests using growth rates different from those being adopted in the base case have been carried out. The results show that variations in the growth rates of these inputs will not result in significant change in traffic demand. Even if the growth rates of all these parameters were reduced by half, the percentage change in traffic demand would be decreased by 10% only. However, based on the historical trends of the parameters, it is most unlikely that this situation will occur. The sensitivity test results reinforce the recommendation that the Trunk Road is required.
- 2.3.5 Tests had been conducted on the effect of having equal tolls at the three cross harbour tunnels by setting the toll level for private cars using the three tunnels at \$20 and \$30 respectively. The main effect is a redistribution of traffic among the three tunnels. As the Cross Harbour Tunnel traffic only accounts for about 25% of all traffic along the section of Gloucester Road outside Immigration Tower, the redistribution of traffic will reduce the traffic in Gloucester Road by only 1 to 2 %. However, traffic in Connaught Road Central will be increased by 4 to 5% due to traffic redistributed to the Western Harbour Crossing. Also examined is the effect of having differential toll by time at the Cross Harbour Tunnel. It is noted that hourly traffic volume through the Cross Harbour Tunnel has already reached the saturation level throughout the day time from 7:30am to midnight. There is very little spare capacity at the tunnel before 7:30am and virtually no spare capacity at the tunnel at the inter-peak period (ie between the morning and evening peak periods) to absorb traffic redistributed from the peak periods or from other tunnels if the toll levels of the tunnel were to be increased in the peak periods and decreased in other periods. Again, such toll adjustment would mainly result in a

re-distribution of traffic among the three tunnels so that the reduction to Gloucester Road traffic would only be marginal as in the case of adopting equal tolls for the three tunnels.

- 2.3.6 From 1995 to 2005, the total length of railways in Hong Kong has increased by about 87% whereas the total length of roads has increased by only 13%. About \$100 billion was spent on new railway projects as compared with \$53 billion on new roads. The railway system has been expanded significantly over the years according to the “railway as backbone” policy, and further expansion is assumed in the traffic demand forecast. The proposed rail lines including Shatin to Central Link, West Hong Kong Island Line (from Sheung Wan to Kennedy Town), and South Hong Kong Island Line, which have direct connection to the existing rail lines along the northern Hong Kong Island, are assumed to be in place by 2016 in the model.
- 2.3.7 Traffic growth in the Corridor has been about 40% to 70% in the past 15 years. Without the Trunk Road, the future traffic growth will be suppressed due to severe traffic congestion. Longer queue lengths and longer period of congestion will occur. It is estimated that the average delay to the passengers in the Corridor will be 20 minutes and based on the number of passengers in the Corridor in 2004, the time lost will cost the passengers about \$1.8 billion per year.

District Traffic Study

- 2.3.8 In addition to the CTS-3 territorial traffic forecasts, a district traffic model was developed for the review and reappraisal of the need for and the scope of the Trunk Road. The district traffic model covered the Central, Wan Chai and Causeway Bay area and was set up using the SATURN (Simulation and Assignment of Traffic to Urban Road Network) suite of traffic analysis programmes. For the purpose of testing the future traffic situation, the design year 2016 was adopted in the assignment. The corresponding CTS-3 design year cordon matrices were used to define the boundary conditions of the district area traffic model. Five sets of traffic forecasts were undertaken to simulate the traffic situation at the Central, Wan

Chai and Causeway Bay areas. Peak hours traffic flows were simulated for the five test scenarios.

Road network configuration

2.3.9 The configuration of the proposed Trunk Road (CWB) tested in the district traffic model was determined to fulfill the following general functional requirements:

- the CWB would be a dual 3-lane road, with local widening to suit the slip roads;
- with an interchange at the west (the Central Interchange) connecting the existing Rumsey Street Flyover with the CWB with slip roads to the distributor road system on the Central Reclamation Phase I;
- with connection to the existing IEC at the east (the IECL) and with existing connections between the IEC and Gloucester Road and Hing Fat Street maintained;
- with slip road connections at Wan Chai and Causeway Bay to provide essential connectivity between the Trunk Road and the local road network.

2.3.10 The slip road connections in Wan Chai North and Causeway Bay adopted in the District Traffic Study represented the minimum requirement after detailed review; they comprise:

- Slip Road 1, for traffic from Central and the Western districts of Hong Kong Island to exit the eastbound Trunk Road tunnel, going to Wan Chai. This slip road also allows traffic connection from the Trunk Road eastbound to Causeway Bay and Tin Hau, as no direct slip road connection from the Trunk Road is provided in Causeway Bay for this movement.
- Slip Road 2, for traffic from the Admiralty and Wan Chai areas to enter the eastbound Trunk Road tunnel, going to the IEC and then North Point and other Eastern districts of Hong Kong Island.
- Slip Road 3, for traffic from the IEC (ie from North Point and other Eastern districts of Hong Kong Island) to exit the westbound Trunk Road tunnel, going to Wan Chai North and beyond to the Wan Chai hinterland and Admiralty.

- Slip Road 8, for traffic from Causeway Bay, Tai Hang, Fortress Hill and Tin Hau areas to enter the westbound Trunk Road tunnel, going to Central and Western districts of Hong Kong Island.

2.3.11 These slip roads provide essential connectivity between the Trunk Road and the local road network, by drawing traffic away from the overloaded sections of Connaught Road Central / Harcourt Road / Gloucester Road. If access to the Trunk Road is not available, it cannot be properly utilised. The demand for a bypass comes not just from traffic from the western side of Hong Kong Island to the eastern side of the Island and vice versa; traffic to/from intermediate areas such as Admiralty, Wan Chai and Causeway Bay also contribute to the congestion in this area. Restricting access to the Trunk Road for this traffic will undermine its purpose in relieving traffic congestion on the overloaded east-west corridor.

2.3.12 It should be noted that an eastbound slip road from the Trunk Road to Victoria Park Road proposed in the previous Trunk Road scheme has not been further pursued, as its function could be substituted by alternative road improvement schemes and in view of the need to avoid reclamation that would otherwise be required for this slip road.

2.3.13 The at-grade roads within the site of CRIII, which had been authorised and were under construction, were included without change in the district traffic model. Road P2 is the major element of the future ground level road system; it is a primary distributor servicing the Central and Wan Chai North areas, and is an integral component of the road network by distributing traffic through these areas and relieving the existing congestion, including that caused by the growing traffic demand within Central, in particular traffic generated from the completed Central Reclamation Area north of Exchange Square. Road P2 runs east-west through CRIII, and the proposed Road P2 within the limit of CRIII is extended eastward to WDII as a through road and is mainly a dual 2-lane road. In Wan Chai North, the Road P2 would run between the gap of HKCEC Phases 1 & 2 and then connect to the existing Hung Hing Road. Hung Hing

Road would either be widened in-situ or realigned to cope with the anticipated traffic flow.

Traffic modelling scenarios

2.3.14 Traffic modelling was carried out to test various scenarios with and without the Trunk Road, slip roads and Road P2, and with and without the proposed development in CRIII, to robustly ascertain the need for the proposed roads to meet forecast traffic demand. No new development in WDII was assumed for all scenarios.

2.3.15 The assumptions of the test scenarios are as follows:

Scenario A

With the Trunk Road, **with** Road P2, **with** the slip roads in WDII, and **with** the proposed developments in CRIII.

Scenario B

Without the Trunk Road, **without** Road P2, **without** the slip roads in WDII, and **with** the proposed developments in CRIII.

Scenario B1

Without the Trunk Road, **without** Road P2, **without** the slip roads in WDII, and **without** the proposed developments in CRIII.

Scenario C

With the Trunk Road, **with** Road P2, **without** the slip roads in WDII, and **with** the proposed developments in CRIII.

Scenario D

With the Trunk Road, **without** the at-grade road P2, **without** the associated slip roads in WDII, and **without** the proposed developments in CRIII.

2.3.16 The scenario testing shows that a dual 3-lane Trunk Road, with slip roads, and Road P2 are required even if there is no new development in WDII and if all the not-yet-started developments in CRIII are removed. A summary of these results is given in the table below.

Table 2.1 Summary of Modelling Assumptions and Results of the 5 Test Scenarios

| | Trunk Road (CWB) | Road P2 | WDII Slip Roads | Develop-ment in CRIII | Traffic Modelling Results | |
|--------------------|------------------|---------|-----------------|-----------------------|--|---|
| | | | | | V/C of Major Road Sections along the Corridor | RC of Major Road Junctions in Central & Wan Chai |
| Scenario A | ✓ | ✓ | ✓ | ✓ | Generally below 1, except along the westbound Inner Gloucester Road. | Generally with some reserve capacities. |
| Scenario B | × | × | × | ✓ | All above 1.2 along both eastbound and westbound. Some as high as 1.55. | Most of the critical junctions have negative reserve capacities. |
| Scenario B1 | × | × | × | × | Most of the west-bound road sections with v/c above 1.2. Some as high as 1.53. | Many of the critical junctions have negative reserve capacities. |
| Scenario C | ✓ | ✓ | × | ✓ | Many of the east-bound road sections with v/c above 1. Some as high as 1.13. | Some critical junctions have negative reserve capacities. |
| Scenario D | ✓ | × | × | × | Most of the east-bound road sections with v/c above 1. Some as high as 1.13. | Most of the critical junctions in Wanchai have negative reserve capacities. |

Notes: (1) V/C is Volume to Capacity Ratio
(2) RC is Reserve Capacity

2.4 Traffic Management Measures

- 2.4.1 A review of alternative traffic management measures, including road pricing, was carried out to determine if the implementation of such measures could resolve the traffic problems along the Corridor and thereby do away with the need for the Trunk Road.
- 2.4.2 Hong Kong's successful provision of a highly efficient and reliable transport system hinges on the adoption of the long established transport policy with emphasis on a 3-pronged approach, comprising the management of road use, the expansion and improvement of public transport, and the improvement of transport infrastructure. These principles have stood the test of time and they represent solutions from both the supply and demand sides, rather than simply relying on indiscriminately suppressing the demand through high tolls and charges, which alone may not be effective to curb traffic congestion problems. Electronic Road Pricing (ERP), as a form of demand management measure, cannot replace the need of a new strategic infrastructure such as the trunk Road; rather, such measures would complement the Trunk Road.
- 2.4.3 At present, Hong Kong's transport system can be characterised by:
- (i) optimum use of traffic management measures such as one-way gyratory road systems, bus lanes, bus gates, no stopping zones as well as demand management measures like first registration tax, annual licence fee and fuel duty on private car;
 - (ii) a highly efficient public transport system in the form of both rail and road providing a high level of service and reliability to the general public; and
 - (iii) a comprehensive road network.
- 2.4.4 As a result, about 90% of all passenger trips are already carried by public transport mode and Hong Kong has achieved a very low private car ownership rate of 50 per 1,000 population, as compared with London and Singapore of 350 and 120 respectively.

- 2.4.5 The suggestion of adopting an equal toll for the Western Harbour Crossing and Cross Harbour Tunnel, so as to reduce utilisation of the latter, is not expected to significantly relieve congestion in the Central and Wan Chai areas, as most of the traffic would still need to go through Central.
- 2.4.6 A Feasibility Study on ERP (2001) concluded that the implementation of an ERP system in Hong Kong was technically feasible, but drastic restraint measures such as ERP were not warranted on traffic management grounds if the growth of the private vehicle fleet was no more than 3% per year.
- 2.4.7 Overseas experience in London² and Singapore has shown that implementation of ERP needs to be supported by alternative routes or bypasses having sufficient capacity to receive the diverted traffic generated from those not intending to enter the charging zone. Such an alternative is fair and necessary as it gives motorists an option whether to pay the charge or not. The consultation results of the PRoGRESS³ urban road charging demonstration project in Europe have reinforced the need for alternative routes.
- 2.4.8 In Hong Kong, because of the geographical constraints around the CBD, such an alternative route does not exist. The use of ERP would not be effective in the absence of the Trunk Road, which is needed to divert the east-west through traffic; the through traffic accounts for 40% of the traffic flows across the CBD. Without an alternative route or a bypass, all motorists travelling in the east-west direction would be forced to pay even though they do not intend to go into the CBD.
- 2.4.9 Furthermore, the percentage of private car traffic going into the London CBD before congestion charging is higher than that in Hong Kong (51% in London compared with 38% in Hong Kong). This shows that we have already removed a lot of non-essential traffic from the CBD through existing traffic and demand management measures. Clearly, it will be harder for

² *Road Charging Options for London: A Technical Assessment, ROCOL Working Group, Nov 1999, p.24*

³ *Final Main Project Report of PRoGRESS, July 2004, p.58*

Hong Kong to achieve any further suppression, even with high ERP charges. Assuming that similar effects on different modes of the London scheme apply to Hong Kong, the net traffic reduction in daily volume would only be about 8%, since Hong Kong has a different vehicle composition to that of London. The reduction in peak hour flows along the Connaught Road Central – Harcourt Road – Gloucester Road Corridor would be even lower.

- 2.4.10 Thus, demand management measures cannot be relied on alone to effectively solve a major congestion problem. New infrastructure is needed to meet the reasonable demand, and to provide an alternative route for through traffic to bypass the ERP charging zone. ERP can complement the Trunk Road, but cannot replace it.
- 2.4.11 Details of traffic forecasts and traffic management measures are provided in a submission to the “Expert Panel Forum on Sustainable Transport Planning and Central-Wan Chai Bypass” (see below) by Transport Department, in **Annex E**.

2.5 Expert Panel

- 2.5.1 The diverse views on transport issues, including opposing views on the need for the Trunk Road and the preference for the implementing ERP instead of the Trunk Road, raised during the public engagement activities of the Envisioning Stage of the HER being carried out by the HEC Sub-committee on WDII Review, prompted the Sub-committee to convene an “Expert Panel Forum on Sustainable Transport Planning and Central-Wan Chai Bypass” (the Expert Panel Forum). The Expert Panel was invited to explore sustainable transport along the northern shore of Hong Kong Island and to deliberate on whether the CWB (ie the Trunk Road) is needed.
- 2.5.2 The Expert Panel comprised local and overseas experts in all relevant fields, including transportation engineering, transport planning, civil and structural engineering, economics, environmental engineering and planning. The Expert Panel members were nominated by the Task Force on HER, Chartered Institute of Logistics and Transport in Hong Kong, Hong Kong

Institution of Engineers, Hong Kong Institute of Planners, Department of Civil and Structural Engineering of the Hong Kong Polytechnic University, Department of Civil Engineering of the Hong Kong University of Science and Technology, and Department of Civil Engineering of the University of Hong Kong. The independence of the Expert Panel is an important aspect in the determination of the need for the Trunk Road; there were no nominees from Government or parties associated with the WDII project and review.

- 2.5.3 To encourage interflow of views and ideas, the Expert Panel Forum was open to the public and opportunities were provided for stakeholders and interested parties to make written submissions to the Forum. Nineteen submissions were received from different organizations and members of the public prior to the Forum. Transport Department also made a detailed submission. Having reviewed the submission of Transport Department, additional traffic analysis and information were requested from Transport Department to ascertain the robustness of the traffic demand model and to verify the assumptions made in the traffic demand model.
- 2.5.4 The Expert Panel held five working group meetings and a site visit in August and September 2005 to consolidate members' views and recommendations. Public participation was fully encouraged throughout the Expert Panel Forum, held on 3 September 2005, to canvas the public's views and to engage in dialogue with participants.

The Need for the Central-Wan Chai Bypass (Trunk Road)

- 2.5.5 The Expert Panel found the recurrent congestion at the east-west Connaught Road Central / Harcourt Road / Gloucester Road corridor and the adjoining areas to be socially, economically and environmentally unacceptable. Analysis of the data showed that using complementary traffic management and fiscal measures to curtail vehicular growth and travel demand, short of draconian measures, would be ineffectual and socially undesirable.

- 2.5.6 Enhancing transportation infrastructure capacity in the corridor vicinity, which would take several years to fruition, would bring long-awaited relief over the medium haul to the Central and Wan Chai districts and greatly facilitate east-west traffic flow. The Panel therefore recommended the construction of a bypass as a medium term solution to tackle the problem of deteriorating traffic congestion in the Central and Wan Chai area. The Panel considered that the CWB is essential for improving the network reliability of the east-west link.

Recommendations of the Expert Panel

- 2.5.7 The Expert Panel provided the following short-term, medium-term and long-term recommendations for the sustainable transport planning of the Central and Wan Chai area.

- 2.5.8 Short-term measures:

- (i) Transportation management measures

Measures include loading/unloading restrictions, junction improvement, public transport route rationalisation, etc, prior to the opening of the CWB.

- (ii) Tunnel toll adjustment

Government should seriously consider differential tolling (tolling by time of day) by revamping the tolling arrangements of the three tunnels traversing the Victoria Harbour as a mitigating measure prior to the opening of the CWB.

- (iv) Managing development programme

Government should address the need to regulate land-use developments throughout the Corridor area in order not to aggravate the congestion problem in the Corridor before the Bypass opens.

- (v) Pedestrian access to the waterfront

Facilities for improvement of pedestrian access to the waterfront should also be provided in the interim.

2.5.9 Medium-term measures:

(i) Enhancing the multi-modal transport network

Since the existing transport infrastructure facilities could not meet current and future vehicular demand by 2016, the Panel members support the construction of the CWB to improve the reliability of the road network and to make use of the opportunities for enhancing multi-modal public transportation in the Corridor. They also support the provision of slip roads at the Hong Kong Convention and Exhibition Centre area and at the Victoria Park Road/ Gloucester Road/ Hing Fat Street passageway to magnify the benefits of the CWB.

(ii) Environmental and social concerns

Government should properly address the visual and environmental impacts and social concerns arising from the construction of the CWB.

(iii) Road P2

The Panel recognises the need for Road P2 as an important *ad interim* measure in addressing traffic congestion in the Central reclamation area before the CWB comes about. The Panel suggests that the Government also review the scale of P2 to match the gradual land development programme. While it may be necessary to reserve sufficient land for the full-scale development of Road P2 over the longer term, the Government should explore introducing *pro tempore* traffic calming measures on Road P2 and greening the reserve area in the meantime.

(iv) Road pricing

The Panel recognises the importance of road pricing as a sustainable transport measure. The Panel also recommends that Government should seriously consider implementing road pricing after undertaking a detailed assessment of the viability of alternative pricing schemes (electronic or otherwise), their relative effectiveness and social acceptability.

(v) The complementariness of road pricing and the Bypass

The Panel recognises that road pricing is a complementary measure to the construction of the CWB. The Panel also recognises a window of opportunity exists to introduce ERP at the opening of the CWB. Integrating ERP with road capacity enhancement thereby constitutes a package of measures that is more likely to be publicly acceptable and truly sustainable over the long term.

2.5.10 Long-term measures:

(i) Holistic approach towards transport/land use planning

The Panel recognises that Government has been taking an interactive approach towards land use and transport planning, and recommends that Government should further fortify this integration, placing due emphasis on the limitation of excessive transport infrastructural development in heavily congested areas.

(ii) An area-wide pedestrian network to the harbour-front

An area-wide pedestrian network linking the waterfront with the hinterland as well as to all means of transport modes should be developed, thereby connecting motorised and non-motorised transportation in a holistic way.

(iii) Incident management capability

Government should strengthen the management of traffic incidents along the Corridor to augment the reliability of the expanded road network.

(iv) The maintenance of reserve capacities

Government should review reserve capacities in the transport infrastructure to better the safety margin; these should be taken as a signal for stemming land use development.

(v) Sustainable transportation

Government should review and adopt best practices in sustainable transportation for Hong Kong. Government should also develop integrated policies, strategies and packages for sustainable transportation in Hong Kong for both motorised and non-motorised transportation.

Government's Responses

- 2.5.11 In addition to agreement on the construction of the CWB and Road P2, Government also agrees with the Expert Panel's recommendation on the need for continued short-term traffic management measures. While Government will continue to enhance its efforts in implementing various traffic management measures and taking a holistic approach to transport / land use planning, the feasibility of other measures as recommended by the Expert Panel are also being actively considered.

Details of the Findings of the Expert Panel

- 2.5.12 Reference can be made to 'Report of the Expert Panel on Sustainable Transport Planning and Central-Wan Chai Bypass' ('Report of the Expert Panel'). A copy of the Report of the Expert Panel is attached at **Annex F**, and it can also be found on the HEC website at: http://www.harbourfront.org.hk/eng/content_page/doc/report_of_the_expert_panel.pdf.

2.6 Cost Effectiveness of the Trunk Road

- 2.6.1 In measuring the cost effectiveness of a project, the overall benefit brought to the community by the project is examined. For transport infrastructure, the bulk of such benefit is related to the saving in travelling time for the public and congestion relief to adjacent roads.
- 2.6.2 The Internal Rate of Return (IRR) refers to the annual discount rate which makes the total return from the project over its project life just equal to the total investment. The IRR is calculated on the basis of benefits accrued from the project annually, through the project life, and the costs incurred in

implementing and operating the project. For the proposed Trunk Road, the following parameters have been adopted:

- an estimated capital cost of the project of HK\$20.5B (September 2006 price) which includes costs for 5 main works packages:
 - the Central Interchange
 - the CWB tunnel in CRI and CRIII
 - the CWB tunnel in WDII
 - electrical and mechanical works and tunnel installation works
 - the IECL;
- in the first year of operation, about 415,000 road users will benefit from using the new road;
- the average time saved by each passenger is 20 minutes;
- there are 300 days in a year that the Trunk Road will be fully used;
- the cost of passenger time is \$67 (September 2006 price) per hour.

2.6.3 The IRR calculation, on the basis of the above parameters, indicates that the investment on the Trunk Road will generate an Economic Internal Rate of Return (EIRR) of about 17% after 40 years of operation, which is considered reasonable for an infrastructure project of this nature.

2.7 Summary of Findings

2.7.1 The existing east-west corridor (Connaught Road Central – Harcourt Road – Gloucester Road) serving the CBD on Hong Kong Island is already operating beyond its capacity, as can be observed on site. Previous and recent strategic transport studies have predicted further increase in traffic demand along the east-west corridor, and confirmed the need for a parallel east-west Trunk Road to avoid more extensive and frequent traffic congestion, and even gridlock, on the road network.

2.7.2 A district traffic study has confirmed that a dual 3-lane Trunk Road (or CWB), together with intermediate slip roads, is required to divert traffic away from the existing east-west

corridor and to provide adequate relief to the corridor and the local road network.

- 2.7.3 Traffic management and fiscal measures are already in place to maximise the capacity of the existing road network and suppress traffic demand. Further measures including ERP have also been considered. However, all these existing and proposed measures, alone, cannot resolve the traffic congestion problem along the east-west corridor. In other words, the Trunk Road is essential, and ERP can complement the Trunk Road but cannot replace it.
- 2.7.4 The need for the Trunk Road has also been confirmed by the Expert Panel on Sustainable Transport Planning and Central-Wan Chai Bypass, comprising leading independent local and overseas transport planning experts. The Expert Panel supports the construction of the CWB to improve the reliability of the road network and to enhance multi-modal public transportation in the Connaught Road Central – Harcourt Road – Gloucester Road corridor. The Expert Panel agrees that the inability of the present infrastructure capacity to cope with the present and future travel demand would persist even if development in the Central reclamation area were stopped and territory-wide car ownership held unchanged from now until 2016, and therefore recommends the construction of the Trunk Road as a medium term solution to tackle the problem of deteriorating traffic congestion in the Central and Wan Chai area. The Expert Panel further supports the provision of the planned slip roads at the HKCEC area and at the Victoria Park Road / Gloucester Road / Hing Fat Street passageway, to magnify the benefits of the CWB. The Expert Panel also recognises the need for Road P2 both in the longer term and as an important ad interim measure in addressing traffic congestion in the Central reclamation area even before the CWB is implemented.

2.8 Conclusions on the Need for the Trunk Road

Is there an overriding public need for the Trunk Road ?

- 2.8.1 The Trunk Road is the “missing link” in the strategic road network of Hong Kong and will provide the essential east-west linkage between Rumsey Street Flyover in Central and the IEC in Causeway Bay. The implementation of the Trunk Road will relieve the existing congested east-west corridor of Hong Kong Island North.
- 2.8.2 The need for the Trunk Road has been clearly established through traffic and transport studies. The Expert Panel has confirmed the need for the Trunk Road and intermediate slip roads. The Expert Panel recommends the construction of a bypass as a medium-term solution to tackle the problem of deteriorating traffic congestion in the Central and Wan Chai area. The Expert Panel considers that the Trunk Road is essential for improving the reliability of the road network.
- 2.8.3 The findings of the traffic and transport studies, and of the Expert Panel, demonstrate conclusively the compelling and present need for the Trunk Road.
- 2.8.4 The HEC Sub-committee on WDII Review considered the report of the Expert Panel and supported the construction of a CWB at its meeting on 12 December 2005.

3 NO-RECLAMATION OPTIONS

3.1 Introduction

- 3.1.1 The need for the Trunk Road has been established; the next step is to determine any reasonable alternative to reclamation that may meet this overriding need. In other words, can an alternative alignment or form of construction for the Trunk Road be adopted that will obviate the need for reclamation? If there is a feasible “no reclamation” option, then it should be pursued. Only if the need for reclamation can be demonstrated to be necessary will scenarios involving minimum reclamation be contemplated.
- 3.1.2 A detailed examination of Trunk Road needs and constraints, including an exhaustive investigation into the need for reclamation for the Trunk Road construction and of alternative schemes that might do away with reclamation or, at least, minimise reclamation, has been carried out. A “Report on Trunk Road Alignments and Harbour-front Enhancement, April 2006” was submitted to the HEC Sub-committee on WDII Review, which set out the findings of these investigations and the conclusions regarding the need for reclamation and the minimum extent of reclamation.
- 3.1.3 A copy of the HEC Report on Trunk Road Alignments and Harbour-front Enhancement is attached at **Annex G**.
- 3.1.4 The investigation of “no reclamation” options starts with the identification of alignment constraints through the WDII project area and, in view of these constraints, the feasible Trunk Road route corridors. Alternative Trunk Road ideas, including suggestions from the public, are examined to determine if any of these would constitute a “no reclamation” option. For the feasible Trunk Road routeing and taking into account engineering constraints, a conclusion can be drawn as to whether there is any feasible “no reclamation” option.

3.2 Trunk Road Route Assessment

- 3.2.1 Chapter 2 of the HEC Report on Trunk Road Alignments and Harbour-front Enhancement (**Annex G**) presents the findings of the assessment of feasible Trunk Road routeing, taking account of the alignment constraints through the WDII project area. These findings are summarised as follows.

Alignment Constraints through the WDII Project Area

- 3.2.2 Trunk Road alignments through the WDII project area are constrained by a number of land use and infrastructure constraints.

- (i) At the western end of the WDII project area, connection is required to the Trunk Road tunnel which will be constructed under CRIII.

The planning of the Trunk Road, including the designed alignment, has been proven to satisfy the overriding public need test under the Review of CRIII (see paragraph 2.1.4). Therefore, the section of Trunk Road in CRIII is regarded as fixed, and the eastern end of the Trunk Road tunnel in CRIII forms the starting point of the Trunk Road in WDII. The Trunk Road in CRIII is a cut-and-cover tunnel with a road level of around – 10mPD at this connection point.

- (ii) To the east of the Causeway Bay Typhoon Shelter, the Trunk Road needs to connect to the existing elevated IEC road structure.

The existing IEC is an elevated road structure with road levels between +12mPD and +15mPD. The Trunk Road, if constructed in the form of tunnel, must therefore rise onto elevated road structure to make this connection.

- (iii) Provision for slip road connections near the HKCEC and at Victoria Park Road/Gloucester Road/Hing Fat Street.

The following slip road connections have been identified as essential in meeting traffic demand and enabling the Trunk Road to adequately perform its function of relieving traffic from the overloaded Connaught Road Central – Harcourt Road – Gloucester Road corridor:

- slip road from eastbound Trunk Road to Wan Chai North ('Slip Road 1')
- slip road from Wan Chai North to eastbound Trunk Road ('Slip Road 2')
- slip road from westbound Trunk Road to Wan Chai North ('Slip Road 3')
- slip road from Victoria Park Road to westbound Trunk Road ('Slip Road 8').

- (iv) Need to cross the MTR Tsuen Wan Line.

The MTR Tsuen Wan Line is an immersed tube rail tunnel running across the seabed at the west side of the HKCEC Extension. The Trunk Road and reclamation in this area must not impose any loads on, or cause any significant movement of, the existing MTR Tsuen Wan Line tunnel. A piled Trunk Road tunnel structure spanning across the MTR tunnel can meet statutory limitations on allowable surcharge, lateral pressure and movement. Tunnelling under the MTR tunnel would need to be at sufficient depth to avoid disturbance to the existing ground and movement of the MTR tunnel, and has been found not feasible (see later paragraphs 3.3.7 to 3.3.11).

- (v) Need to cross the Cross Harbour Tunnel.

The Cross Harbour Tunnel is an immersed tube tunnel constructed in 1970, comprising a thin steel external shell lined internally with reinforced concrete. The immersed tube section of the Cross Harbour Tunnel is considered to be particularly fragile and susceptible to damage due to movement, particularly when the age of the Cross

Harbour Tunnel is taken into account. Repair work would be extremely difficult. Given the susceptibility of the old Cross Harbour Tunnel to damage, a near zero movement tolerance would need to be imposed for any Trunk Road tunnel crossing, which will be extremely difficult to ensure. As a result, the risk of damage due to any Trunk Road tunnel scheme crossing the immersed tube section of the Cross Harbour Tunnel will be unacceptably high. Any Trunk Road crossing under the Cross Harbour Tunnel must therefore be confined to the zone beneath the portal and approach ramp of the Cross Harbour Tunnel, where risk of damage can be kept within manageable bounds. In this case, though, the Trunk Road tunnel would need to avoid the rock anchors that tie down the approach ramp structure to the underlying rock; these anchors are there to prevent uplift caused by hydrostatic forces (flotation). The rock anchors, based on available as-built information, are installed to a depth of around -17mPD, therefore, allowing for minimum clearance beneath the anchors, the Trunk Road must pass beneath the Cross Harbour Tunnel at a road level of around -30mPD.

- (vi) Allowance to be made for proposed rail infrastructure such as the NIL and the SCL.

The NIL is planned to run within existing land along the northshore area of Causeway Bay and Wan Chai to an Exhibition Station located beneath the existing Wan Chai North Public Transport Interchange (PTI). From there, the NIL tunnel will run partly through the HKCEC water channel in cut-and-cover tunnel, crossing over the MTR Tsuen Wan Line in similar form of construction as that proposed for the Trunk Road crossing, and then continuing westwards along the Central shoreline through the CRIII project area. The major impact on the Trunk Road is at the Wan Chai North area where the NIL tunnel and Exhibition Station will conflict with Trunk Road tunnel alignments that turn southwards (inland) after the CRIII connection.

The SCL will be an immersed tube tunnel from Hung Hom across the Harbour (alternative easterly and westerly alignments have been proposed), turning westwards through the Causeway Bay Typhoon Shelter to run within existing land along the northshore area of Wan Chai, along a similar alignment as the NIL, before turning southwards under Fenwick Pier Street to Admiralty Station. The major impact on the Trunk Road is through the Causeway Bay Typhoon Shelter, where the SCL rail tunnels will conflict with Trunk Road tunnel options; avoidance of the conflict dictates the level of the Trunk Road tunnel through the typhoon shelter.

- (vii) Major services infrastructure near the harbour-front such as electricity sub-stations and sewage treatment plants.

A major element of the services infrastructure in the Wan Chai North area is the Wan Chai East Sewage Screening Plant (WCESSP), located on Hung Hing Road between the Wan Chai Sports Ground and the ex-Public Cargo Working Area (PCWA) basin. The WCESSP provides primary treatment for sewage from the Wan Chai East catchment area as well as that of the Wan Chai West catchment area. The WCESSP also forms an essential part of the Harbour Area Treatment Scheme (HATS). Other essential services infrastructure includes Hong Kong Electric's Wan Chai Zone Sub-Station on Hung Hing Road and new Electricity Receiving Station, under construction, on Wan Shing Street.

Reprovisioning these major sewerage and electricity supply facilities, even if suitable alternative sites could be found in the already congested northshore area, would result in massive disruption to these essential services, and indeed to the whole of the Wan Chai business and residential district. Relocation of these essential services infrastructure is therefore considered not practically feasible. The major impact on the Trunk Road is therefore the physical obstruction of these facilities to southerly Trunk Road alignments along the Wan Chai northshore area.

- (viii) Basement level developments and piled foundations of existing developments and land uses in Wan Chai North, such as the HKCEC Extension, Grand Hyatt Hotel, Wanchai Tower, Central Plaza, Renaissance Harbour View Hotel, Great Eagle Centre, Harbour Centre, China Resources Building, Sun Hung Kai Centre, etc.

All these developments form physical barriers to Trunk Road alignments (whether in tunnel, at-grade or elevated) that turn northwards (offshore) or southwards (inland) after the connection with CRIII.

Trunk Road Route Corridors through WDII Project Area

3.2.3 Three possible corridors have been considered when examining potential Trunk Road alignments between the connection with the Trunk Road tunnel in CRIII and the connection with the IEC to the east of the Causeway Bay Typhoon Shelter:

- (i) an ‘offshore corridor’, where the Trunk Road alignment turns seawards (northwards) after the connection with the Trunk Road tunnel in CRIII and runs through the harbour until turning back to connect with the IEC further east in North Point;
- (ii) an ‘inland corridor’, where the Trunk Road alignment turns inland (southwards) after the connection with the Trunk Road tunnel in CRIII and runs through existing land in tunnel, following roughly the Gloucester Road passageway and joining up with the existing IEC in front of Victoria Park;
- (iii) a ‘foreshore corridor’, where, after passing through the HKCEC water channel in tunnel, the Trunk Road runs along the Wan Chai shoreline and through the Causeway Bay Typhoon Shelter either as tunnel, at-grade or elevated road, joining up with the existing IEC to the east of the typhoon shelter.

Offshore Alignments

- 3.2.4 Offshore Trunk Road alignments face a major physical constraint in the form of the HKCEC Extension. Even at minimum horizontal curvature, the Trunk Road will not be able to turn northwards sharply enough from its CRIII connection to avoid conflict with the HKCEC Extension building or its foundations.
- 3.2.5 Nor can the Trunk Road pass above or beneath the HKCEC Extension building: the road cannot rise steeply enough to clear the roof of the HKCEC Extension, therefore an elevated offshore alignment is not possible; nor can the Trunk Road drop low enough to avoid conflict with the basement of the HKCEC Extension and its foundations.
- 3.2.6 Other constraints to offshore alignments include the high risk of damaging the Cross Harbour Tunnel if tunnelling beneath it, and not being able to provide the necessary slip road connections in Wan Chai and Causeway Bay. However, it is primarily due to the physical conflict with the HKCEC Extension and its foundations that offshore alignments for the Trunk Road are not feasible.

Inland Alignments

- 3.2.7 Inland Trunk Road alignments face major physical constraints, mainly due to conflicts with existing developments and highway infrastructure, and conflicts with the future rail infrastructure. At-grade or elevated Trunk Road inland alignments are self-evidently not possible in view of the scale of existing building developments and infrastructure, and consideration of inland alignments is therefore confined to tunnel options.
- 3.2.8 After turning southwards from the connection with the tunnel constructed under CRIII, the Trunk Road will be obstructed by building developments in Wan Chai North. The inland tunnel alignment will conflict with the basement and foundations of the HKCEC Phase I and the Grand Hyatt Hotel (similar to the case with the HKCEC Extension, the Trunk Road tunnel cannot

drop low enough to avoid conflict with the foundations of these buildings). Thereafter, the Trunk Road tunnel would also conflict with the China Resources Building, Causeway Centre and Sun Hung Kai foundations.

- 3.2.9 Other constraints to inland alignments include conflict with the proposed NIL and SCL rail tunnels and Exhibition Station, conflict with major services infrastructure (Electricity Sub-Station and Wan Chai East Sewage Screening Plant at Hung Hing Road), conflict with the foundations of the Cross Harbour Tunnel approach road structures, and the demolition of the northern part of Victoria Park as well as cutting off the westbound Victoria Park Road to facilitate the connection with the IEC.
- 3.2.10 As a consequence of the above physical obstructions and constraints, Trunk Road inland alignments are found to be not feasible.

Foreshore Alignments

- 3.2.11 At the western end of the WDII project area, the passageway through the HKCEC water channel presents a physical constraint to the Trunk Road alignment, both horizontally and vertically. An elevated road would clash with the atrium bridge and cannot be constructed without demolishing this essential element of the HKCEC and its Extension. At-grade road options for the Trunk Road would conflict with the ground level road system. An at-grade Trunk Road would also present a physical barrier that will cut off ground level road and pedestrian access to the HKCEC Extension from Wan Chai North. The water channel itself, on the other hand, provides an opportunity for tunnel options that can be constructed in the narrow gap between the foundations of the HKCEC and the HKCEC Extension.
- 3.2.12 The shallow tunnel through the HKCEC water channel also means that the Wan Chai North slip road connections to the existing ground level road network can be readily provided, while meeting the necessary highway design standards.

- 3.2.13 After leaving the HKCEC water channel, foreshore alignments of the Trunk Road will run along the Wan Chai shoreline and through the ex-Public Cargo Working Area (PCWA) basin. The alignment here is determined mainly by infrastructure constraints, in particular the crossing at the Cross Harbour Tunnel. As mentioned above, the feasible crossing point (for a Trunk Road in tunnel) is below the Cross Harbour Tunnel portal structure, at a sufficiently deep level to avoid the Cross Harbour Tunnel rock anchors. Alternately, a Trunk Road on flyover can cross over the Cross Harbour Tunnel portal area. Trunk Road tunnel alignments further north will result in high risk of damage to the immersed tube section of the Cross Harbour Tunnel, while more southerly alignments are constrained by the Wan Chai East Sewage Screening Plant and the Electricity Substation on Hung Hing Road.
- 3.2.14 The Trunk Road alignment must then pass through (under or over) the Causeway Bay Typhoon Shelter to connect with the existing IEC to the east of the typhoon shelter. Other potential conflicts in the Causeway Bay area to be avoided for foreshore alignments are the Royal Hong Kong Yacht Club (RHKYC) and the SCL. The provision of the Causeway Bay slip road will also influence the Trunk Road form and alignment; connection from the existing ground level road network can be made to relatively shallow Trunk Road cut-and-cover tunnels or to flyovers, but limitations on tunnel gradients would mean that this slip road connection to deep bored tunnels would not be possible.
- 3.2.15 Trunk Road tunnels will need to rise up onto elevated road to connect with the IEC to the east of the Causeway Bay Typhoon Shelter. A Trunk Road flyover can connect directly to the elevated IEC at the eastern end of the typhoon shelter.
- 3.2.16 In conclusion, there are no insurmountable constraints to foreshore alignments for the Trunk Road. Foreshore alignments are feasible, and consideration of these alignments is focussed primarily on the determination of the best practical form of construction in overcoming conflicts and minimising impacts and the extent of reclamation.

Summary of Trunk Road Route Assessment

- 3.2.17 Alternative routeings for the Trunk Road along offshore, inland and foreshore corridors have been examined to determine practicable and feasible Trunk Road alignments. Trunk Road alignments are, however, constrained by existing developments along the Wan Chai and Causeway Bay northshore area, existing cross harbour tunnels, proposed rail infrastructure and essential services infrastructure.
- 3.2.18 Offshore alignments are obstructed by the HKCEC Extension, will pose unacceptable risk to the Cross Harbour Tunnel when tunnelling beneath it, and cannot provide the necessary slip road connections. Due primarily to the physical conflict with the HKCEC Extension, Trunk Road offshore alignments are found to be not feasible.
- 3.2.19 Inland alignments are obstructed by existing developments in Wan Chai North, including the HKCEC Phase I, Grand Hyatt Hotel, Great Eagle Centre and Sun Hung Kai Centre. Trunk Road inland alignments will also conflict with the proposed NIL and SCL rail infrastructure, and existing road and services infrastructure. Due to these physical conflicts, Trunk Road inland alignments are also found to be not feasible.
- 3.2.20 The feasible Trunk Road routeing is along the foreshore of Wan Chai and Causeway Bay. After crossing over the MTR Tsuen Wan line, the Trunk Road will run in shallow tunnel through the HKCEC water channel and along the Wan Chai shoreline. Thereafter, the Trunk Road can pass either below the Cross Harbour Tunnel portal in tunnel or over the top of the Cross Harbour Tunnel portal as flyover, continuing as either tunnel or flyover through the Causeway Bay Typhoon Shelter to a connection with the existing elevated IEC to the east of the typhoon shelter.

3.3 Engineering Requirements for Reclamation at the Trunk Road Connections

3.3.1 In Section 3.2 above, the feasible Trunk Road routeing was found to be along the foreshore of Wan Chai and Causeway Bay. However, foreshore alignments do require reclamation:

- for Trunk Road tunnel construction at the tie-in to CRIII and for the crossing of the MTR Tsuen Wan Line to the west of the HKCEC Extension, where the Trunk Road tunnel structure will lie above seabed level;
- for the slip road connections in Wan Chai North (Slip Roads 1, 2 and 3) that will require reclamation as they rise above seabed level to their portals at ground level;
- for the Trunk Road tunnel construction where it rises above the seabed to a ground level tunnel portal before rising onto elevated road structure to connect to the IEC to the east of the Causeway Bay Typhoon Shelter.

3.3.2 The connecting constraints mean that all schemes for the Trunk Road alignment through the WDII project area will require some reclamation at least at the western end for all Trunk Road schemes and at the eastern end for tunnel schemes.

3.3.3 The following paragraphs examine the unavoidable reclamation requirements at the critical areas of the MTR tunnel crossing and the IEC connection.

MTR Tsuen Wan Line Crossing

3.3.4 After the connection with the CWB tunnel in the CRIII area, the Trunk Road will have to cross the MTR Tsuen Wan Line tunnel. As noted in Section 2 above, the Trunk Road must not impose any loads on, or cause any significant movement of, this existing MTR immersed tube tunnel.

3.3.5 Piled deck structure over the MTR tunnel is a feasible solution that will meet these conditions. A proposed scheme for this tunnel crossing, developed and agreed in consultation with

MTRC to meet their statutory limitations on allowable surcharge, lateral pressure and movement, involves the construction of a row of bored piles along either side of the Tsuen Wan Line tunnel with precast tunnel sections supported by these piles for the Trunk Road tunnel which spans over the MTR tunnel. Details of the scheme, extracted from the detailed engineering design of the MTR tunnel crossing, are shown in Chapter 3 of the HEC Report on Trunk Road Alignments and Harbour-front Enhancement (**Annex G**). For this scheme, the Trunk Road will cross over the MTR tunnel at a road level of around -7mPD and, taking into account the height of the Trunk Road tunnel, including ventilation ducts, the top of tunnel structure would be at a level of around $+2.5\text{mPD}$.

- 3.3.6 Reclamation is required for the adjacent cut-and-cover tunnels that tie into the precast tunnel sections over the MTR tunnel, as these are above seabed level. Moreover, the Trunk Road tunnel structure would be above sea level (even above high tide level: mean higher high water level is around $+2.0\text{mPD}$) at this crossing, and this would effectively be regarded as reclamation, anyway.
- 3.3.7 Tunnelling under the MTR Tsuen Wan Line has been suggested as a means of eliminating the reclamation for the crossing over the MTR tunnel. This would need to be at sufficient depth to avoid disturbance to the existing ground and movement of the MTR tunnel. The constraints in this case are: (i) the Trunk Road tunnel connection back to existing road links at the Central Interchange, and (ii) the slip road connections to the ground level road network in Wan Chai North. Neither can be achieved for a deep Trunk Road tunnel beneath the MTR tunnel due to gradient limitations.
- 3.3.8 To illustrate this vertical alignment constraint, a deep tunnel alignment where the Trunk Road drops down from the tie-in with the Central Interchange at Central Reclamation Phase I at the maximum permissible tunnel gradient to pass beneath the MTR Tsuen Wan Line is shown in Annex G.
- 3.3.9 The location of the Trunk Road tunnel western portal in Central is fixed by the connection of the mainline Trunk Road to the

Rumsey Street Flyover, which has already been constructed, and by slip road connections at the Central Interchange that must tie into existing roads in Central. Moving the portal further west, in order to provide a longer Trunk Road tunnel length over which the deep tunnel can drop to a lower level when it passes beneath the MTR tunnel, will mean that the mainline Trunk Road and slip road connections at the Central Interchange cannot be made as the road alignments will exceed maximum permissible gradients and cannot comply with highway design standards in respect of road geometry. The location of the western portal of the Trunk Road, therefore, cannot be moved.

- 3.3.10 With the western portal of the Trunk Road being fixed, and the Trunk Road vertical alignment dropping at the maximum permissible gradient to pass under the MTR tunnel, the vertical profile shown in Annex G illustrates the consequences in respect of clearance between the MTR immersed tube tunnel and the Trunk Road bored tunnel. As can be seen, the clearance between the two tunnels would be only around 5m, whereas the Trunk Road bored tunnel diameter is around 15.5m. Clearance of at least around 1.5 to 2 times the bored tunnel diameter needs to be provided to keep disturbance of existing ground and movement of the MTR tunnel to within MTRC's statutory limits, so as to ensure that the MTR tunnel is not damaged. Quite clearly, the available clearance is totally inadequate.
- 3.3.11 Therefore, a deep Trunk Road tunnel passing beneath the MTR Tsuen Wan Line is not feasible. The Trunk Road must pass over the MTR tunnel, and reclamation associated with this crossing is unavoidable.
- 3.3.12 A feasible vertical profile of the Trunk Road tunnel from the western portal in Central, over the MTR Tsuen Wan Line, is presented in Annex G, which also indicates the reclamation required in WDII at the connection with CRIII and the crossing over the MTR tunnel, where the Trunk Road tunnel rises above seabed level. The determination of this vertical profile takes into account essential related infrastructure such as tunnel ventilation adits that pass over the Trunk Road tunnel structure, below ground level in the limited available space.

IEC Connection

- 3.3.13 At the eastern end of the WDII project area, all Trunk Road tunnel schemes need to rise to a ground level portal and then onto elevated road structure to connect with the existing elevated IEC at a level of around +15mPD. The tunnel will be constructed by cut-and-cover method as the Trunk Road rises to and above the seabed, and reclamation will be required where the tunnel rises above the seabed, through the ground level tunnel portal and up to the start of flyover structure.
- 3.3.14 Chapter 3 of the HEC Report on Trunk Road Alignments and Harbour-front Enhancement (**Annex G**) illustrates the minimum reclamation situation where a cut-and-cover tunnel rises up to ground level immediately to the east of the Causeway Bay Typhoon Shelter eastern breakwater. The existing land formation in this area, which extends beyond the IEC structure into the harbour, can be put to good use to accommodate the Trunk Road tunnel so as to minimise the extent of new reclamation required. As shown in Annex G, though, this existing area of land is not sufficient to encompass the Trunk Road tunnel and portal entirely; additional reclamation is required both in length and width.
- 3.3.15 The width of reclamation required to accommodate the Trunk Road tunnel is determined by the cross-sectional elements of the Trunk Road tunnel structure, which is located adjacent to the existing IEC foundation piles, and the wave absorbing seawall alongside the tunnel structure. As illustrated in Annex G, the existing width of the formed land is insufficient to accommodate the Trunk Road tunnel structure and its protecting seawall, and an additional width of reclamation, of around 40m, is required.
- 3.3.16 The length of reclamation at this connection to the IEC is determined by the maximum gradient of the tunnel as it rises from seabed level to the tunnel portal at ground level, with reclamation continuing to just beyond the flyover abutment, to the point at which the flyover structure rises to a high enough level to span over the sea. As illustrated in Annex G, an overall length of formed land of around 620m is needed, however the

length of the existing formed land is only around 430m, therefore an additional length of reclamation, of around 190m, must be provided.

- 3.3.17 The resulting area of reclamation, of up to 4ha, is therefore required for Trunk Road tunnel schemes rising up to connect to the existing IEC.

3.4 Alternative Trunk Road Ideas

- 3.4.1 The following alternative Trunk Road ideas, including suggestions received from the public through the Envisioning Stage public engagement exercise, have been examined to determine if they would constitute a feasible “no reclamation” option, or result in an avoidance of reclamation.

Deep Bored Tunnel

- 3.4.2 A deep bored tunnel option for the Trunk Road has been examined with a view to avoiding reclamation. The idea being that a tunnel constructed by tunnel boring machine (TBM) at sufficient depth below the surface would not require reclamation and can be constructed without disturbing existing facilities and infrastructure.
- 3.4.3 However, at the western end of WDII, at the connection with the Trunk Road tunnel constructed under CRIII and for the crossing over the MTR Tsuen Wan line, the deep tunnel option must start off as shallow cut-and-cover tunnel, in reclamation, similar to all other Trunk Road options. At the eastern end, as the tunnel rises towards the seabed and ground cover becomes insufficient for the TBM construction, the form of construction needs to change to cut-and-cover tunnel, with associated reclamation to facilitate this construction along the North Point shoreline. Therefore reclamation is still essential and the bored tunnel is not a “no reclamation” option.
- 3.4.4 The major issue associated with a deep tunnel option is that the longer length of the Trunk Road tunnel along the North Point shoreline, all the way to the connection with the IEC near the

North Point ferry piers, results in extensive reclamation along this part of the shoreline.

3.4.5 The issue of reclamation, and whether it is unnecessarily extensive, is the key concern in this instance, particularly in light of the CFA ruling on reclamation in relation to the PHO, which requires the minimisation of reclamation when examining alternatives for the Trunk Road.

3.4.6 Because the bored tunnel must rise from a deeper level under the Causeway Bay Typhoon Shelter than the alternative cut-and-cover tunnel option, the tunnel portal will need to be located further to the east along the North Point shoreline, where there is no existing formed land that can be put to good use to accommodate the ground level tunnel portal, as is the case for the connection immediately to the east of the Causeway Bay Typhoon Shelter (Section 3.3 above). As a consequence, the deep bored tunnel option will require a greater area of reclamation along the North Point shoreline than the alternative cut-and-cover tunnel option.

3.4.7 Comparison of the extent of reclamation along the North Point shoreline for the bored tunnel option and the alternative tunnel option that can connect to the IEC immediately to the east of the Causeway Bay Typhoon Shelter, indicates that their approximate reclamation areas are:

- deep tunnel option, 14ha
- alternative tunnel option, 4ha.

3.4.8 The reclamation required for the deep tunnel option appears unnecessarily extensive; in the light of the CFA ruling, it must be concluded that, as the deep tunnel option will result in a greater area of reclamation than an alternative available tunnel option, and as in any event the deep tunnel option does not perform as well as the alternative cut-and-cover tunnel option, there is no justification or overriding need to pursue this deep tunnel option.

3.4.9 Moreover, the deep tunnel will render Slip Road 8 (from Victoria Park Road to Trunk Road westbound) not able to join the mainline Trunk Road tunnel in Causeway Bay, as a

connection from the ground level Victoria Park Road to the bored tunnel at this deep level will exceed maximum permissible tunnel gradients. Omitting Slip Road 8 for the deep tunnel option means that this scheme will not meet all the functional requirements of the Trunk Road and, as such, the deep tunnel option does not perform as well as other tunnel options that can meet the functional requirements. In this respect, the deep tunnel option will not meet the identified overriding need for the Trunk Road.

- 3.4.10 Further details of the deep bored tunnel option are provided in Chapter 3 of the HEC Report on Trunk Road Alignments and Harbour-front Enhancement (**Annex G**).

Alternative Trunk Road Tunnel Schemes submitted by the Public

- 3.4.11 Alternative Trunk Road and harbour-front enhancement schemes have been submitted by members of the public during the course of the Envisioning Stage consultation, with a view to minimising reclamation and improving the waterfront. Two noteworthy proposals were submitted as full scheme proposals: one from Swire Properties (“A Proposal for the Wan Chai - Causeway Bay Shoreline” submitted to the Sub-committee on WDII Review in July 2005), and another from RHKYC (“Preserving the Vibrancy and Diversity of Victoria Harbour” submitted to the Sub-committee on WDII Review in July 2005). Other public submissions (for example those from the Designing Hong Kong Harbour District and Business and Professionals Federation of Hong Kong) are, in general, ideas that are covered collectively below. The suggestion by several parties, including the Eastern District Council, to move the Trunk Road tunnel eastern portal further eastwards is covered under the examination of the deep bored tunnel proposal above.
- 3.4.12 An extract from the Swire’s proposal is at **Annex H**. Swire’s submitted their proposal to demonstrate an idea that would allow Victoria Park unfettered access to the waterfront. As can be seen from Annex H, their scheme involves Trunk Road tunnel construction that does require reclamation along the Wan

Chai shoreline and in the corners of the CBTS. This is therefore not a “no reclamation” idea.

- 3.4.13 An extract from the RHKYC proposal is at **Annex I**. RHKYC noted that they had brainstormed with and solicited ideas from various stakeholders including Wan Chai District Council and Eastern District Council, NGOs, sports associations and RHKYC members, in deriving their proposal. As can be seen from Annex I, reclamation will be needed for Trunk Road tunnel construction along the Wan Chai shoreline and in the corners of the Causeway Bay Typhoon Shelter for the RHKYC scheme. This scheme is therefore also not a “no-reclamation” idea.
- 3.4.14 Nevertheless, these proposed schemes have been further investigated in developing variations of Trunk Road tunnel options as discussed in Section 4 of this report.

Double Decking over Gloucester Road

- 3.4.15 A member of the public has proposed a double-decking idea, which involves the construction of an elevated Trunk Road structure above the existing Connaught Road Central / Harcourt Road / Gloucester Road. The idea being to make use of the air space above the existing road corridor for Trunk Road construction.
- 3.4.16 The Trunk Road is a dual 3-lane carriageway with an overall elevated deck width of around 30m. This will need to span across the existing Gloucester Road, including over existing flyovers such as Tonnochy Road Flyover and Arsenal Street Flyover, and keep clear of the numerous pedestrian bridges that currently span over Gloucester Road. An extremely bulky portal structure for the Trunk Road will be required that will result in the loss of existing traffic lanes in both the east-bound and west-bound carriageways of Gloucester Road for the supporting piers. Moreover, the structure will be very high, in order to pass over the existing elevated structures along Gloucester Road (the Trunk Road level would be at around the 5th or 6th floor level of the adjacent buildings along Gloucester

Road). Visual impacts and the blocking effects of the double-deck structure will be severe.

- 3.4.17 Traffic impacts are of primary concern when considering the feasibility of this double-deck idea. During construction, two lanes on Gloucester Road will need to be closed in both east-bound and west-bound directions to allow for the portal frame construction and contractor's working space. With the Gloucester Road corridor already filled to capacity with roads, there is no spare road space for temporary traffic diversions. Then, once the Trunk Road is complete, there will be a permanent loss of one lane in both directions.
- 3.4.18 The consequence will be a loss of around 40% of road capacity in both directions during construction and a permanent loss of around 25% of road capacity in both directions after construction. This loss of road capacity, from a major strategic road corridor that is already operating over capacity and will continue to operate at or near capacity even after the implementation of the Trunk Road, would most like result in a gridlock situation and cannot be tolerated; this means that the overriding need for the Trunk Road cannot be met.
- 3.4.19 Therefore, from both visual and traffic impacts points of view, the suggested double-deck arrangement along Gloucester Road is considered to be not feasible.

Full Flyover Idea

- 3.4.20 It was suggested by a member of the Sub-committee on WDII Review that a Trunk Road in the form of flyover starting from CRIII project boundary all the way to the connection with the IEC should be presented for consideration by the public. This suggestion is in respect of new land formation not being required for flyover, putting aside the question of whether the bridge piers in the harbour would constitute reclamation.
- 3.4.21 The major obstacle for a Trunk Road in the form of flyover starting from the CRIII project boundary is the existing development in Wan Chai North, in particular, the HKCEC Phase I and the HKCEC Extension, and their connecting Atrium

Link bridge, which form a physical barrier to elevated road structures (as discussed in Section 3.2 above). Full flyover options cannot rise to a high enough level to pass over the HKCEC and/or the Atrium Link.

- 3.4.22 All Trunk Road alignments must pass through the HKCEC water channel in tunnel, in reclamation. Only after passing through the water channel can the Trunk road rise up onto flyover, therefore a so-called “full flyover” option (having no new land formation) is not feasible.

Total Offshore Idea

- 3.4.23 Following on from the full flyover idea above, an idea of having the Trunk Road alignment completely offshore (ie not constrained by the connecting point with CRIII to the west of the HKCEC) has been considered.
- 3.4.24 A flyover running through the middle of the harbour would clearly be unacceptable, due to marine impacts: pleasure, ferry and commercial shipping would be affected.
- 3.4.25 A Trunk Road tunnel running offshore will be constrained by the crossing beneath the MTR Tsuen Wan Line and the Cross Harbour Tunnel. Similar to the case for the MTR Tsuen Wan Line crossing as discussed in Section 3.3, a Trunk Road alignment that turns northwards into to the harbour from the connection with the Central Interchange in Central will also not be able to drop down deep enough to pass beneath the MTR immersed tube tunnel with sufficient clearance.
- 3.4.26 Therefore, “total offshore” ideas for the Trunk Road alignment are not feasible.

“Shallow Water” Idea

- 3.4.27 Another suggestion from a member of the Sub-committee on WDII Review is that, even if the top of the Trunk Road tunnel structure is above the existing seabed level, as long as the top of structure is below sea level, this should be presented as an alternative choice instead of constructing the tunnel in

reclamation. The preference being that even a shallow water area should be returned to the harbour.

3.4.28 **Annex J** presents details of the “Shallow Water” Idea and its consequences.

3.4.29 From the engineering and marine impacts points of view, the major concern is that, due to its exposure above seabed, the Trunk Road tunnel structure would be vulnerable to ship impact, including ocean going vessels in the nearby navigation fairways and especially during typhoon periods. The consequences of structural damage to the road tunnel would be severe, and possibly catastrophic, and would take a long time to rectify. Protection in the form of a breakwater is therefore required. A rubble mound breakwater will provide the most effective protection to the tunnel structure from vessels in the harbour, which range from small harbour craft to large ocean going vessels, without compromising navigational safety.

3.4.30 The resulting scheme means that the perceived benefits of “seeing a water surface” along the shoreline rather than reclamation are offset by the reclamation formed by the offshore protective breakwaters, and the shallow water area inside the breakwater will have limited marine or recreational use.

3.4.31 This perceived saving in reclamation is, in fact, countered by an infringement of the principle of protecting and preserving the Harbour under the PHO in respect of:

- the area occupied by offshore breakwaters required for protecting the Trunk Road tunnel against ship impact, which constitutes reclamation under the PHO;
- the area occupied by the tunnel structure above seabed (albeit below sea level), which also constitutes reclamation under the PHO;
- the area between the existing shoreline and the breakwater, where marine access is restricted and where existing drainage outfalls into the embayed body of water will result in poor water quality that will be unsightly, odorous and restrict recreational use of this area – this part of the

Harbour will be so adversely affected that the principle of preserving and protecting the Harbour under the PHO can be regarded as infringed.

- 3.4.32 This is not a “no-reclamation” idea and, as the affected area of the Harbour is greater than that arising from the conventional cut-and-cover tunnel approach, under the PHO this should not be pursued further.

3.5 Conclusions on “No Reclamation” Options

Is there any “no reclamation” option ?

- 3.5.1 All possible alignments for the Trunk Road, including suggestions from the public, have been examined, taking into account land use and infrastructural constraints, with a view to determining if there are any that do not require any reclamation for the Trunk Road construction. It is found that the feasible Trunk Road routeing is along the foreshore of Wan Chai and Causeway Bay.
- 3.5.2 However, foreshore alignments do require reclamation for Trunk Road tunnel construction at the western end of WDII where the Trunk Road tunnel crosses over the MTR Tsuen Wan Line, and at the eastern end of WDII where the Trunk Road tunnel must rise to ground level for the connection with the elevated IEC, at least.
- 3.5.3 Alternative Trunk Road ideas that have been proposed to avoid reclamation are found to be not feasible, or would result in an even greater area of reclamation or affected area of the harbour.
- 3.5.4 Consequently, it is concluded that there is no feasible “no-reclamation” alignment for the Trunk Road, and it must be accepted that at least some reclamation will be required for the Trunk Road construction.

4 TRUNK ROAD FEASIBLE OPTIONS

4.1 Introduction

- 4.1.1 In Section 3 it was found that the feasible Trunk Road routing is along the foreshore of Wan Chai and Causeway Bay, with the Trunk road in tunnel crossing over the MTR Tsuen Wan line, and staying in shallow tunnel through the HKCEC water channel and along the Wan Chai shoreline. Thereafter, the Trunk Road can pass either below the CHT portal in tunnel or over the top of the Cross Harbour Tunnel portal as flyover, continuing through the Causeway Bay Typhoon Shelter to a connection with the existing elevated IEC to the east of the typhoon shelter.
- 4.1.2 For tunnel options, cut-and-cover tunnel construction is considered to be a technically feasible form of construction for implementation of the Trunk Road. Nevertheless, determination of the feasible form of tunnel construction must take into account alternative construction methods that may be considered appropriate along the different sections of the WDII project area. In this Section, possible variations of Trunk Road tunnel options are examined, with a view to determining practically feasible tunnel ideas that can be consolidated with harbour-front enhancement ideas for realising the objectives of this project.
- 4.1.3 There is broad support from the public for a tunnel option, especially where this can incorporate suggested harbour-front enhancement ideas while at the same time provide for the functional requirements of the Trunk Road. However, a flyover option is also technically feasible. Notwithstanding that there is little public support for a flyover option, this option does need to be given further consideration insofar as whether it represents a scheme requiring a lesser area of new land formation. At issue is which option, tunnel or flyover, would comply with the PHO. Accordingly, this section also examines a possible Trunk Road flyover idea and compares it with the Trunk Road in tunnel.

- 4.1.4 At-grade Trunk Road options are not acceptable as they would require extensive reclamation in the Causeway Bay Typhoon Shelter, thus not complying with the PHO, and the reclaimed land would be used mainly for roads, leaving little opportunity for harbour-front enhancement.

4.2 Alternative Tunnel Construction Methods

- 4.2.1 With the Trunk Road crossing over the MTR tunnel at the west of the HKCEC, as described previously, and the shallow tunnel (above seabed level) passing through the HKCEC water channel, the most practical construction approach in this area will be to construct the Trunk Road as a cut-and-cover tunnel after reclaiming along the shoreline to the west of the HKCEC and filling the water channel between the two seawalls of the Convention Centres. This reclamation will also accommodate the slip road connections in Wan Chai North.
- 4.2.2 Along the Wan Chai shoreline, the Trunk Road tunnel remains above the seabed level, therefore, again, cut-and-cover tunnel constructed in reclamation is considered the appropriate form of construction in this area.
- 4.2.3 Cut-and-cover tunnel construction involves first installing the tunnel walls by using diaphragm walls (these are reinforced concrete wall panels constructed in existing ground from ground level down to the required depth, usually to the underlying rock layer) on both sides of the tunnel, then excavating the soil from between the diaphragm walls, constructing reinforced concrete top and bottom slabs between the diaphragm walls to form the tunnel box and, finally, backfilling over the tunnel. This form of construction is carried out in existing or formed land to provide the necessary construction access from the surface – should the tunnel alignment cross over seabed, reclamation will be required to first form the land through which the diaphragm walls need to be constructed.
- 4.2.4 Where the tunnel lies above seabed level, the reclamation also provides protection to the tunnel structure. If the tunnel structure were to be left exposed above the seabed level, it

would be at risk of damage from ship impact from ferries and local craft in the inshore water area and from ocean going vessels in the adjacent navigation fairways. The consequences of structural damage to the road tunnel would be severe and not tolerable.

4.2.5 Immersed tube tunnel form of construction may be used where the tunnel lies just below seabed level; reclamation would not be required for this form of tunnel construction. However, this form of construction is not suitable where the tunnel level rises above seabed level, as the exposed tunnel section would then be at risk of damage from ship impact, anchors, etc, the tunnel structure would be more susceptible to degradation in the aggressive marine environment, and the protrusion of the tunnel structure above the seabed would restrict marine access to the shoreline. Also, even where the tunnel lies below seabed level, the soft seabed material would need to be excavated so that the immersed tube units lie in a trench on a firm foundation. Along the Wan Chai shoreline, this would involve excavating a deep trench immediately adjacent to the existing seawalls, which would undermine these seawalls. Use of immersed tube is therefore considered not feasible in this instance, and the most practical and reasonable form of construction for the Trunk Road tunnel along the Wan Chai shoreline is cut-and-cover, constructed through reclaimed land.

4.2.6 Through the ex-PCWA basin and the Causeway Bay Typhoon Shelter, where the Trunk Road tunnel lies below seabed level, immersed tube or cut-and-cover tunnel construction may be considered. For both forms of construction, permanent reclamation is not required. In the case of cut-and-cover tunnel, temporary reclamation may be formed to facilitate the tunnel construction, but this can be removed on completion of construction so that the finished product, ie retention of the existing seabed condition, is the same for both methods. (Alternative methods of construction may be proposed by the future contractor, however, any such alternative method must not result in permanent reclamation.) Factors to be considered in selecting an appropriate construction method include: whether the tunnel alignment runs wholly through seabed or partly in existing seabed and partly under existing seawalls and

land formation, the latter making cut-and-cover construction more practically feasible (more efficient and cost effective construction with less disruption to existing shoreline facilities and infrastructure) than use of precast immersed tunnel sections that need to be placed in open trenches; the depth of the tunnel (where the tunnel lies at a significant depth below the seabed, for example near the Cross Harbour Tunnel crossing, at – 30mPD, major deep and wide trenches will need to be excavated, making immersed tube construction more disruptive with greater impacts); or the tunnel length available for immersed tube construction (short lengths will not be cost effective for the precast fabrication of tunnel units). The form of tunnel construction is an important consideration in respect of avoiding conflict with the SCL, as Trunk Road cut-and-cover tunnel can be constructed across the future SCL alignment with much closer separation allowance. Because the Trunk Road tunnel is on diaphragm wall (piled) supports, it will not be structurally adversely affected by the construction of the SCL tunnels.

4.2.7 Where the Trunk Road tunnel rises up above the seabed to ground level, for the connection with the IEC at the eastern end of the Causeway Bay Typhoon Shelter, cut-and-cover tunnel in reclamation will again be the feasible form of construction.

4.2.8 In summary, cut-and-cover tunnel construction is considered to be the practical and feasible form of construction for implementation of the Trunk Road at the west of the HKCEC, through the HKCEC water channel, along the Wan Chai shoreline and through the Causeway Bay Typhoon Shelter. Permanent reclamation will be required at the HKCEC, along the Wan Chai shoreline and at the eastern end of the Causeway Bay Typhoon Shelter, for the cut-and-cover tunnel, where it lies above the seabed level.

4.3 Trunk Road Tunnel Variations

4.3.1 Three feasible Trunk Road tunnel variations have been developed that will meet the overriding public need for the Trunk Road are presented. Chapter 4 of the HEC Report on Trunk Road Alignments and Harbour-front Enhancement

(**Annex G**) describes the tunnel option variations and their corresponding harbour-front enhancement potential in more detail, and the major issues associated with these tunnel variations. Key features of the three tunnel variations are described briefly as follows.

Trunk Road Tunnel Variation 1

- 4.3.2 In this tunnel option, the Trunk Road starts off at the connection with CRIII in cut-and-cover tunnel, crosses over the MTR Tsuen Wan Line tunnel and continues through the HKCEC water channel and along the Wan Chai shoreline, in cut-and-cover tunnel, in reclamation.
- 4.3.3 The Trunk Road tunnel passes beneath the Cross Harbour Tunnel portal at sufficient depth (–30mPD) to avoid conflict with the existing rock anchors of the Cross Harbour Tunnel portal structure. The low level of the Trunk Road tunnel means that the tunnel structure lies entirely below the seabed level of the ex-PCWA basin and the Causeway Bay Typhoon Shelter, only rising up above seabed level to ground level to the east of the Causeway Bay Typhoon Shelter, where the Trunk Road then rises up to connect with the existing elevated IEC. Permanent reclamation in the ex-PCWA basin and in the Causeway Bay Typhoon Shelter is not essential. While temporary works will be required (which may include temporary land formation for tunnel construction purposes) these can be removed afterwards and the existing seabed and water area reinstated.
- 4.3.4 Connection to the IEC is made to the northern side of the existing IEC elevated road structure, which is considered to be the least disruptive form of connection. The existing IEC links back into Causeway Bay (to Victoria Park Road and Hing Fat Street) are retained.

Trunk Road Tunnel Variation 2

- 4.3.5 This scheme has been based on a submission from the public (Swire Properties Ltd) during the Envisioning Stage. The Trunk Road tunnel runs along the HKCEC and Wan Chai

shorelines in cut-and-cover tunnel similar to Trunk Road Tunnel Variation 1, but turns southwards around the Cross Harbour Tunnel portal to avoid the anchorage zone of the portal structure. The Trunk Road tunnel then connects directly into the IEC at the eastern side of the Causeway Bay Typhoon Shelter, with the existing IEC connections to Victoria Park Road reconstructed. So as to free up more waterfront space along the southern edge of the Causeway Bay Typhoon Shelter and to construct a wide landscaped deck to extend Victoria Park to the waterfront, Victoria Park Road and associated connecting roads are proposed to be reconstructed further to the south (within the existing Victoria Park).

- 4.3.6 The shallower tunnel through the south-western corner of the Causeway Bay Typhoon Shelter for this Tunnel Variation 2 requires reclamation in this area, and reclamation is required in the south-eastern corner of the Causeway Bay Typhoon Shelter for the reconstruction of the IEC and Victoria Park Road connections in tunnel (above seabed level).

Trunk Road Tunnel Variation 3

- 4.3.7 Instead of pulling the tunnel southwards to go around the Cross Harbour Tunnel portal anchorage zone, the Trunk Road tunnel passes beneath the Cross Harbour Tunnel portal in order to improve the road alignment and to avoid the disruption that would be caused by construction across the entrance to the Cross Harbour Tunnel. Other details are similar to Trunk Road Tunnel Variation 2. This scheme, too, has been based on a submission from the public (the RHKYC) during the Envisioning Stage.
- 4.3.8 Whilst the straightened alignment avoids the need for reclamation in the south-western corner of the Causeway Bay Typhoon Shelter, reclamation is still required in the south-eastern corner of the Causeway Bay Typhoon Shelter for the reconstruction of the IEC and Victoria Park Road connections in tunnel.

Comparison of the Trunk Road Tunnel Variations

4.3.9 **Table 4.1** provides a comparison between the Trunk Road Tunnel Variations 1, 2 and 3, in broad terms, in respect of key indicators: area of reclamation, impacts to existing traffic, technical highway concerns and impacts to existing highway structures, impacts to existing development, planning and land use considerations, environmental concerns, time for construction and costs.

4.3.10 The following major issues are highlighted as being of particular concern:

- more reclamation due to filling in of the corners of the Causeway Bay Typhoon Shelter (south-east and south-west corners for Variation 2, south-east corner for Variation 3);
- major road diversions and traffic impacts during construction (particularly for Variations 2 and 3);
- intrusion into and demolition of Victoria Park for the construction of the realigned Victoria Park Road (both Variations 2 and 3);
- need for the reconstruction of major existing highway structures, including the IEC, Gloucester Road Flyover and the newly constructed Causeway Bay Flyover (both Variations 2 and 3);
- demolition of the Police Officers' Club (Variation 2);
- air quality concern at the tunnel portal, due to close proximity of residential units (all tunnel variations, but more so for Variations 2 and 3).

4.3.11 It should be noted that the areas of reclamation given in Table 4.1 are the areas of permanent reclamation, and include a notional allowance for reprovisioning requirements (for ferry pier, salt water pumping station, cooling water pumping stations, etc) associated with each of these tunnel variation options.

Table 4.1 Comparison of Trunk Road Tunnel Variations

| | Tunnel Variation 1 | Tunnel Variation 2 | Tunnel Variation 3 |
|---|---|---|---|
| Area of permanent reclamation | 15 ha | 18.5 ha | 16.5 ha |
| Impact to existing traffic | <ul style="list-style-type: none"> Some disruption at new tie-in to IEC | <ul style="list-style-type: none"> Major disruption due to demolition of IEC and new tie-in to IEC Major disruption due to reconstruction of Victoria Park Road, Causeway Bay Flyover and Gloucester Road Flyover Major disruption at CHT approach roads due Trunk Road tunnel construction | <ul style="list-style-type: none"> Major disruption due to demolition of IEC and new tie-in to IEC Major disruption due to reconstruction of Victoria Park Road, Causeway Bay Flyover and Gloucester Road Flyover |
| Other technical concerns (impacts to highways structures, etc.) | <ul style="list-style-type: none"> Localised reconstruction of existing IEC at City Garden for merging with the Trunk Road | <ul style="list-style-type: none"> Reverse curves at the CHT area: undesirable for Trunk Road in tunnel Reconstruction of Victoria Park Road and associated connections and Causeway Bay Flyover and Gloucester Road Flyover Demolition of existing IEC from Victoria Park Road to City Garden | <ul style="list-style-type: none"> Reconstruction of Victoria Park Road and associated connections and Causeway Bay Flyover and Gloucester Road Flyover Demolition of existing IEC from Victoria Park Road to City Garden |
| Impacts to existing development | Existing development not affected | POC needs to be demolished | Existing development not affected |

| | | Tunnel Variation 1 | Tunnel Variation 2 | Tunnel Variation 3 |
|---|--------------------------------|--|---|---|
| Planning and land use concerns | Along Wan Chai shoreline | Land formed can be used for harbour-front enhancement and pedestrian access to the waterfront | Land formed can be used for harbour-front enhancement and pedestrian access to the waterfront | Land formed can be used for harbour-front enhancement and pedestrian access to the waterfront |
| | PCWA basin | PCWA basin can be developed into a vibrant marine recreational facility | PCWA basin can be developed into a vibrant marine recreational facility | PCWA basin can be developed into a vibrant marine recreational facility |
| | Northern side of Victoria Park | Victoria Park can be extended to the harbour-front via a landscaped deck over the ground level roads | Victoria Park is reconstructed with a wide landscaped deck over the ground level roads, to a widened promenade | Victoria Park is reconstructed with a wide landscaped deck over the ground level roads, to a widened promenade |
| | CBTS | The existing CBTS is preserved as far as possible | Filling in the corners of the CBTS can be used for additional waterfront uses | Filling in the south-east corner of the CBTS can be used for additional waterfront uses |
| Environmental concerns | Noise & Air | <ul style="list-style-type: none"> • (Lesser) air quality concern at tunnel portal • Noise at tie-in to IEC (short 'new road' section) | <ul style="list-style-type: none"> • Air quality concern at tunnel portal • Noise along reconstructed IEC (long 'new road' section) | <ul style="list-style-type: none"> • Air quality concern at tunnel portal • Noise along reconstructed IEC (long 'new road' section) |
| | Water Quality | No major operational impacts due to the scheme | No major operational impacts due to the scheme | No major operational impacts due to the scheme |
| | Visual | No significant visual impacts | No significant visual impacts | No significant visual impacts |
| Time for construction | | 7 years | 8 years | 8 years |
| Costs (<i>incl</i> WDII works & CWB in WDII) | Total Construction | HK\$20B | HK\$28B | HK\$25B |
| | Total Annual Recurrent | HK\$110M | HK\$125M | HK\$123M |

- 4.3.12 It should also be noted that there will be a requirement for temporary works (including temporary reclamation) to facilitate cut-and-cover tunnel construction and for temporary traffic diversions. These temporary works will be required in the ex-PCWA basin and in the Causeway Bay Typhoon Shelter. In the Causeway Bay Typhoon Shelter, the extent of the temporary works, for all three tunnel variations, will be such that the existing moorings will need to be relocated outside the typhoon shelter during the construction period.
- 4.3.13 As can be seen, neither Tunnel Variation 2 nor 3 perform as well as the Trunk Road Tunnel Variation 1. The major drawbacks of Tunnel Variations 2 and 3 include additional reclamation for filling in of the corners of the Causeway Bay Typhoon Shelter, major traffic disruption, demolition of a large part of Victoria Park, demolition and then reconstruction of major highway structures, and air quality concerns at the tunnel portal area in North Point.
- 4.3.14 The reclamation issue is particularly important in respect of the PHO. The Trunk Road Tunnel Variation 1 requires a lesser extent of reclamation than that associated with the Tunnel Variations 2 and 3.

4.4 Trunk Road Flyover

- 4.4.1 The Trunk Road flyover option and the comparison with the tunnel option are presented in Chapter 4 of the HEC Report on Trunk Road Alignments and Harbour-front Enhancement (**Annex G**).
- 4.4.2 Same as for the tunnel option, the Trunk Road starts off at the connection with CR III in cut-and-cover tunnel, crosses over the MTR Tsuen Wan Line and continues through the HKCEC water channel and along the Wan Chai shoreline, in cut-and-cover tunnel. Alignment constraints through the HKCEC water channel, including the HKCEC atrium link bridge and ground level road access, mean that the Trunk Road will need to stay in tunnel through the HKCEC water channel, only rising up to a tunnel portal along the Wan Chai shoreline. As for the case

with tunnel options, reclamation is required along this part of the shoreline for Trunk Road construction.

- 4.4.3 The road then rises up onto elevated road structure to cross over the ex-PCWA basin, then over Kellett Island (and the Cross Harbour Tunnel portal), and stays on elevated structure to the connection with the existing IEC at the eastern side of the Causeway Bay Typhoon Shelter, at a level of around +14mPD. No permanent reclamation (that is, land formation) is required in the ex-PCWA basin, the Causeway Bay Typhoon Shelter or along the North Point shoreline.

Comparison of Tunnel and Flyover Options

- 4.4.4 **Table 4.2** provides a comparison between the tunnel and flyover options in broad terms, in respect of key indicators: affected area of the Harbour, impacts to existing traffic, technical highway concerns and impacts to existing highway structures, planning and land use considerations, environmental concerns, time of construction, and costs. Trunk Road Tunnel Variation 1 is used as the basis of tunnel option comparison. The key issue that is of concern in respect of the PHO is the area of the Harbour that will be affected by the tunnel and flyover options.

Area of the Harbour affected by the Trunk Road Tunnel and Flyover Options

- 4.4.5 The PHO requires the Harbour to be protected and preserved as a special public asset and a natural heritage of the Hong Kong people, and establishes a presumption against reclamation in the Harbour. Notwithstanding that there is an overriding need for reclamation for the project, it is essential to find the option that will best serve to protect and preserve the Harbour, with the minimum area of the Harbour affected by reclamation. In this regard, the area of the Harbour affected by the alternative Trunk Road tunnel and flyover options is of concern. The flyover structures over water will impinge upon the water area of the Harbour and their visual impacts do not promote the protection and preservation of the Harbour. Moreover, where the marine use of existing water areas is restricted due to the presence of

highway structures and the like, these affected water areas may not be regarded as “protected” or “preserved” for the purposes of the PHO.

4.4.6 Therefore, when examining Trunk Road options, and especially when examining the flyover option, the land formation by physical reclamation is taken into account together with the water areas of the Harbour affected by flyover structures in order to determine which option may serve best to protect and preserve the Harbour.

Table 4.2 Comparison of Tunnel and Flyover Options

| | | Tunnel Option (Tunnel Variation 1) | Flyover Option |
|--|--------------------------|---|---|
| Affected area of the Harbour: | | | |
| (a) Land formed | | 15 ha | 11.5 ha |
| (b) Flyover structures over water | | 0.5 ha | 3 ha |
| (c) Affected water area | | - | 4 ha |
| Impact to existing traffic | | Some disruption at new tie-in to IEC | <ul style="list-style-type: none"> • Major disruption at new tie-in to IEC • Major disruption due to reconstruction of Victoria Park Road connections |
| Other technical concerns (impacts to highways structures, etc) | | Localised reconstruction of existing IEC at City Garden for merging with the Trunk Road | Reconstruction of existing IEC from Victoria Park Road to Victoria Centre |
| Planning and land use considerations | Along Wan Chai shoreline | Land formed can be used for harbour-front enhancement and pedestrian access to the waterfront | Land formed is partly occupied by the tunnel portal which constrains the extent of area for harbour-front enhancement and pedestrian access to the waterfront |
| | PCWA basin | PCWA basin can be developed into a vibrant marine recreational facility | Highway bridge piers and the low headroom clearance of the flyover restrict the development of the PCWA basin as a recreational facility |

| | | Tunnel Option (Tunnel Variation 1) | Flyover Option |
|---|--------------------------------|--|---|
| | Northern side of Victoria Park | Victoria Park can be extended to the harbour-front via a landscaped deck over the roads | With the flyover running along the northern side of Victoria Park, the landscaped deck over Victoria Park Road and extension of Victoria Park are impractical |
| | CBTS | The existing CBTS is preserved as far as possible | Part of the water area and the existing promenade will be occupied by bridge piers |
| | North Point | Seaward portions of existing and planned developments from Hing Fat Street to Oil Street are affected. Part of land formed can be used for harbour-front enhancement and pedestrian access | No major impact on existing and planned developments |
| Environmental concerns | Noise & Air | <ul style="list-style-type: none"> Air quality concern at tunnel portal Noise at tie-in to IEC (short 'new road' section of IEC) | Significant air and noise impacts along flyover section in Causeway Bay and reconstructed IEC at North Point ('new road') |
| | Water Quality | No major operational impacts due to the scheme | No major operational impacts due to the scheme |
| | Visual | No significant visual impacts | Significant impacts in Wan Chai and (especially) in Causeway Bay (flyover along part of Wan Chai shoreline and through CBTS) |
| Time for construction | | 7 years | 6 years |
| Costs (including WDII works & CWB in WDII) | Total Construction | HK\$20B | HK\$11B |
| | Total Annual Recurrent | HK\$110M | HK\$75M |

4.4.7 In most respects, it is found that the Trunk Road tunnel option (Tunnel Variation 1) performs better than the flyover option. The tunnel option:

- will result in a lesser affected area of the Harbour;
- will cause less traffic disruption during construction;
- will not require any major reconstruction of existing highway structures;
- will have more opportunities for harbour-front enhancement and providing access to the waterfront;
- will cause less extensive air and noise impacts (although air quality at the tunnel portal will need to be carefully addressed);
- will have no significant visual impacts (the flyover, on the other hand, will have significant visual impacts along the harbour-front).

4.4.8 Only in respect of time for construction and costs can the flyover option be seen as performing better than the tunnel option.

4.4.9 The key issue of concern is: “which option would serve best to protect and preserve the Harbour?” In addressing this question, the area of the Harbour that is affected by the Trunk Road options should be taken into account, including not only land formed by reclamation but also the impingement of highway structures on the existing water areas and the restricted use of water areas due to the presence of the highway structures (ie the areas where the functionality of the Harbour is adversely affected). In addition, the visual aspects of the flyover option (viewed in terms of “preserving the Harbour”) should be considered. In these respects, the Trunk Road tunnel option is clearly the option that would serve best to protect and preserve the Harbour.

4.5 Conclusions of the Review of Feasible Options

Which Trunk Road option has the minimum extent of reclamation or, more pertinently, affects the minimum area of the Harbour ?

- 4.5.1 Tunnel and Flyover Options along the foreshore of Wan Chai and Causeway Bay have been found to be feasible options that can meet the overriding need for the Trunk Road. Three variations have been developed for the Tunnel Option; these variations differ mainly in the manner that the Trunk Road crosses the Cross Harbour Tunnel and the way it connects to the existing IEC, with Variations 2 and 3 being based on submissions from the public.
- 4.5.2 Comparing the tunnel variations, Tunnel Variation 1 is found to require the least extent of reclamation, would cause the least disruption to traffic during construction, has the least impacts to existing highway infrastructure and the least impacts to Victoria Park. It should be noted that, when considering Trunk Road variations having similar functional/traffic performance (ie in meeting the overriding need), the CFA ruling on the PHO requires that the one with the least amount of reclamation (in this case Tunnel Variation 1) should be selected. Therefore, of these tunnel variations, Trunk Road Tunnel Variation 1 is recommended, in compliance with the requirements of the PHO.
- 4.5.3 Although both capital and annual recurrent costs would be higher for the Tunnel Option when compared with the Flyover Option, the Tunnel Option is recommended, in compliance with the requirements of the PHO, primarily because the affected area of the Harbour would be smaller and it would cause less visual impact than the Flyover Option.
- 4.5.4 Trunk Road Tunnel Variation 1 affects the minimum area of the Harbour and serves best to protect and preserve the Harbour, among all the options that have been assessed.

5 PUBLIC VIEWS

5.1 Public Engagement Activities

- 5.1.1 The first stage of the HER project, the Envisioning Stage, had as its purpose the engagement of the community at an early stage to solicit their visions on the need for and the form of Trunk Road as well as the types of harbour-front developments they aspire for at Wan Chai, Causeway Bay and the adjoining areas. Five public forums and two community design charrettes were convened during May to July 2005, and opinion surveys were carried out. These public engagement activities were well received by the public, in particular by the key stakeholders, as providing a platform for thorough exchange of views, rational discussions and consensus building.
- 5.1.2 The public's views collected and findings of the Envisioning Stage are presented in a Public Engagement Report, March 2006. A copy of the report is attached at **Annex K** for reference, and the report can be viewed on the HEC website at: http://www.harbourfront.org.hk/eng/content_page/doc/engagement_report/Main_Report.pdf.
- 5.1.3 In addition, discussions with the Town Planning Board, Legislative Council (LegCo), District Councils and relevant statutory and advisory bodies have also been held, as part of an on-going and continuous process of public engagement for seeking consensus on the project proposals. In particular, the Town Planning Board, relevant District Councils, LegCo Planning Lands and Works (PLW) Panel, Transport Advisory Committee and professional institutions were further engaged from April to June 2006 on the findings regarding alignments and construction forms for the Trunk Road and harbour-front enhancement ideas.

5.2 Public Views on the Trunk Road Ideas

5.2.1 The outcome of the public engagement activities and the public views received on the Trunk Road ideas are summarised as follows.

Public Forums and Submissions

5.2.2 Public views and opinions were received during engagement exercises including community charrettes, where most participants agreed that if there is no alternative and there is a need for the construction of the Trunk Road to solve the traffic congestion problem, they prefer a tunnel form of construction, to allow more flexible use of the waterfront with least adverse visual impacts.

5.2.3 Many parties realise that some reclamation may be necessary for building the Trunk Road. However, all agree that minimum reclamation should be an overriding principle in the design of transport infrastructure. Most participants in the public engagement exercises accept the need for reclamation at the HKCEC and along the Wan Chai shoreline for shallow cut-and-cover tunnel construction, but there is a clear preference for tunnel options that do not result in reclamation in the Causeway Bay Typhoon Shelter (although some parties have suggested limited reclamation in the corners of the typhoon shelter for waterfront enhancement).

5.2.4 The written submission by Swire Properties Ltd, “A Proposal for the Wan Chai - Causeway Bay Shoreline”, incorporates a shallow Trunk Road tunnel, in reclamation, through the HKCEC water channel and along the Wan Chai shoreline. In the Swire’s scheme the Trunk Road tunnel swings southwards around the Cross Harbour Tunnel portal and through the south-west corner of the typhoon shelter, in reclamation, before turning northwards to connect into the IEC at North Point. This Trunk Road option has been developed as Trunk Road Tunnel Variation 2, presented in Section 4 above.

5.2.5 The written submission by RHKYC, “Preserving the Vibrancy and Diversity of Victoria Harbour”, also involves a shallow

Trunk Road tunnel, in reclamation, through the HKCEC water channel and along the Wan Chai shoreline. The Trunk Road tunnel then passes under the Cross Harbour Tunnel portal area and under the Causeway Bay Typhoon Shelter (deep enough not to require reclamation) before connecting to the outside of the existing IEC at North Point. This Trunk Road option has been developed as Trunk Road Tunnel Variation 3, presented in Section 4 above.

- 5.2.6 The Eastern District Council held a concept design competition “A New Face for the Eastern Harbourfront”. Whilst the designs were focussed on the harbour-front design rather than on the Trunk Road, the basis of the design of the winning entry, “Healthy Life Healthy City”, is a Trunk Road tunnel option similar to Trunk Road Tunnel Variation 2.
- 5.2.7 In general, therefore, public views clearly favour a Trunk Road tunnel option, very much in line with the tunnel variation schemes presented in Section 4. There is consistency in the views and proposals for a shallow cut-and-cover tunnel along the Wan Chai shoreline, in reclamation; and for a deeper tunnel, beneath the seabed, that does not require reclamation through the Causeway Bay Typhoon Shelter, although there are different views about the need for reclamation in the corners of the typhoon shelter.

Town Planning Board

- 5.2.8 Members paid particular attention to potential impacts on traffic arising from temporary traffic diversions associated with the various Trunk Road ideas, potential impacts to Victoria Park and whether any of the Trunk Road ideas would jeopardize the railway projects being planned.
- 5.2.9 There was view that the Flyover Option is unlikely to be acceptable to the general public and Variation 1 of the Tunnel Option was the most viable option. On these premises, it was advisable for the Government and the consultants to clearly explain the merits of this option to the public with a view to soliciting the widest possible community support. The Town Planning Board also saw the need to focus on the practicality

and details of the feasible options in the Realization Stage of public consultation in HER.

Transport Advisory Committee

- 5.2.10 The Transport Advisory Committee maintained their full support for the construction of the Trunk Road with its two sets of planned slip roads in Wan Chai and Causeway Bay. It also looked forward to the early completion of this last piece of infrastructure of the strategic road link along the northern shore of the Hong Kong Island.
- 5.2.11 It was stressed that due regard should be paid to the need to minimise traffic disruption and nuisance caused to the public during the construction stage.
- 5.2.12 The Committee also noted that considerable attention had been given to limit the reclamation required in examining how to build the Trunk Road and to maximise the opportunities the reclamation may provide for enhancing the harbour-front.

District Councils

- 5.2.13 There was a general support for the construction of the Trunk Road and quite a number of members urged for early completion of the Trunk Road.
- 5.2.14 As for the construction forms of the Trunk Road, there was a majority support for Variation 1 of the Tunnel Option in the Southern District Council and there were also views expressed in the other three District Councils in support of it. On the other hand, the Flyover Option had little support.
- 5.2.15 Another main concern of the members was on traffic impacts during the construction stage and members stressed that such impacts must be minimised.
- 5.2.16 Members requested for maximising harbour-front enhancement opportunities, but there were views expressed that this should not be a reason for reclaiming the Harbour.

5.2.17 Members of the District Councils pointed out that there was a need to ensure that all ideas have already been exhausted in arriving at the conclusion that there is no possible “no-reclamation” alignment for constructing the Trunk Road. The Central and Western District Council passed a motion objecting to the conclusion of no possible “no reclamation” alignment and requesting the Administration to review the planning for Central and Wan Chai and to reduce the commercial development in CRIII and Tamar Development so as to minimise the transport need. The Eastern District Council passed a motion urging for extending the Trunk Road eastern tunnel portal and the North Point waterfront promenade to the eastern side of the ex-North Point Estate. (However, locating the tunnel portal further east at the ex-North Point Estate would result in more reclamation and would therefore not satisfy the “overriding public need test” under the PHO.)

Professional Institutions

5.2.18 The need for the Trunk Road with its planned slip roads at Wan Chai and Causeway Bay was supported by many participants and reaffirmed by the representatives from Hong Kong Institute of Architects, Hong Kong Institution of Engineers, Hong Kong Institute of Landscape Architects, Hong Kong Institute of Planners and Hong Kong Institute of Surveyors, that organised a Joint Institute Seminar to discuss the matter.

5.2.19 Regarding the various options and ideas for the Trunk Road, Variation 1 of the Tunnel Option was considered to be the most feasible solution.

5.2.20 There was a suggestion of achieving the effect of retaining the harbour at the reclaimed land through the introduction of water related landscape features, such as large fountains, lakes, etc, to create a ‘water theme’.

5.2.21 The Hong Kong Institution of Engineers also convened a separate forum on the same topic. In the closing remarks, support for building the Trunk Road was reiterated and Tunnel Variation 1 was considered the best option in compliance with the PHO and enhancement of the harbour-front.

LegCo PLW Panel

- 5.2.22 The Consultants explained the reasons for the conclusion that there was no possible “no reclamation” alignment for constructing the Trunk Road and the fact that all ideas and proposals from the public have been carefully assessed; nevertheless there was some debate about such conclusion and members requested further consideration in that respect.
- 5.2.23 On the other hand, there was a view that out of the options/variations considered by the Consultants, Trunk Road Tunnel Variation 1 serves best in complying with the PHO.
- 5.2.24 As for harbour-front enhancement, there was a view to introduce some water-related features on part of the reclaimed land above the sea level so as to mitigate the impact due to reclamation. There was a request to enhance the continuity of the pedestrian walkways/footbridges along the northern shore of the Hong Kong Island as well as to enhance the accessibility to the harbour-front of Hong Kong Island.
- 5.2.25 The LegCo PLW Panel also invited deputations to express views. Twelve parties/individuals presented their views in person with written submissions from two others. Majority of the views supported the construction of the Trunk Road and Tunnel Option Variation 1. They also stressed on seizing the opportunity to enhance the harbour-front. There were some divergent views that traffic measures alone, including electronic road pricing, may be sufficient to resolve the traffic congestion problems. There was also the view suggesting to submerge the whole length of the IEC, or a substantial section of it, as part of the harbour-front enhancement measures; in response, Government noted that submerging the whole of the existing IEC was beyond the ambit of the WDII project and, as explained to LegCo, there is no plan at this stage to demolish the IEC and reconstruct it in the form of tunnel.

5.3 Conclusions Drawn from the Public Engagement

What does the Public think ?

5.3.1 The general sentiment of the public, in respect of the Trunk Road ideas and aspirations for harbour-front enhancement, expressed through the Envisioning Stage consultation, includes:

- a preference for having the Trunk Road in tunnel;
- generally, an acceptance of the need for reclamation for shallow tunnel construction at the HKCEC and along the Wan Chai shoreline;
- but, rather have tunnel options that do not result in reclamation in the Causeway Bay Typhoon Shelter.

5.3.2 Overall, Trunk Road Tunnel Variation 1 is seen as the best option in complying with the PHO, and this Trunk Road option has clearly expressed support as the preferred Trunk Road scheme.

6 PREFERRED TRUNK ROAD SCHEME

6.1 Confirmation of Preferred Trunk Road Option

6.1.1 The conclusion of the review of feasible Trunk Road options, which is supported by the views of the Public, is that Trunk Road Tunnel Variation 1 affects the minimum area of the Harbour and serves best to protect and preserve the Harbour, among all the options and variations that have been assessed.

6.1.2 After due consideration of these investigations, the HEC Subcommittee on WDII Review agreed at their meeting on 13 June 2006 to endorse Trunk Road Tunnel Variation 1 as the basis for proceeding to the next stage of the WDII Review, the preparation of the Concept Plan.

6.2 Trunk Road Scheme Engineering Details

6.2.1 The engineering layout of the preferred Trunk Road scheme, Trunk Road Tunnel Variation 1, is presented in **Annex L**. Whilst the various elements of the scheme have been discussed in the preceding sections, for completeness, the overall Trunk Road scheme is described briefly below.

Overall Trunk Road Layout

6.2.2 At the western end of the WDII project area, connection is made to the Trunk Road tunnel which will be constructed under CRIII. The eastern end of the Trunk Road tunnel in CRIII is located to the west of the HKCEC Extension, near Lung King Street, and forms the starting point of the Trunk Road at the western end of the WDII project area. The Trunk Road is a cut-and-cover tunnel with a road level of –10mPD and top of tunnel structure at around –1mPD (ie above existing seabed level) at this connection point. Reclamation is required for this cut-and-cover tunnel above seabed level.

6.2.3 Then, the Trunk Road tunnel must cross over the top of the MTR Tsuen Wan Line tunnel. A piled Trunk Road tunnel structure spanning across the MTR tunnel has been developed

and agreed previously in consultation with MTRC. In this case, the Trunk Road tunnel structure will lie completely above the seabed level, with a road level of around -7mPD . Taking into account the height of the Trunk Road tunnel, the top of the tunnel structure would then lie above sea level, at a level of around $+2.5\text{mPD}$, and needs to be contained within reclamation.

- 6.2.4 The Trunk Road tunnel continues through the HKCEC water channel and along the Wan Chai shoreline, with the tunnel structure still above seabed level. Again, reclamation is required for the shallow cut-and-cover tunnel construction and to contain the tunnel structure above seabed level. This reclamation will also accommodate the slip road connections in Wan Chai North.
- 6.2.5 Further east, the tunnel passes beneath the Cross Harbour Tunnel portal at a level of around -30mPD ; this depth is required in order to avoid conflict with the existing rock anchors of the CHT portal structure.
- 6.2.6 The low level of the Trunk Road tunnel under the Cross Harbour Tunnel means that the tunnel structure lies entirely below the seabed level of the adjacent ex-PCWA basin and the Causeway Bay Typhoon Shelter, only rising up above seabed level to a ground level tunnel portal east of the Causeway Bay Typhoon Shelter. Permanent reclamation in the ex-PCWA basin and in the Causeway Bay Typhoon Shelter is not essential. While temporary works will be required (which may include temporary land formation for tunnel construction purposes) these can be removed afterwards and the existing seabed and water area reinstated.
- 6.2.7 To the east of the Causeway Bay Typhoon Shelter, along the North Point shoreline, the Trunk Road rises up above seabed level to the ground level portal, where once again, reclamation is required for the cut-and-cover tunnel construction and to contain and protect the tunnel structure. The Trunk Road then rises on flyover structure to connect with the existing elevated IEC. Connection to the existing IEC elevated road structure, at road levels between $+12\text{mPD}$ and $+15\text{mPD}$, is made to the northern side of the IEC. The existing IEC connections back

into Causeway Bay (to Victoria Park Road and Hing Fat Street) are retained.

Horizontal Alignment

- 6.2.8 The horizontal alignment of the Trunk Road through the WDII project area is governed by a number of constraints, including highway design standards that dictate the geometry of the road and physical obstructions or restrictions that result in “fixed alignment points”. Together, these determine the road curvature and the extent of intrusion of the Trunk Road tunnel into the harbour. The following fixed alignment points largely determine the horizontal alignment.
- 6.2.9 At the western end of WDII, connection is required to the Trunk Road tunnel under CRIII; this location has already been fixed. Then the tunnel must pass through the HKCEC water channel, between the HKCEC foundations (alignment options both to the north and south of the water channel have been examined in Section 3 above, but found not feasible due to conflict with existing development). The HKCEC foundations limit the possible movement, both northward and southward, of the Trunk Road alignment through the water channel.
- 6.2.10 Through the centre of the WDII project area, along the Wan Chai shoreline, the existing electricity substation and the Wan Chai East Sewage Screening Plant obstruct the Trunk Road from turning southwards. The northern boundary of the existing Wan Chai East Sewage Screening Plant defines the southern limit of the Trunk Road tunnel alignment: immediately inside this boundary are existing sewage outfall facilities and the planned dropshafts of the Harbour Area Treatment scheme, which restrict any further southward shifting of the Trunk Road alignment. The crossing under the Cross Harbour Tunnel is restricted southwards by the foundations of the Police Officers’ Club and northwards by the extent of the Cross Harbour Tunnel portal structure (crossing any further north, beyond the zone of the Cross Harbour Tunnel portal structure, would result in unacceptably high risk of damage to the Cross Harbour Tunnel).

- 6.2.11 At the eastern end of WDII, the Trunk Road tunnel structure is located adjacent to the existing IEC foundation piles, which constrain the extent to which the Trunk Road alignment can be moved any further southwards; this therefore fixes the horizontal alignment of the Trunk Road at this location.
- 6.2.12 The Trunk Road horizontal alignment from the connection with CRIII in the west to the connection to the IEC in the east is then determined by fitting a smooth curve between all these fixed points. Road curvature is in accordance with highway design standards with regard to geometric values for radii and sight distances requirements.
- 6.2.13 The resulting horizontal alignment for the Trunk Road, as shown in Annex L, is found to be the optimal alignment in meeting the necessary highway design standards within physical alignment constraints. The alignment ensures the least intrusion into the harbour, and therefore the minimum extent of reclamation.

Slip Roads

- 6.2.14 The following slip road connections have been identified as essential in meeting traffic demand and enabling the Trunk Road to adequately perform its function of relieving traffic from the overloaded Connaught Road Central – Harcourt Road – Gloucester Road corridor:
- a slip road for traffic from Central and western Hong Kong Island exiting the eastbound Trunk Road at Wan Chai North ('Slip Road 1');
 - a slip road for traffic from Wan Chai North entering the eastbound Trunk Road to the IEC (North Point and eastern Hong Kong Island) ('Slip Road 2');
 - a slip road for traffic from the IEC exiting the westbound Trunk Road at Wan Chai North ('Slip Road 3'); and
 - a slip road for traffic from the Causeway Bay and Tin Hau area entering the westbound Trunk Road to Central and western Hong Kong Island ('Slip Road 8').

- 6.2.15 The Wan Chai slip roads (Slip Roads 1, 2 and 3) will rise up from the Trunk Road tunnel, which is above seabed level in reclamation, to their ground level tunnel portals. The slip roads will also be constructed as cut-and-cover tunnel and, as the slip roads also lie above seabed level (and above sea level), they need to be contained within reclamation.
- 6.2.16 The Causeway Bay slip road (Slip Road 8) would ordinarily require reclamation if aligned from the connection with Victoria Park Road directly through the Causeway Bay Typhoon Shelter, due to its shallow level (above seabed). Under the Trunk Road Tunnel Variation 1 scheme, however, an alternative alignment for Slip Road 8 has been proposed, where the slip road connects to the southern side of Victoria Park Road, running along the northern boundary of Victoria Park before dropping into tunnel to cross under Victoria Park Road to connect with the Trunk Road tunnel at a deep enough level below the seabed of the Causeway Bay Typhoon Shelter, such that, similar to the mainline Trunk Road tunnel, permanent reclamation for the slip road is not required.

Trunk Road Lane Configuration

- 6.2.17 As recommended by previous traffic studies at various stages of the project and endorsed by the Expert Panel, a dual 3-lane configuration for the mainline tunnel is required to meet forecast traffic flows along the Trunk Road generally. However, traffic/safety restrictions will affect the Trunk Road lane configuration and will result in additional lanes at some sections of the tunnel. These include:
- no merging or weaving in tunnels (so slip roads entering the Trunk Road tunnel cannot join the mainline lanes but need to maintain their own lane);
 - nearside lanes should be continuous through the mainline tunnel for buses to keep to these lanes.
- 6.2.18 The restriction on merging and weaving in tunnels means that Slip Roads 2 and 8 will join the mainline tunnel as separate lanes, in which case a mainline 3-lane configuration will increase to 4 lanes in the respective directions at those locations. To minimise the extent of reclamation, efforts have been made

to investigate whether the restriction on continuity of nearside lanes for buses and the need to maintain 3 mainline lanes through the tunnel length could be relaxed, without undermining safety or compromising traffic capacity. By allowing buses to use the middle lane as well as the nearside lane, still leaving the offside lane unobstructed for lighter/faster traffic (ie continuity need only be maintained for the middle lane rather than the nearside lane), and by matching the number of mainline lanes closely with the actual traffic demand through the various sections of the Trunk Road, rather than looking at the overall traffic demand, a reduction in the number of lanes can be achieved, with the Trunk Road having the following lane configuration:

- For the eastbound direction – initially three lanes run through CRIII to Slip Road 1, which exits as a lane drop. Two mainline lanes continue through the HKCEC water channel. Slip Road 2 joins the Trunk Road in Wan Chai and provides the third lane again to meet traffic demand along this section, through to the tunnel portal at the IEC connection in North Point.
- For the westbound direction – initially three lanes from the eastern portal in North Point run through Causeway Bay until they are joined by an additional lane from Slip Road 8, on the offside (centre of tunnel). This is so as to enable the Slip Road 8 traffic, which will be limited to passenger cars and light goods vehicles, to continue through to Central rather than having to exit the Trunk Road at Slip Road 3 in Wan Chai. From the Slip Road 8 connection, a short section of the westbound Trunk Road will consist of four lanes, to the exit of Slip Road 3 in Wan Chai, where one lane is dropped, leaving three lanes running westbound through the HKCEC water channel and through CRIII.

6.2.19 This Trunk Road lane configuration provides a more efficient and effective use of traffic lanes, a reduced width of Trunk Road tunnel structure and consequently a reduced extent of reclamation for construction of the Trunk Road.

Ancillary Trunk Road Tunnel Infrastructure

- 6.2.20 Tunnel ventilation buildings are required at around the centre of the Trunk Road tunnel, near the HKCEC, and near the eastern tunnel portal. A tunnel administration building, for the tunnel operator, is required near the eastern tunnel portal, and operator's roads need to be provided at the eastern portal to facilitate emergency and breakdown vehicle access to and from both the eastbound and westbound tunnels.
- 6.2.21 All of these facilities will be located on existing land or on reclaimed land already formed for the Trunk Road tunnel, and therefore no additional reclamation for this ancillary infrastructure is required.

6.3 Ground Level Roads

- 6.3.1 The ground level road layout associated with the Trunk Road Tunnel Variation 1 scheme, is presented at **Annex M**.
- 6.3.2 The major element of the future ground level road system is Road P2, which runs east-west from Central to connections with the existing road network in Wan Chai North. Road P2 is mainly a dual 2-lane primary distributor that serves both local east-west movements and the distribution of north-south traffic movements. Occasionally, additional right-turning pockets are provided at road junctions to ensure the operational efficiency of the junctions.
- 6.3.3 Road P2 also serves to provide access to the existing and new development areas through CRIII and WDII, drawing local traffic away from the Connaught Road Central – Harcourt Road – Gloucester Road corridor.
- 6.3.4 The Road P2 alignment has been planned to run over the top of the Trunk Road tunnel through CRIII and the HKCEC water channel, to the connection with Fleming Road, in order to minimise the overall road "footprint" and the area of land sterilised by highway infrastructure.

- 6.3.5 Along the Wan Chai shoreline, the existing Hung Hing Road in front of the Wan Chai North PTI is realigned to connect with the new Road P2 / Fleming Road junction, but the current Hung Hing Road alignment in front of the Wan Chai Sports Ground is retained. The retention further east of the existing Hung Hing Road alignment means that there is no intrusion by new roads into the new Wan Chai waterfront area.
- 6.3.6 All the new ground level roads and the modifications to the existing ground level road network, is accomplished within existing land areas or (in the case of Road P2) over the top of the Trunk Road tunnel. Therefore, no additional reclamation is required for the ground level roads over and above that already required for the Trunk Road construction.

6.4 Reprovisioning of Affected Facilities

- 6.4.1 The construction of the Trunk Road will affect a number of existing facilities and services along the HKCEC / Wan Chai / Causeway Bay / North Point shoreline, which will need to be reprovisioned.

Wan Chai Ferry Pier

- 6.4.2 The Wan Chai ferry pier is a single storey finger pier with double deck of exit ramps, which at present is used by three ferry services, including two cross harbour ferry services (one between Wan Chai and Tsim Sha Tsui and the other between Wan Chai and Hung Hom) and one Harbour Tour service. The former two are regular services and are well patronised, carrying, respectively, an average of 21,000 and 2,600 passengers daily (as at December 2006). The Harbour Tour service shares the pier facilities and carries 260 passengers per day on average (as at December 2006). There is a present and compelling need to maintain these services. There are no available alternative ferry piers in the vicinity that are suitable for maintaining the operation of these ferry services. The existing Expo Drive East pier is a single berth facility, which is insufficient to handle the two cross harbour ferry services. The existing ferry operator has pointed out that the pontoon-type berthing facilities located along Expo Drive East would not be

acceptable from an operations point of view. As the existing ferry pier will need to be demolished for the Trunk Road construction, it must be reprovided at the new seawall to the north of the existing location, so that it can continue to serve the cross harbour ferry services from Wan Chai North.

- 6.4.3 The new pier will take up an area of the harbour which is not already designated as Trunk Road reclamation. Although the ferry pier will be constructed on piled deck, and not on reclaimed land, its construction could nevertheless be viewed as, in effect, forming 'land' to accommodate a permanent building structure. Under the PHO, the area occupied by the ferry pier would be regarded as affected water area, or 'reclamation', over and above that already required for the Trunk Road construction.

Services and Utilities

- 6.4.4 Affected services such as water mains, stormwater drains, sewers, utility cables, etc, will be relocated within the existing formed land, and no additional reclamation will be required. Drainage outfalls will need to be extended through the new reclamation formed for the Trunk Road construction, but will not themselves require additional reclamation. The existing Wan Chai East sewage outfall will need to be reprovioned, however this is a submarine pipeline that will be constructed below the seabed and therefore does not constitute reclamation. Likewise, the reprovioning of the existing cross harbour watermains, which will be cut off by the Trunk Road tunnel construction, will lie beneath the seabed.
- 6.4.5 Existing cooling water intakes and pumping chambers along the HKCEC seawall, that will be subsumed by the Trunk Road reclamation, will be relocated at existing pumping chambers that have already been provided for this purpose at the north side of the HKCEC Extension, under the earlier Wan Chai Reclamation Phase I project. The existing cooling water intake and pumping chamber for the Sun Hung Kai building, which is located on the Wan Chai seawall, will need to be reprovioned at a similar location behind the new seawall of the Trunk Road reclamation; the smaller pumping chamber requirements and

lesser operational access requirements for this single cooling water facility means that the new pumping chamber can be designed to be located within the available area of land formed for the Trunk Road, therefore no additional reclamation will be required.

- 6.4.6 The salt water pumping station, located at the seawall next to the Wan Chai ferry pier, will also be subsumed by the Trunk Road reclamation. The reprovisioned facility is proposed to be relocated to the existing vacant site at Wan Shing Street, next to the Wan Chai East Sewage Screening Plant. The reprovisioned salt water pumping station therefore does not require reclamation.
- 6.4.7 In summary, with the exception of the Wan Chai ferry pier, all affected facilities along the existing shoreline can be reprovisioned without the need for additional reclamation over and above the reclamation required for the Trunk Road construction.

6.5 Provision for Harbour-Front Enhancement

- 6.5.1 The provisions of the PHO apply to the implementation of harbour-front enhancement ideas in the same way as they do to the implementation of the Trunk Road. Consideration should therefore be given to the need for any additional reclamation that may be required for harbour-front enhancement, which in turn will need to satisfy the Overriding Public Need Test.
- 6.5.2 A Concept Plan has been developed based on the public's visions, wishes and concepts proposed during the first round public engagement exercise of the HER project, the Envisioning Stage. The Concept Plan is at **Annex N**.
- 6.5.3 Harbour-front enhancement ideas, where these are confined to the existing land areas and the areas of reclamation formed for the construction of the Trunk Road, that have been suggested by the public through the Envisioning Stage consultation, have been consolidated with the Trunk Road scheme in the Concept Plan. These have resulted in:

- the development of an “arts and culture precinct” to the west of the HKCEC, for arts and cultural fairs, performance venues, and an expo promenade, etc;
- a “water park precinct” along the Wan Chai shoreline, with landscaped recreational areas and alfresco dining (outdoor cafes, etc.) to add vibrancy to the waterfront;
- a “water recreation precinct” at the ex-PCWA basin for water sports and recreation including public sailing activities, and berthing for visiting sailing ships or yachts;
- a “heritage precinct” at the Causeway Bay Typhoon Shelter, preserving the existing typhoon shelter and taking advantage of the presence of the floating Tin Hau Temple, Noonday Gun, etc, and with a landscaped deck providing an extension of Victoria Park to the waterfront;
- a “leisure and recreation precinct” at the North Point waterfront, with landscaped recreational areas.

6.5.4 The Concept Plan and these harbour-front enhancement ideas have been presented to the Public for their comment and evaluation through the Realisation Stage of the public engagement exercise of the HER. The Concept Plan proposals, and the public views on these, will be presented in a Realisation Stage Public Engagement Report, which will be available for viewing on the HEC website: www.harbourfront.org.hk.

6.5.5 Returning to the need for reclamation, it is noted that the harbour-front enhancement ideas as presented in the Concept Plan do not require any additional reclamation over and above the reclamation required for the Trunk Road construction, and hence do not compromise the provisions of the PHO.

6.6 Summary of Reclamation Requirements of the Trunk Road Scheme

What are the reclamation requirements associated with the preferred Trunk Road scheme ?

- 6.6.1 A Trunk Road scheme has been proposed with the minimum reclamation necessary to meet the overriding need for the Trunk Road, in conformance with the PHO.
- 6.6.2 Reclaimed land will need to be formed along the existing HKCEC, Wan Chai and North Point shorelines, for the construction of the Trunk Road. Modification of the local road network (ground level roads) and reprovisioning of existing affected facilities (other than the Wan Chai ferry pier) can be implemented without the need for additional reclamation over and above that required for the Trunk Road. An attractive waterfront with a new public promenade can be provided within existing land areas and within the new reclamation areas formed for the Trunk Road.
- 6.6.3 The new reclamation will form a narrow strip of land along the Wan Chai shoreline from the interface with the CR III project west of the HKCEC Extension to the ex-PCWA basin, and along the North Point shoreline immediately to the east of the Causeway Bay Typhoon Shelter. In total, an indicative area of around 15 ha of permanent reclamation was found in preliminary studies to be required for the Trunk Road construction. The earlier indicative estimate of reclamation area also made provisional allowance for reprovisioning of affected facilities, most of which have now been determined as not requiring additional reclamation, and allowed for some flexibility in defining the reclamation edge in order to cater for uncertainties of the seawall design.
- 6.6.4 This area of reclamation is examined in more detail in the following section to ensure that it is the minimum necessary for the implementation of the Trunk Road scheme with reclamation requirements that have now been more clearly defined.

7 MINIMUM RECLAMATION

7.1 Introduction

7.1.1 In this section, the area of reclamation is defined more accurately, based on the Trunk Road alignment and configuration that have now been established in more detail, seawall construction details arising from more detailed engineering design, and on the more clearly established reprovisioning requirements, as described in Section 6 above. The resulting reclamation will then be the minimum required by the overriding public need for the Trunk Road, in compliance with the CFA ruling on the PHO.

7.2 Minimum Extent of Reclamation

7.2.1 Details of the extent of reclamation, in respect of the engineering requirements for the construction of the Trunk Road tunnel, reclamation and seawalls, are presented in a Minimum Reclamation Report, a copy of which is appended at **Annex O**.

7.2.2 In the preceding sections, reclamation for the preferred Trunk Road scheme is shown to be required in the area to the west of the HKCEC Extension, in the HKCEC water channel, along the Wan Chai shoreline and along the North Point shoreline. Permanent reclamation is not required in the ex-PCWA basin and in the Causeway Bay Typhoon Shelter. These areas of reclamation are required for the Trunk Road tunnel construction. In addition, there is a need to reprovision the Wan Chai ferry pier, which is considered as 'reclamation' under the PHO. There is no other requirement for reclamation, over and above that for the Trunk Road tunnel construction, for reprovisioning, ground level roads or harbour-front enhancement.

HKCEC West and Water Channel

- 7.2.3 The Trunk Road tunnel structure lies above the seabed in the area to the west of the HKCEC, where it crosses over the MTR Tsuen Wan Line tunnel, and remains above seabed level through the whole of the HKCEC water channel. The extent of reclamation in the area to the west of the HKCEC is set by the extent of seawall protection in front of the tunnel structure, while the HKCEC water channel will need to be filled in to enable the Trunk Road construction.
- 7.2.4 Previous WDII and CRIII proposals included a marine basin between the HKCEC Extension and the CRIII project area, with the seawall at the HKCEC West area curved outwards to tie in with the shoreline as gazetted under the CRIII project. A causeway was proposed across the front of the marine basin.
- 7.2.5 Although the causeway was proposed as a piled structure, it nevertheless affects that area of the Harbour over which it passes. In line with the need under the PHO to reduce the affected harbour area, the causeway has been deleted from the current proposal. With the deletion of the causeway from the current proposal, the extent of reclamation at the northeast corner of CRIII can be reduced, as described in Annex O.
- 7.2.6 The separation between the edge of the Trunk Road structure and the seawall copeline is determined by the width of the seawall structure and its foundations, with the seawall kept clear of the diaphragm walls of the Trunk Road tunnel, for constructability reasons. In compliance with Works Branch Technical Circular (WBTC) No. 3/95, which specifies requirements for Control of Wave Reflection in Victoria Harbour, and in response to public calls to minimise waves in Victoria Harbour to improve safety, the use of wave attenuating seawalls is considered a must. Precast caisson seawall units, similar to those already being used in CRIII, are proposed for WDII. The design of these seawalls has been optimised through physical hydraulic modelling studies undertaken by specialist consultants to meet the limiting requirements for wave reflection.

- 7.2.7 A typical section through the caisson seawall in the HKCEC West area is shown in the Minimum Reclamation Report, in Annex O. Allowing for dredging of soft marine sediments (the typical dredge level is –15mPD in this area, as determined from ground investigation), and maintaining the necessary clearance between the seawall foundation and the diaphragm wall of the Trunk Road tunnel, a distance of 32.5m needs to be maintained between the outer edge of the Trunk Road tunnel and its slip roads, and the seawall copeline, in general. Dredged levels are lower towards the CRIII interface (dredged levels at the eastern end of CRIII are around –18mPD), which means that, moving westwards towards CRIII, the separation between the seawall copeline and the diaphragm wall of the Trunk Road tunnel will increase, to around 37m at the eastern end of CRIII.
- 7.2.8 At the MTR Tsuen Wan Line crossing, the caisson seawall cannot be constructed over the MTR tunnel; instead, a wave absorbing and tunnel protection structure will be incorporated in the piled deck over the MTR tunnel, which will serve both to protect the Trunk Road tunnel structure from ship impact and for wave energy absorption. This wave wall structure, of minimum width around 7m, means that the seawall copeline can be pulled back closer to the Trunk Road tunnel structure, and hence reduce the extent of reclamation at the MTR tunnel crossing point. Special MTR tunnel interface wave walls on piles will be constructed for the seawall adjacent to the MTR tunnel protection zone, to avoid disturbance to the MTR tunnel during construction. These are tied back into the caisson seawalls on either side, with blockwork landing steps providing a transition between the piled wave walls and the gravity caisson seawall units.
- 7.2.9 The area of new WDII reclamation in the HKCEC West area, as defined by this seawall copeline, is 3.7 ha.
- 7.2.10 In the HKCEC water channel, the Trunk Road tunnel structure, together with the proposed NIL tunnel, occupies the entire area of the channel. The whole of the water channel will need to be filled in for the Trunk Road construction. Whilst the NIL will occupy part of the reclaimed water channel, this reclamation is

required for Trunk Road construction and additional reclamation is not required for the NIL tunnel.

- 7.2.11 The area of new WDII reclamation in the HKCEC water channel is 1.6 ha.

Wan Chai Shoreline

- 7.2.12 After crossing over the MTR Tsuen Wan Line, the vertical alignment of the Trunk Road drops down to the crossing beneath the Cross Harbour Tunnel portal, at road level around -30mPD. The Trunk Road tunnel structure would lie above the seabed along this shoreline and therefore requires reclamation for the cut-and-cover tunnel construction.

- 7.2.13 The extent of reclamation along the Wan Chai shoreline is determined primarily by the extent of seawall protection in front of the Trunk Road tunnel structure. As noted above, the use of wave attenuating seawalls is considered a must, and precast caisson seawall units, similar to those currently designed for CRIII, will also be used for the Wan Chai seawall.

- 7.2.14 A typical section through the seawall at the Wan Chai shoreline is shown in the Minimum Reclamation Report, in Annex O. For a typical dredge level of -14mPD in this area, as determined from ground investigation, and maintaining the necessary clearance between the seawall foundation and the diaphragm wall of the Trunk Road tunnel, a distance of 31m needs to be maintained between the outer edge of the Trunk Road tunnel and the seawall copeline (the lesser dimension than for the HKCEC West area due to the less deep dredging requirement along the Wan Chai shoreline).

- 7.2.15 This minimum 31m separation between Trunk Road tunnel and seawall copeline is maintained along most of the Wan Chai shoreline. The seawall copeline follows the curvature of the Trunk Road tunnel edge.

- 7.2.16 A splay in the seawall is incorporated at the corner with Expo Drive East to accommodate the outfall of the drainage Culvert M, which must be extended from Fleming Road through the

reclamation to the new seawall. The splay is curved to enhance flows through this corner and prevent accumulation of pollutants at the culvert discharge area.

- 7.2.17 At the eastern end of the Wan Chai shoreline, the Trunk Road tunnel and its protection layer dips below the seabed just before reaching the existing seawall of the ex-PCWA. Practical and sensible engineering design suggests that the new seawall along the Wan Chai shoreline nevertheless be continued the short distance eastwards until joining the ex-PCWA seawall (ie maintaining generally the width of reclamation along the whole of the Wan Chai shoreline). However, the PHO's minimum reclamation criterion dictates that the seawall be cut back in the area where it is deemed not to meet the overriding need (for the Trunk Road). For water quality reasons, the drainage culvert N must discharge outside the embayment that is created by this cutting back of the seawall (outfalls should not discharge into embayed areas to avoid entrapment of pollutants and consequent deterioration of water quality and odour problems), therefore the seawall is extended eastwards to accommodate the box culvert outfall structure, before the return seawall is introduced. The return seawall is curved to provide a smooth shoreline, also for water quality reasons; this is in order to avoid sharp corners and to enhance tidal flows through the small embayed area that is created, so that pollutants and flotsam are not trapped, which would otherwise give rise to adverse water quality, odour and unsightliness.
- 7.2.18 The extent of reclamation along the Wan Chai shoreline is also determined by the water area occupied by the reprovisioned Wan Chai ferry pier.
- 7.2.19 Existing ferry pier facilities at the Wan Chai shoreline include the Wan Chai (East) ferry pier (which has a plan area of 1,970m²) and the Wan Chai (West) ferry pier (which has a plan area of 450m²).
- 7.2.20 The reprovisioned Wan Chai ferry pier will provide for the continuation of the three ferry services currently operating at the affected site. The new pier, of plan area 2,270m², represents a

reduction in size when compared with the aggregate area of around 2,420m² occupied by the two existing piers.

- 7.2.21 There have been rising expectations among passengers for better facilities at ferry piers. Central Piers No. 7 and 8, which came into service in November 2006, provide facilities for people with disabilities, in accordance with the Disability Discrimination Ordinance, and facilities for different operators to have shared use of the pier (eg separate ticketing offices and pier offices). Each ferry pier occupies a plan area of around 2,270m². Passengers will expect the newly reprovisioned pier in Wan Chai be of similar standard, with facilities comparable to those available at the Central Piers No. 7 and 8.
- 7.2.22 The reprovisioned ferry pier is the minimum size required to meet the above-mentioned needs.
- 7.2.23 The area of new reclamation along the Wan Chai shoreline, as defined by the seawall copeline, is 3.9 ha. The area of the reprovisioned ferry pier structure is around 0.2 ha. Therefore, altogether, the area of new reclamation at Wan Chai is 4.1 ha.

North Point Shoreline

- 7.2.24 To the east of the Causeway Bay Typhoon Shelter, the Trunk Road rises up above seabed level to a ground level tunnel portal, and then rises on elevated road structure to connect with the existing IEC. The vertical alignment of the Trunk Road in this area is determined by ensuring that the tunnel is at a low enough level through the adjacent typhoon shelter to avoid the need for reclamation there, but then rising as quickly as possible (at a maximum tunnel gradient of 3%) to ground level at North Point. From the tunnel portal, the Trunk Road rises to connect with the existing IEC, at a level of +15mPD, near City Garden. Although the existing formed land area is occupied as much as possible, by keeping the Trunk Road alignment as close as possible to the existing IEC structure foundations, the tunnel structure will nevertheless extend beyond the existing seawall and the existing area of land will therefore need to be widened.

- 7.2.25 Similar to above, the use of wave attenuating seawalls is considered a must, and precast caisson seawall units, similar to those currently designed for CRIII, will be used for the North Point seawall.
- 7.2.26 Typical sections through the seawall at the North Point shoreline are shown in the Minimum Reclamation Report, at Annex O. For a typical dredge level of -14mPD in this area, and maintaining the necessary clearance between the seawall foundation and the diaphragm wall of the Trunk Road tunnel, a distance of 31m needs to be maintained between the outer edge of the Trunk Road tunnel and the seawall copeline.
- 7.2.27 This minimum 31m separation between Trunk Road tunnel and the seawall copeline is maintained along the entire length of North Point shoreline. The eastern limit of the reclamation is determined by the provision of a 1.5m headroom clearance beneath the bridge abutment as the Trunk Road rises onto elevated bridge structure, for maintenance purposes. The resulting 15m separation between the abutment and the seawall copeline is occupied by the caisson seawall structure, which must be set in front of the piled foundations of the abutment.
- 7.2.28 The area of new reclamation along the North Point shoreline, as defined by this seawall copeline, is 3.3 ha.
- 7.2.29 As noted earlier when examining the flyover option for the Trunk Road, new flyover structures over water are considered to result in affected water area which may be equated to “reclamation” under the PHO. At the eastern end of the Trunk Road, flyover structures will tie into the existing IEC. The area of new flyover structures over water is 0.4 ha. Together with the area of land formation, the total affected area of the harbour in respect of the PHO along the North Point shoreline is 3.7 ha.

7.3 Summary of Minimum Reclamation Requirements

Is this the minimum area of reclamation ?

7.3.1 The minimum reclamation required in the area to the west of the HKCEC Extension, in the HKCEC water channel, along the Wan Chai shoreline and along the North Point shoreline is summarised as follows:

- (i) HKCEC West : 3.7 ha
- (ii) HKCEC Water Channel : 1.6 ha
- (iii) Wan Chai Shoreline: 4.1 ha
- (iv) North Point Shoreline : 3.3 ha⁴

7.3.2 In total, an area of 12.7 ha of reclamation (in addition to an area of 0.4 ha of affected water area by flyover structures) is needed to meet essential engineering requirements for construction of the Trunk Road. This is considered to be the minimum extent of reclamation required for implementation of the Trunk Road and associated reprovisioning requirements.

7.3.3 The reduction from the previous indicative estimate of 15 ha of reclamation under the earlier preliminary studies arises mainly from a smaller reclamation area at HKCEC West due to the modification of the interface with CRIII, a smaller reclamation area at the Wan Chai shoreline by cutting back the seawall at the eastern end, a smaller reclamation area at the North Point shoreline which is now calculated based on more precise dredge levels determined using recently available site investigation data, and by not having to provide additional reclamation for reprovisioning of facilities such as cooling water pumping chambers, salt water pumping station, etc.

⁴ This area excludes the affected water area by flyover structures (0.4 ha); the total affected area of the harbour under the PHO at the North Point shoreline is 3.7ha.

8 CONCLUSIONS

8.1 Overriding Public Need for the Trunk Road

- 8.1.1 The first, and essential, part of the test laid down by the CFA ruling on compliance with the PHO, is: “is there an overriding public need for the Trunk Road?”
- 8.1.2 The existing east-west corridor (Connaught Road Central – Harcourt Road – Gloucester Road) serving the CBD on Hong Kong Island is already operating beyond its capacity, as can be observed on site. Previous and recent strategic transport studies have predicted further increase in traffic demand along the east-west corridor, and confirmed the need for a parallel east-west Trunk Road to avoid more extensive and frequent traffic congestion, and even gridlock, on the road network.
- 8.1.3 A district traffic study has confirmed that a dual 3-lane Trunk Road, together with intermediate slip roads, is required to divert traffic away from the existing east-west corridor and to provide adequate relief to the corridor and the local road network.
- 8.1.4 The need for the Trunk Road has also been confirmed by the Expert Panel on Sustainable Transport Planning and Central-Wan Chai Bypass. Among the package of measures recommended, the Expert Panel recommends the construction of a bypass as a medium-term solution to tackle the problem of deteriorating traffic congestion in the Central and Wan Chai area. The Expert Panel considers that the Trunk Road is essential to improve the reliability of the road network.
- 8.1.5 The conclusion is, therefore, that the need for the Trunk Road has been clearly established through traffic and transport studies, and the need for the Trunk Road has been confirmed by the Expert Panel.
- 8.1.6 Is there an overriding public need for the Trunk Road? The findings of the traffic and transport studies, and of the Expert Panel, demonstrate conclusively the compelling and present need for the Trunk Road.

8.2 The Need for Reclamation

- 8.2.1 Having established the need for the Trunk Road, is there any reasonable alternative to reclamation (ie “no reclamation” options)?
- 8.2.2 All possible alignments for the Trunk Road, including suggestions from the public, have been examined, taking into account land use and infrastructural constraints, with a view to determining if there are any that do not require any reclamation for the Trunk Road construction. It is found that the feasible Trunk Road routing is along the foreshore of Wan Chai and Causeway Bay.
- 8.2.3 However, foreshore alignments do require reclamation for Trunk Road tunnel construction at the western end of WDII where the Trunk Road tunnel crosses over the MTR Tsuen Wan Line, and at the eastern end of WDII where the Trunk Road tunnel must rise to ground level for the connection with the elevated IEC, at least.
- 8.2.4 Alternative Trunk Road ideas that have been proposed to avoid reclamation are found to be not feasible, or would result in an even greater area of reclamation or affected area of the harbour.
- 8.2.5 Is there any “no reclamation” option? After exhaustive investigation into the need for reclamation, it is concluded that there is no feasible “no-reclamation” alignment for the Trunk Road. It must be accepted that at least some reclamation will be required for the Trunk Road construction at the western and eastern ends of the Trunk Road through WDII.

8.3 Minimum Reclamation Required to Meet the Overriding Public Need

- 8.3.1 A feasible scheme that meets the overriding need for the Trunk Road must also be demonstrated to have the minimum extent of reclamation required to meet the overriding need.
- 8.3.2 A Trunk Road scheme has been developed that satisfies the traffic and functional requirements for the Trunk Road in

meeting the overriding public need, and affects the least area of the Harbour. The scheme also accommodates harbour-front enhancement ideas that have been proposed by the Public, and the scheme has the broad support of the Public.

- 8.3.3 Trunk Road Tunnel Variation 1, as described in Section 6.2, affects the minimum area of the Harbour and serves best to protect and preserve the Harbour, among all the options that have been assessed. Overall, Trunk Road Tunnel Variation 1 is considered the best option in complying with the PHO. This option has clearly expressed support as the preferred Trunk Road scheme, following extensive consultations with various public, advisory and relevant statutory bodies. Trunk Road Tunnel Variation 1 has been endorsed by the HEC Subcommittee on WDII Review as the basis for the preparation of the Concept Plan for the WDII project.
- 8.3.4 Construction of this Trunk Road scheme will, though, require reclamation in the areas to the west of the HKCEC, through the HKCEC water channel, along the Wan Chai shoreline and along the North Point shoreline. Permanent reclamation is not required in the ex-PCWA basin or in the Causeway Bay Typhoon Shelter.
- 8.3.5 Is this the minimum area of reclamation required by the overriding public need? Detailed examination of the engineering requirements in respect of highway geometric design and construction of the Trunk Road tunnel, reclamation and seawalls, and reprovisioning requirements, has been carried out to accurately determine the minimum extent of reclamation. In total, an area of 12.7 ha of reclamation (in addition to an area of 0.4 ha of affected water area by flyover structures) is needed to meet essential engineering requirements for construction of the Trunk Road. This is the minimum reclamation required to meet the overriding public need for the Trunk Road.