

**CONSOLIDATION OF HARBOUR-FRONT
& TRUNK ROAD IDEAS**

Trunk Road Alignments & Harbour-Front Enhancement

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REPORT TO THE HEC SUB-COMMITTEE ON WDII REVIEW ON TRUNK ROAD ALIGNMENTS & HARBOUR-FRONT ENHANCEMENT

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1 INTRODUCTION

1.1 Background

- 1.1.1 The Sub-committee on Wan Chai Development Phase II (WDII) Review of the Harbour-front Enhancement Committee convened a 'Envisioning Stage – Consolidation Forum', on 12 November 2005, to conclude the public engagement activities of the Envisioning Stage of the 'Harbour-front Enhancement Review – Wan Chai, Causeway Bay and Adjoining Areas' (HER). 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. The forum also provided opportunities to involve the public in consolidating these views before proceeding with the preparation of the Concept Plan(s) for the development and enhancement of the harbour-front of Wan Chai, Causeway Bay and the adjoining areas.
- 1.1.2 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 Island Eastern Corridor (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.
- 1.1.3 A number of Trunk Road options have been reviewed together with harbour-front enhancement suggestions put forward by the public, for the derivation of consolidated harbour-front and Trunk Road ideas that would then form the basis of the preparation of Concept Plan(s). In reviewing these various ideas, a number of issues have arisen in respect of Trunk Road alignments and form of construction, and associated requirements of reclamation, the impacts of ground level roads and slip roads on harbour-front planning intentions, and harbour-front enhancement ideas to be taken on board to achieve the public's vision for a high quality and vibrant waterfront. These issues need to be addressed by the Sub-committee on WDII Review in the next stage of the HER project, the Realization Stage.

1.2 The CFA Judgement and WDII Review

- 1.2.1 The Court of Final Appeal (CFA) handed down its judgement on 9 January 2004 in respect of the judicial review on the Draft Wan Chai North OZP (S/H25/1).
- 1.2.2 According to the CFA judgement, the presumption against reclamation specified in the Protection of the Harbour Ordinance (PHO) can only be rebutted by establishing an overriding public need for reclamation. This need (ie the economic, environmental and social needs of the community) must be a compelling and present need with no reasonable alternative to reclamation (all circumstances including the economic, environmental and social implications should be considered). 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 a last resort, or something which the public cannot do without.

1.2.3 Following the CFA judgement, and in response to a request by the Town Planning Board, Government has undertaken to conduct a planning and engineering review of the development and reclamation proposals for the WDII project (the ‘WDII Review’). WDII proposals, including the Trunk Road, must comply with the overriding public need test.

1.2.4 The Harbour-front Enhancement Committee (HEC) was established in May 2004 to advise the 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 an overview to harbour-front planning, the HEC has established a number of harbour planning principles which should be followed when examining Trunk Road and harbour-front enhancement schemes. These are:

- preserving Victoria Harbour as a natural, public and economic asset
- Victoria Harbour as Hong Kong’s identity
- a vibrant harbour
- an accessible harbour
- maximising opportunities for public enjoyment
- integrated planning for a world-class harbour
- sustainable development for the harbour
- early and ongoing stakeholder engagement.

1.2.5 The HEC has set up a Sub-committee, namely the Sub-committee on WDII Review, to advise on the WDII Review. The 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 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.

1.3 HER Project and Status

1.3.1 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 Outline Zoning Plan (OZP) 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 Sustainability Principles and Indicators as a basis for the development of the Concept Plan(s)

- (ii) “Realization Stage” Public to evaluate Concept Plan(s) to arrive at consensus
- (iii) “Detailed Planning Stage” Ensure draft OZP and draft RODP reflect consensus.

1.3.2 The Envisioning Stage was formally launched on 22nd 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 have been prepared and agreed through the public consultation process; these agreed sustainability principles and indicators will be used to evaluate the Concept Plan(s) to be developed in the Realization Stage.

1.3.3 Following the conclusion of the public engagement activities of the Envisioning Stage, with the ‘Envisioning Stage – Consolidation Forum’, the various issues that have been raised by participants during the Envisioning Stage consultation, in respect of Trunk Road alignments and harbour-front enhancement ideas, will need to be addressed by the Sub-committee on WDII Review as part of the process of consolidating harbour-front and Trunk Road ideas, that would then form the basis of the preparation of the Concept Plan(s) in the Realization Stage. These Concept Plans, for the development and enhancement of the harbour-front under the ambit of the WDII Review, will be created for evaluation and consensus by the public, using the HEC’s harbour planning principles and the sustainability principles and indicators that have been developed during the Envisioning Stage.

1.4 Need for the Trunk Road

1.4.1 The existing east-west corridor (Connaught Road Central / Harcourt Road / Gloucester Road) serving the Central Business District 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.

1.4.2 A district traffic study has confirmed that a dual 3-lane Trunk Road (or Central-Wan Chai Bypass), 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. The need for the Trunk Road has also been confirmed by the Expert Panel on Sustainable Transport Planning and Central-Wan Chai Bypass (‘Expert Panel’), which consists of independent local and overseas experts in the relevant fields.

1.4.3 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 for improving the network reliability of the east-west link. Reference can be made to ‘Report of the Expert Panel on Sustainable Transport Planning and Central-Wan Chai Bypass’ (‘Report of the Expert Panel’).

1.4.4 The need for the Trunk Road has therefore been clearly established. What is required now is to take a holistic approach to the planning of the harbour-front, where waterfront land use planning is examined together with the planning of essential transport infrastructure, in line with the principle of sustainable development and the HEC's harbour planning principles. One of the primary concerns in this process is to start off with an acceptable Trunk Road scheme: one that meets functional traffic requirements; is practically feasible to implement; that can avoid reclamation or, if not, then minimise reclamation, in compliance with the PHO and the CFA ruling on the presumption against reclamation in respect of this ordinance.

1.5 Envisioning Stage Report

1.5.1 The 'Harbour-front Enhancement Review – Wan Chai, Causeway Bay and Adjoining Areas, Envisioning Stage Public Engagement Report, March 2006' ('Envisioning Stage Report') summarises the public comments received during the Envisioning Stage public engagement exercise. These include input and feedback from public forums, community charrettes, opinion surveys, written submissions, the Expert Panel Forum and the Consolidation Forum, as well as parallel discussions with District Councils, Town Planning Board, Legislative Council and the HEC Sub-committee on WDII Review.

1.5.2 The conclusions of the Envisioning Stage Report are extracted and repeated here for reference:

- ♦ In the various public engagement activities in the Envisioning Stage, there is obvious consensus among the public on the need for enhancement of the harbour-front in the following aspects. Indeed, the public urges the Government to take immediate actions wherever possible to enhance the quality and the usage of the existing harbour-front.
 - (a) Increase vibrancy through provision of facilities for diverse use on land and on the water.
 - (b) Enhance connectivity between the harbour-front and the hinterland, and continuity of the harbour-front.
 - (c) Ensure land and marine use compatibility in terms of function and design.
 - (d) Enhance identity of Hong Kong by conserving natural and cultural heritage.
 - (e) Harbour is the greatest natural heritage and minimize harbour reclamation is the key.
 - (f) Enhance visual amenity, landscape and quality of space with emphasis on greening and flexible use of space and less building structures.
 - (g) Enhance environmental quality with particular attention on the existing water quality in the typhoon shelter and the form of CWB in that more support goes to tunnel form.
 - (h) Devise an acceptable and sustainable solution for the present traffic and infrastructure issues.

- There are many specific suggestions for achieving the above enhancement objectives and a consolidated set of sustainability principles and indicators has been developed through the participation of the public.
- There is also majority support for the need to improve the traffic conditions along the Connaught Road/ Gloucester Road Corridor for a comprehensive harbour-front enhancement. The Government has put up a strong case for building the CWB as a fundamental solution with traffic management schemes as complementary measures. There are divided views among the public on the absolute need for the CWB. However, the results of the opinion surveys show a clear majority in favour of constructing the CWB together with traffic management measures. On this issue, HEC and the Government organized a Transport Expert Forum on 3 September 2005 to have an impartial and in-depth deliberation, from which a conclusion based on the majority view of the expert panel has been drawn. The Expert Panel was provided with detailed traffic data and models. No detailed road design information identifying the impact on harbour-front land use and harbour-front enjoyment of the various options was available at this stage.
- The expert panel concludes that doing nothing is not sustainable, and the provision of the CWB alone or implementing road pricing alone is not sustainable either. The panel observes that long term sustainability warrants the implementation of both electronic road pricing and the construction of the CWB. To facilitate access to the waterfront and the enjoyment thereof by the public should be made a priority in the development of the CWB. The panel has put forward short-term, medium-term and long-term measures to achieve a sustainable transport strategy. Of particular reference to the current concept planning for the WDII Review, the panel's recommendations include:
 - (a) Take a holistic approach towards transport/ land use planning and fortify the simultaneous integration of land use and transport planning, placing due emphasis on the limitation of excessive transport infrastructural development in heavily congested areas.
 - (b) Support the construction of CWB as an essential link in the strategic road network.
 - (c) Support the construction of slip roads around the HKCEC and Victoria Park Road/Gloucester Road/Hing Fat Street.
 - (d) Recognize the need for Road P2 as an important *ad interim* measure in addressing traffic congestion in the Central reclamation area before CWB comes about. Suggest Government to 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 reserve area in the meantime.
 - (e) Improve pedestrian connections to the harbour-front in the interim and long terms. Enhance the Victoria harbour-front and properly address the visual and environmental impacts and social concerns arising from the construction of the multi-billion dollar Bypass, in addition to improving pedestrian access.

(f) Seize the opportunities to rationalize multi-modal public transport routes and improve connectivity with rail.

- The public mostly provided their views and proposals for the waterfront areas between the HKCEC and the IEC. But there were also views expressed for the waterfront areas west of the HKCEC including the CRIII areas. They included the importance of sustainable land use/ transport planning in that a review on the intensity of planned land uses on CRIII and Tamar was called for; a formal waterfront at CRIII as compared with an informal waterfront at WDII; and depressing existing waterfront access roads to enhance pedestrian connectivity to the harbour, etc.

1.5.3 The recommendations of the Envisioning Stage Report are also extracted and repeated here for reference:

- Fortify the integration of land use and transport planning, placing due emphasis on the limitation of excessive transport infrastructural development in heavily congested areas.
- Prepare Land Use Concept Plans based on at least two highway options, viz, tunnel and flyover with minimum reclamation and harbour-front land use possible for each option or option variations. It is not necessary to have a Concept Plan without the CWB. While the public's concern over the visual impact of a flyover option is fully appreciated, it is not recommended to be dropped at this stage until more comprehensive information on the flyover option is provided at the next stage.
- With regard to provision of P2, slip roads, tunnel portals and other surface infrastructure, more details should be provided including engineering details, surface land occupied, reclamation required, pedestrian connectivity and visual impact. The traffic impact for the different options should also be covered.
- In preparing the Concept Plans, the Government should take full account of the sustainability principles and indicators (*as presented in the Envisioning Stage Report*), and the public's suggestions on the harbour-front enhancement measures, activity nodes and the possible land uses within the nodes as reported in previous sections and summarized in Figures 3.2 to 3.4 (*of the Envisioning Stage Report*). If there are technical problems for certain ideas, clear explanations should be provided.
- With regard to the heliport proposals, the government's 2-pad proposal, and the Regional Heliport Working Group's 4-pad proposal may be incorporated as inserts for the Concept Plans.
- To assist the evaluation of the Concept Plans by the public in the Realization Stage, it is necessary to provide information for the sustainability indicators particularly those which can be expressed in quantitative terms, e.g. construction cost, operation cost, reclamation area, reduction/increase in harbour-front land area required for

surface infrastructure, building height and building bulk, open space, pollution levels, etc. Qualitative evaluation of other indicators should also be presented.

- It is also essential to help the public to visualize the concepts through perspective drawings, physical models and/or computer animations.

1.6 Purpose of this Report

- 1.6.1 In moving forward to the development of the Concept Plan(s) in the Realization Stage of the HER project, a number of issues relating to Trunk Road alignments and form of construction, requirements for reclamation, impacts of highway infrastructure on harbour-front planning intentions, and harbour-front enhancement ideas to be taken on board, raised during the Envisioning Stage consultation, need to be addressed by the Sub-committee on WDII Review.
- 1.6.2 This Report to the HEC Sub-committee on WDII Review outlines the appraisal of these issues and the conclusions in respect of the feasibility or acceptability of Trunk Road alignments and harbour-front enhancement ideas.

2 TRUNK ROAD ROUTE ASSESSMENT

2.1 Alignment Constraints through the WDII Project Area

- 2.1.1 The derivation of Trunk Road alignments through the WDII project area is constrained by the mainline connections at either end to existing or committed road alignments, slip road connections in Wan Chai North and Causeway Bay, existing cross harbour tunnels such as the MTR Tsuen Wan Line and the Cross Harbour Tunnel (CHT), proposed rail infrastructure such as the MTR North Island Line (NIL) and the Shatin to Central Link (SCL), services infrastructure such as electricity sub-stations and sewage treatment plants, and existing development and land uses along the northshore.
- 2.1.2 Affected facilities such as water mains, sewage outfalls, cooling water systems, drainage outfalls and ferry piers, etc, can be reprovisioned and, as such, should not be regarded as fixed or immovable constraints to the Trunk Road alignment. However, cross harbour road and rail tunnels, major infrastructure development such as sewage treatment works and electricity sub-stations, and existing developments such as the Hong Kong Convention and Exhibition Centre (HKCEC), do form physical barriers around which the Trunk Road will need to be routed.
- 2.1.3 The following paragraphs outline some of the major constraints to the Trunk Road alignment. These are also highlighted in **Figure 2.1**.

Trunk Road Connections

- 2.1.4 At the western end of the WDII project area, connection is required to the Trunk Road tunnel which will be constructed under Central Reclamation Phase III (CRIII). The optimal Trunk Road alignment through CRIII has already been determined (reference can be made to 'A Review of Central Reclamation Phase III by applying the Court of Final Appeal's "Overriding Public Need Test", April 2004'). 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 adjacent 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.
- 2.1.5 To the east of the Causeway Bay Typhoon Shelter (CBTS), the Trunk Road needs to connect to the existing elevated IEC road structure at a road level between +12mPD and +15mPD. The Trunk Road must therefore rise onto elevated road structure to make this connection.
- 2.1.6 These connecting constraints mean that all schemes for the Trunk Road alignment through the WDII project area will start off in tunnel at the western end and end up as elevated road structure at the eastern end.

Slip Road Connections

- 2.1.7 One of the key issues for the Trunk Road alignment is to ensure adequate connectivity with the local road network. If the Trunk Road is to achieve its purpose in serving as a strategic east-west link, by getting traffic out of the currently built-up and congested northshore urban area, it must also ensure adequate access to the Wan Chai and Causeway Bay areas. Otherwise, if traffic is unable to get onto or off the Trunk Road at suitable locations, the new road cannot be properly utilised and will not be able to relieve congestion along the Connaught Road Central / Harcourt Road / Gloucester Road corridor.
- 2.1.8 The following slip road connections (illustrated indicatively in Figure 2.1) 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 the eastbound Trunk Road to Wan Chai North, allowing traffic from the Western and Central areas to Wan Chai and HKCEC to bypass Connaught Road Central, Harcourt Road and Gloucester Road ('Slip Road 1');
 - slip road from Wan Chai North to the eastbound Trunk Road, allowing traffic from the Admiralty area and Wan Chai to Island East to bypass Gloucester Road and Victoria Park Road ('Slip Road 2');
 - slip road from the westbound Trunk Road to Wan Chai North, allowing traffic from Island East to Wan Chai to bypass Victoria Park Road and Gloucester Road ('Slip Road 3');
 - slip road from Victoria Park Road to the westbound Trunk Road, allowing traffic from North Point, Fortress Hill, Tin Hau and Tai Hang areas to Central to bypass Victoria Park Road, Gloucester Road and Harcourt Road ('Slip Road 8').
- 2.1.9 The Trunk Road form of construction, and alignment and level, through Wan Chai North and Causeway Bay must facilitate the provision of these slip roads.

MTR Tsuen Wan Line

- 2.1.10 The Trunk Road and reclamation at the west side of the HKCEC Extension must not impose any loads on, or cause any significant movement of, the existing MTR Tsuen Wan Line tunnel. Tunnelling under the MTR Tsuen Wan Line would need to be at sufficient depth (around -60mPD) to avoid disturbance to the existing ground and movement of the MTR tunnel; this depth for the Trunk Road cannot be achieved without exceeding tunnel gradients limitations from the fixed connection to the existing road network at the Central Interchange; conversely, the Trunk Road connection to the Central Interchange and the existing Rumsey Street Flyover cannot be achieved for the resulting deep Trunk Road tunnel under the MTR tunnel. (Further clarification is provided in Section 3.)
- 2.1.11 Moreover, a deep Trunk Road tunnel beneath the MTR Tsuen Wan Line would mean that the slip road connections in Wan Chai North (Slip Roads 1, 2 and 3) cannot be

provided for this scheme, due to gradient limitations; the slip roads cannot rise to ground level from this depth without exceeding maximum permissible road gradients.

- 2.1.12 Instead, Trunk Road schemes that cross over the top of the MTR tunnel need to be pursued. A piled Trunk Road tunnel structure that can span across the MTR tunnel provides a feasible solution. In this case, the Trunk Road tunnel structure will lie completely above the seabed level, with a road level of around -7mPD (the MTR tunnel being an immersed tube tunnel that lies just below the seabed). 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.

Cross Harbour Tunnel

- 2.1.13 The CHT 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 CHT is considered to be particularly fragile and susceptible to damage due to movement, particularly when the age of the CHT is taken into account. Repair work would be extremely difficult. Given the susceptibility of the old CHT 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 passing beneath the immersed tube section of the CHT will be very (indeed, unacceptably) high. Movement of the CHT structure leading to failure of the waterproofing membrane or the structure itself would have major consequential impacts to the high volumes of traffic through the tunnel. The resulting traffic congestion on Hong Kong Island and in Kowloon would be severe, to the extent that any damage whatsoever to the CHT would give rise to an unacceptable situation.

- 2.1.14 On the other hand, an elevated Trunk Road crossing over the CHT would be acceptable from a construction risk point of view, or else tunnelling under the portal and approach ramp of the CHT may be possible within manageable bounds of construction risk. In this case, though, the Trunk Road tunnel would need to take into account the rock anchors that tie down the approach ramp structure to the underlying rock, which are used to prevent uplift caused by hydrostatic forces (flotation). If these rock anchors were to be released due to tunnelling operations below, without any compensating holding down loads, then the CHT approach structure would fail under the action of uplift pressures. The rock anchors, based on available as-built information, are installed to a depth of around -17mPD . Tunnelling through the anchorage zone would be technically complex and would involve a high degree of risk. Tunnelling under the CHT approach structure should be deep enough to avoid conflict with these anchors; to achieve this, the Trunk Road level would need to be at around -30mPD for a tunnel box section, or deeper for a bored tunnel section.

NIL and SCL Rail Tunnels

- 2.1.15 The NIL is a proposed extension of the MTR system along the northshore of Hong Kong Island, and allowance needs to be made for the NIL alignment in planning for the Trunk Road. The alignment for the NIL is proposed 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 with 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.

- 2.1.16 Allowance also needs to be made for the proposed fourth harbour rail crossing of the SCL. The SCL will be an immersed tube tunnel from Hung Hom across the Harbour (alternative easterly and westerly alignments have been proposed) to the breakwater of the CBTS, from where the tunnel will change to bored tunnel under the typhoon shelter, for both alternative alignments, but with a possible Causeway Bay North Station under Gloucester Road in front of the Excelsior Hotel for the easterly alignment. From there, the SCL alignment will run under the Wan Chai Sports Ground to an Exhibition Station located in Harbour Road, then continuing westwards under Harbour Road and Fenwick Pier Street to Admiralty Station.

Existing Services Infrastructure

- 2.1.17 The major services infrastructure of concern in the Wan Chai North area is Hong Kong Electric's Wan Chai Zone Sub-Station on Hung Hing Road and new Electricity Receiving Station (under construction) on Wan Shing Street, and Drainage Services Department's Wan Chai East Sewage Screening Plant on Hung Hing Road.
- 2.1.18 The Electricity Sub-Station and Receiving Station have closed-spaced bored piled foundations down to founding levels of around -35mPD, which will obstruct any Trunk Road tunnel alignments running beneath these facilities. The Trunk Road would need to be at a level of around -60mPD to clear the foundation piles; this level is too deep for a Trunk Road tunnel to reach, after the high level crossing over the top of the MTR Tsuen Wan Line. In addition, it would not be possible to provide Slip Roads 2 and 3 to Wan Chai North, as the slip roads cannot rise to ground level from this depth without exceeding maximum permissible road gradients.
- 2.1.19 The Sewage Screening Plant comprises a pumping station with a well that extends down to a level of around -23mPD, and which is then founded on bored pile walls down to a founding level of around -35mPD, as well as screening plant facilities on bored pile foundations which also extend down to founding levels of around -35mPD. As for the case with the Electricity Sub-Station, these foundations will obstruct any Trunk Road tunnel alignments running beneath the Sewage Screening Plant site.
- 2.1.20 Reprovisioning these major electricity supply and sewerage facilities would involve locating suitable alternative sites in the already congested northshore area and then the relaying of all the high voltage feeder cables in Wan Chai and the reconstruction of sewage pipelines that currently gravitate to the existing sewage plant, through the congested streets of Wan Chai. This would incur major costs to the community, and result in massive disruption to these essential services and to the whole of the Wan Chai business and residential district, and is considered to be impractical and unreasonable, even if alternative sites could be found (identifying suitable relocation sites will be difficult). Therefore, relocating the electricity supply and sewerage facilities, in order to

remove their constraint on the Trunk Road alignment, is considered not practically feasible from land use, engineering and land administration points of view.

Existing Development and Land Uses

- 2.1.21 Major development in Wan Chai North includes the HKCEC Phase I and the HKCEC Extension, Grand Hyatt Hotel, Arts Centre, Telecom House, Shui On Centre, Wanchai Tower, Revenue Tower, Immigration Tower, Central Plaza, Renaissance Harbour View Hotel, Great Eagle Centre, Harbour Centre, China Resources Building, Causeway Centre and Sun Hung Kai Centre.
- 2.1.22 These buildings all have basement level development and piled foundations that extend down to bedrock (which varies around –30mPD to –40mPD in this area). This existing development therefore forms a physical barrier to the Trunk Road.
- 2.1.23 Similarly, existing development along the south side of Gloucester Road forms a barrier to Trunk Road alignments all the way through to Causeway Bay.
- 2.1.24 At Kellett Island, the Royal Hong Kong Yacht Club (RHKYC) is an existing land use which should be avoided, if possible (the RHKYC clubhouse is considered by the Antiquities and Monuments Office to be a building of historical significance).

2.2 Trunk Road Route Corridors through WDII Project Area

- 2.2.1 Three possible corridors can be considered when examining potential Trunk Road alignments between the CWB in CRIII and the IEC to the east of the CBTS (**Figure 2.2**):
- (i) An ‘offshore corridor’, where the Trunk Road alignment turns seawards (northwards) after the connection with the CWB 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 CWB 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 CBTS either as tunnel, at-grade or elevated road, joining up with the existing IEC at the eastern end of the typhoon shelter (or further to the east of the typhoon shelter along the North Point shoreline).

2.3 Offshore Alignments

- 2.3.1 Offshore Trunk Road alignments face a major physical constraint in the form of the HKCEC Extension. Design standards limit the minimum horizontal curvature, which means that, from the connection with the CWB tunnel in CRIII, the Trunk Road will not be able to turn northwards sharply enough to avoid the HKCEC Extension building or its foundations (see **Figure 2.3**).

- 2.3.2 The HKCEC Extension building presents a physical obstruction to elevated Trunk Road alignments, as the road cannot rise steeply enough to clear the roof of the HKCEC Extension (at +71mPD); therefore an elevated offshore alignment is not possible.
- 2.3.3 Keeping the Trunk Road in tunnel is the obvious preference, but, as the Trunk Road will first need to cross over the existing MTR Tsuen Wan Line, the high level of the Trunk Road tunnel (above water level) at this point means that it will not be able to drop down fast enough to avoid conflict with the basement of the HKCEC Extension. The top of the Trunk Road tunnel structure when it reaches the HKCEC Extension building will be at a level of around -0.5mPD while the level of the HKCEC Extension basement is at around -1mPD, then the HKCEC Extension foundation piles extend down to a founding level of around -30mPD. Therefore, Trunk Road tunnel alignments will conflict physically with the HKCEC Extension and its foundations.
- 2.3.4 Further eastwards, an offshore Trunk Road tunnel will need to pass beneath the CHT. As discussed in para 2.1.13 above, construction risk for any Trunk Road tunnel scheme crossing the immersed tube section of the CHT will be very high, with unacceptable consequences in the (likely) event of damage to the CHT.
- 2.3.5 Putting aside the risk of damage to the CHT, an offshore Trunk Road tunnel will need to be constructed as a deep bored tunnel in order to pass beneath the CHT. This will mean that the slip road connections in Wan Chai North (Slip Roads 1, 2 and 3) and in Causeway Bay (Slip Road 8) cannot be provided for this scheme.
- 2.3.6 The high construction risk of tunnelling across the CHT, the inability of providing the necessary slip road connections and, primarily, the physical obstruction of the HKCEC Extension make the Trunk Road offshore alignments not feasible.

2.4 Inland Alignments

- 2.4.1 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 development and infrastructure, and consideration of inland alignments is therefore confined to tunnel options.
- 2.4.2 **Figure 2.4** shows a Trunk Road tunnel turning inland (southwards) immediately after the connection with CRIII.
- 2.4.3 After turning southwards from the connection with the tunnel constructed under CRIII, and crossing over the existing MTR Tsuen Wan Line, the Trunk Road will be obstructed by building development in Wan Chai North. Due to the high level of the Trunk Road as it passes over the MTR tunnel and Trunk Road gradient limitations, the inland tunnel alignment will conflict with the basement and foundations of the HKCEC Phase I and the Grand Hyatt Hotel (the Trunk Road tunnel cannot drop down fast enough after crossing the MTR Tsuen Wan Line to avoid conflict with the foundations of these buildings). Thereafter, the Trunk Road tunnel will also conflict with the China Resources Building, Causeway Centre and Sun Hung Kai foundations.

- 2.4.4 As it turns inland after passing over the MTR Tsuen Wan Line, the Trunk Road will also need to cross the NIL rail tunnel, but both the Trunk Road and the NIL tunnels will be at the same level at this location, as both will cross over the MTR Tsuen Wan Line at a similar (adjacent) location. Therefore, either the presence of (or allowance for) the NIL will obstruct the Trunk Road inland alignment, or the implementation of a Trunk Road inland alignment will mean that the NIL cannot be constructed.
- 2.4.5 Further east, in Causeway Bay, the Trunk Road inland alignment will need to run under Gloucester Road where it will conflict with both the NIL and SCL tunnels and the proposed Causeway Bay North station. Alignments further south of Gloucester Road, to avoid this conflict, are not possible due to the wall of existing development on the south side of Gloucester Road.
- 2.4.6 Connection to the existing IEC will need to be made to the north of Victoria Park. Self-evidently, inland alignments cannot be taken further inland around the south of the typhoon shelter to connect with the IEC in North Point, due to the mass of existing building development in the Tin Hau / Fortress Hill area. To achieve the connection with the IEC, the Trunk Road tunnel will need to rise up to a portal located in the northern 'knoll' area of Victoria Park. This not only results in demolition and permanent removal of this heavily wooded area of the park, but as the Trunk Road rises up to connect with the IEC it will cut off the westbound Victoria Park Road.
- 2.4.7 As a consequence of the above physical obstructions and constraints, this Trunk Road inland alignment is found to be not feasible.
- 2.4.8 Alternative inland alignments have been examined with a view to avoiding some of these constraints. **Figure 2.5** shows a Trunk Road tunnel turning inland further east, through the Wan Chai Sports Ground, to avoid conflict with the Harbour Centre and Sun Hung Kai foundations. In this case, the Trunk Road will conflict with the NIL Exhibition Station in Wan Chai North, as gradient limitations mean that it will not be able to pass beneath the NIL station foundations. Similar to the case above, either allowance for the NIL will obstruct this Trunk Road inland alignment, or the implementation of this Trunk Road inland alignment will mean that the NIL cannot be constructed. Moving the inland alignment even further east to avoid the conflict with the NIL Exhibition Station (also shown in **Figure 2.5**) will result in conflict with the major services infrastructure at Hung Hing Road.
- 2.4.9 Then, with this Trunk Road alignment turning inland further to the east, it will conflict with the foundations of the CHT approach roads structures. While smaller (around 7m diameter) rail tunnels may be able to thread their way through these numerous foundations, with underpinning of some of the foundations where conflict cannot be avoided, the Trunk Road tunnel is an approximately 35m wide structure that will require demolition of large sections of the existing CHT approach structures to facilitate its construction. Traffic disruption and impacts, particularly to the CHT traffic, will be unacceptable.
- 2.4.10 Further east in Causeway Bay, where the Trunk Road runs under Gloucester Road and then rises up to a tunnel portal in Victoria Park to connect with the IEC, constraints

(conflicts with NIL and SCL, demolition of the park 'knoll', and cutting off Victoria Park Road) will be similar to the previous inland alignment case.

- 2.4.11 In view of the above, these alternative Trunk Road inland alignments are also considered not feasible, primarily due to physical conflict with existing development and infrastructure.

2.5 Foreshore Alignments

- 2.5.1 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, after it passes over the MTR Tsuen Wan Line. An elevated road will clash with the atrium bridge (which has a soffit level around +12mPD and a top of roof level at +41mPD), 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.
- 2.5.2 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.
- 2.5.3 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 basin ('PCWA basin'). The alignment here is determined mainly by infrastructure constraints, in particular the crossing at the CHT. As mentioned in para 2.1.14, the feasible crossing point (for a Trunk Road in tunnel) is below the CHT approach (portal) structure, at a sufficiently deep level to avoid the CHT rock anchors. Alternately, a Trunk Road on flyover can cross over the CHT portal area. Trunk Road tunnel alignments further north will result in high risk of damage to the immersed tube section of the CHT, while more southerly alignments are constrained by the Wan Chai East Sewage Screening Plant and the Electricity Sub-station on Hung Hing Road.
- 2.5.4 The Trunk Road alignment must then pass through (under or over) the CBTS to connect with the existing IEC to the east of the typhoon shelter. Trunk Road tunnels that do not require reclamation can pass beneath the typhoon shelter without disrupting the marine uses, but Trunk Road flyovers should be kept as close as possible to the CBTS shoreline in order to minimise impacts to the typhoon shelter operations.
- 2.5.5 Other conflicts in the Causeway Bay area to be avoided for foreshore alignments are the RHKYC and the SCL. The provision of Slip Road 8 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 is not possible.

- 2.5.6 Trunk Road tunnels will need to rise up onto elevated road to connect with the IEC. This connection can be either directly at the eastern end of the CBTS (in which case the Trunk Road tunnel will need to rise up above seabed level through the typhoon shelter to make this connection) or further east along the North Point shoreline (with the Trunk Road tunnel remaining below seabed level through the typhoon shelter and only rising up above the seabed to the east of the typhoon shelter, along the outside of the existing IEC). A Trunk Road flyover can connect directly to the IEC at the eastern end of the CBTS.
- 2.5.7 In conclusion, though, 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.

2.6 Summary of Trunk Road Route Assessment

- 2.6.1 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 development along the Wan Chai and Causeway Bay northshore area, existing cross harbour tunnels, proposed rail infrastructure and essential services infrastructure.
- 2.6.2 Offshore alignments are obstructed by the HKCEC Extension, will pose unacceptable risk to the CHT 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.
- 2.6.3 Inland alignments are obstructed by existing development 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.
- 2.6.4 The most reasonable and practical 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 CHT portal in tunnel or over the top of the CHT portal as flyover, continuing through the CBTS to a connection with the existing elevated IEC to the east of the typhoon shelter. The issues to be addressed when appraising foreshore alignments are related mainly to the determination of the best practical form of construction and minimising the extent of reclamation.

3 NO-RECLAMATION ALIGNMENTS

3.1 The Need for Reclamation

- 3.1.1 The need for reclamation for Trunk Road construction was a primary concern raised during the public engagement activities of the Envisioning Stage. When investigating Trunk Road schemes, any reasonable alignments that do not require or result in reclamation (ie “no-reclamation alignments”) need to be identified and pursued, in accordance with the CFA ruling on the presumption against reclamation in respect of the PHO.
- 3.1.2 In Section 2, offshore and inland alignments, which could conceivably be thought of as “no-reclamation alignments” (if excepting unavoidable reclamation at the tie-in to CRIII), were found not feasible due to conflict with existing development and infrastructure.
- 3.1.3 Trunk Road alignments along the foreshore corridor were found to be feasible. However, foreshore alignments do require reclamation for Trunk Road tunnel construction at the tie-in to CRIII to the west of the HKCEC Extension, through the HKCEC water channel and along the Wan Chai shoreline to the east of the HKCEC Extension, as a minimum.
- 3.1.4 At the connection with CRIII, the Trunk Road tunnel structure will lie above seabed level. Then, as it passes over the MTR Tsuen Wan Line, the Trunk Road tunnel will rise above sea level. Therefore, at the western end of the WDII project area, the Trunk Road tunnel structure must be contained within reclamation.
- 3.1.5 From the high level crossing over the MTR tunnel, at the western end of the HKCEC water channel, even dropping at maximum gradient, the tunnel structure will be above sea level through the western part of the water channel, and will stay above seabed level through the eastern part of the water channel. The most practical engineering solution will be to construct the Trunk Road as a cut-and-cover tunnel after reclaiming the water body between the two seawalls of the Convention Centres.
- 3.1.6 The slip road connections in Wan Chai North (Slip Roads 1, 2 and 3) will also require reclamation as they rise above seabed level to their portals at ground level, in areas where this reclamation is not already formed for the mainline Trunk Road construction.
- 3.1.7 Moving further eastwards, the Trunk Road tunnel will only drop beneath the seabed at it nears the PCWA basin, and will therefore require reclamation for construction of cut-and-cover tunnel along the Wan Chai shoreline.
- 3.1.8 Then, to the east of the CBTS, the Trunk Road needs to connect to the existing elevated IEC road structure at a road level around +15mPD. This means that any Trunk Road tunnel running under the seabed (even if deep enough not to require reclamation) must, at some point or another, rise above the seabed to a tunnel portal at ground level before rising onto elevated road structure to connect to the IEC. As the tunnel rises to and

above the seabed, reclamation will be required for cut-and-cover tunnel construction, and reclamation will be required for the ground level tunnel portal construction.

- 3.1.9 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. In addition, the feasible foreshore alignments will also require reclamation for cut-and-cover tunnel construction though the HKCEC water channel and along the Wan Chai shoreline to the east of the HKCEC Extension. There is, therefore, no possible “no-reclamation” alignment option for the Trunk Road through the WDII area.
- 3.1.10 The following paragraphs examine the unavoidable reclamation requirements in more detail, and investigate other ideas that have been suggested in pursuit of no-reclamation alignments.

3.2 MTR Tsuen Wan Line Crossing

- 3.2.1 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 para 2.1.10, the Trunk Road must not impose any loads on, or cause any significant movement of, this existing MTR immersed tube tunnel.
- 3.2.2 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 **Figure 3.1**. For this scheme, the Trunk Road will cross over the MTR tunnel at a road level of around -6.5mPD and, with the height of the tunnel structure being approximately 9m from road level, a top of tunnel structure level of around $+2.5\text{mPD}$.
- 3.2.3 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 $+2.0\text{mPD}$) at this crossing point, and this would effectively be regarded as reclamation, anyway.
- 3.2.4 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.

- 3.2.5 To illustrate this vertical alignment constraint, **Figure 3.2** shows a deep tunnel alignment where the Trunk Road drops down from the tie-in with the Central Interchange at Central Reclamation Phase I (CRI) at the maximum permissible tunnel gradient to pass beneath the MTR Tsuen Wan Line.
- 3.2.6 The location of the Trunk Road tunnel western portal at CRI 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.
- 3.2.7 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, **Figure 3.2** illustrates the consequences in respect of clearance between the MTR immersed tube tunnel and the Trunk Road bored tunnel. As can be seen in **Figure 3.2**, the clearance between the two tunnels only around 5m, whereas the Trunk Road bored tunnel diameter is around 15.5m. Clearance of 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. Clearly, the available clearance is totally inadequate.
- 3.2.8 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.
- 3.2.9 A feasible vertical profile of the Trunk Road tunnel from the western portal in CRI over the MTR Tsuen Wan Line is presented in **Figure 3.3**, 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.

3.3 IEC Connection

- 3.3.1 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, up to the start of flyover structure.
- 3.3.2 **Figure 3.4** illustrates the minimum reclamation situation where a cut-and-cover tunnel rises up to ground level immediately to the east of the CBTS 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 Figure 3.4, 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.

- 3.3.3 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 Figure 3.4, 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.
- 3.3.4 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 Figure 3.4, 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.
- 3.3.5 The resulting area of reclamation, around 4ha, is the minimum requirement for Trunk Road tunnel schemes rising up to connect to the existing IEC.

3.4 Deep Tunnel Option

- 3.4.1 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.
- 3.4.2 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. The Trunk Road then stays in cut-and-cover tunnel through the HKCEC water channel and along the Wan Chai shoreline, until it drops down low enough beneath the seabed to change to bored tunnel.
- 3.4.3 The Trunk Road bored tunnel then passes beneath the existing CHT and beneath the proposed SCL tunnels, at a level of around -50mPD in order to provide adequate clearance between the tunnels, before rising up along the North Point shoreline to connect with the existing elevated IEC. Rising from this depth, even at maximum tunnel gradient, means that the connection with the IEC can only be made at around the location of the North Point ferry piers. 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.

- 3.4.4 Therefore, bored tunnel would only be possible through the central portion of the Trunk Road in WDII (under the CHT, under the CBTS and immediately to the east of the CBTS). At the HKCEC and along the Wan Chai shoreline, and along the North Point shoreline for the connection with the IEC, the Trunk Road would be cut-and-cover tunnel, in reclamation. **Figure 3.5** shows the deep tunnel option layout and profile.
- 3.4.5 Two of the major issues associated with this deep tunnel option are:
- (i) The longer length of the Trunk Road cut-and-cover tunnel along the North Point shoreline, all the way to the connection with the IEC at the North Point ferry piers, results in extensive reclamation along this part of the shoreline.
 - (ii) Slip Road 8 (from Victoria Park Road to Trunk Road westbound) cannot 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.
- 3.4.6 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.
- 3.4.7 However, it is the issue of reclamation, and whether it is unnecessarily extensive, that 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.

Extent of Reclamation for the Deep Tunnel Option

- 3.4.8 As noted above, reclamation will be required at the connection with CRIII, through the HKCEC water channel and along the Wan Chai shoreline. This area of reclamation is, in fact, common to all Trunk Road schemes. Reclamation is not required through the CBTS for the deep tunnel option, but is also not required for the permanent works of alternative cut-and-cover tunnel options, where these lie beneath the seabed of the CBTS.
- 3.4.9 The area of concern when comparing the deep tunnel option against other tunnel options is along the North Point shoreline, where the deep tunnel rises towards the seabed and, as the ground cover to the tunnel reduces, the form of construction needs to change from bored tunnel to cut-and-cover tunnel (in reclamation).
- 3.4.10 The more extensive reclamation along the North Point shoreline is not in itself a technical problem, but, when examining feasible and acceptable schemes, the need to minimise reclamation and, where reclamation is required, to fully justify its extent, is an essential aspect of this project. If there are feasible alternatives that require a lesser extent of reclamation, they should be pursued instead.
- 3.4.11 **Figure 3.6** shows the layout of the deep bored tunnel option in the area along the North Point shoreline, where it rises up to connect with the elevated IEC, and the extent of reclamation required in this area for the scheme.

- 3.4.12 **Figure 3.7** shows the layout and extent of reclamation of an alternative cut-and-cover tunnel option (as referenced in Section 3.3 above) which rises to connect to the IEC outside the CBTS. The more westerly connection with the IEC for this option, immediately outside the CBTS rather than at the North Point Ferry Piers, is made possible by the shallower depth of the cut-and-cover Trunk Road tunnel through the typhoon shelter, where it lies below the seabed level but not at the deep level required for bored tunnel construction. The lesser extent of reclamation is due in part to the higher seabed level through the typhoon shelter compared to the seabed level along the North Point shoreline (the alternative cut-and-cover tunnel therefore having less length of tunnel structure above the seabed, requiring reclamation).
- 3.4.13 In examining the extent of reclamation, it can be seen from Figure 3.7 that the alternative cut-and-cover tunnel scheme can make good use of the existing land beneath and along the north side of the IEC, in the area immediately to the east of the typhoon shelter. As a result, this scheme requires a lesser extent of reclamation than the deep tunnel option which requires a wider and therefore greater area of reclamation due to the more set-back shoreline at the North Point ferry piers.
- 3.4.14 Measurement of the extent of reclamation along the North Point shoreline for these two tunnel options indicates that their approximate reclamation areas are:
- deep tunnel option, 14ha
 - alternative tunnel option, 4ha.
- 3.4.15 In short, the deep bored tunnel option requires a greater area of reclamation along the North Point shoreline than the alternative cut-and-cover tunnel option. Moreover, the deep bored tunnel option cannot perform as well as the alternative cut-and-cover tunnel option, due to its deficiency in providing the Slip Road 8 connection.
- 3.4.16 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 continue to pursue this deep tunnel option.

3.5 Alternative Trunk Road Tunnel Ideas

- 3.5.1 Alternative Trunk Road and harbour-front enhancement ideas 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 proposals in particular warrant attention: 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).
- 3.5.2 An extract from the Swire’s proposal is shown in **Figure 3.8**. Swire’s submitted their proposal to demonstrate an idea that would allow Victoria Park unfettered access to the

waterfront. As can be seen from Figure 3.8, 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.

- 3.5.3 An extract from the RHKYC proposal is shown in **Figure 3.9**. 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 Figure 3.9, reclamation will be needed for Trunk Road tunnel construction along the Wan Chai shoreline and in the corners of the CBTS for the RHKYC scheme. This scheme is therefore also not a “no-reclamation” idea.

3.6 Double Decking over Gloucester Road

- 3.6.1 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.
- 3.6.2 Connection to Connaught Road Central is proposed through a multi-storey car park building at Rumsey Street or Shun Tak Centre. Leaving aside for now the practicality of having Trunk Road traffic circulating up and down through a car park building to access or exit the Trunk Road, and the road network connectivity requirements in Central, constructing a bridge deck or flyover over the length of Gloucester Road, in the WDII project area, is not feasible.
- 3.6.3 If flyovers are constructed above existing roadways, there must be space for the bridge piers and foundations. The Trunk Road is a dual 3-lane carriageway with an overall elevated deck width of around 30m. This will need to span clear across the existing Gloucester Road, including access flyovers such as Tonnochy Road Flyover and Arsenal Street Flyover, and keep clear of the numerous pedestrian bridges that currently span over Gloucester Road.
- 3.6.4 A portal support structure for the Trunk Road will be required. **Figure 3.10** illustrates the arrangement at two of the critical sections along Gloucester Road. As can be seen, an extremely bulky structure 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. Moreover, the structure will be very high, in order to pass over the existing elevated structures along Gloucester Road (Trunk Road level would be at around +23mPD, ie 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.
- 3.6.5 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.

- 3.6.6 The consequence will be a loss of around 30% to 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, cannot be tolerated.
- 3.6.7 From both visual and traffic impacts points of view, the suggested double-deck arrangement along Gloucester Road is considered to be not feasible. Similar conclusions can be readily drawn for double-decking along Connaught Road Central and Harcourt Road.

3.7 Full Flyover Idea

- 3.7.1 It has been 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.
- 3.7.2 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 2). Full flyover options cannot rise to a high enough level to pass over the HKCEC and/or the Atrium Link (para 2.5.1).
- 3.7.3 Referring to Section 2.6, 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 possible.

3.8 Total Offshore Idea

- 3.8.1 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.
- 3.8.2 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.
- 3.8.3 A Trunk Road tunnel running offshore will be constrained by the crossing beneath the MTR Tsuen Wan Line and the CHT. Similar to the case for a deep tunnel described in Section 3.2, a Trunk Road alignment that turns northwards into to the harbour from the connection with the Central Interchange in CRI will not be able to drop down deep enough to pass beneath the MTR immersed tube tunnel with sufficient clearance.
- 3.8.4 Therefore, “total offshore” ideas for the Trunk Road alignment are not feasible.

3.9 Quasi No-Reclamation Idea

- 3.9.1 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.
- 3.9.2 **Figures 3.11 and 3.12** show the alternative arrangement for a Trunk Road tunnel option at Wan Chai and North Point respectively, if a minimum of 1m of water depth is provided above the tunnel protection layer at mean low water level.
- 3.9.3 This shallow water depth is inadequate for navigation access by the range of vessels (pleasure craft and ferries) that would require access to the waterfront. In particular, the Wan Chai North cross harbour ferry services would be compromised and there would be no access to landing steps along the existing seawalls.
- 3.9.4 Furthermore, the Trunk Road tunnel structure would be exposed to damage from ship impact, including ocean going vessels in the nearby navigation fairways (and the consequences of structural damage to the road tunnel would be severe). Protection in the form of a rubble mound bund, or breakwater, would be required, as shown in Figures 3.11 and 3.12.
- 3.9.5 As a result, 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. This “quasi no-reclamation”, or “shallow water”, Trunk Road idea:
- nevertheless has a tunnel structure above seabed level that constitutes reclamation under the PHO;
 - results in additional reclamation for the protective breakwaters;
 - compromises marine access to the waterfront, including essential ferry services;
 - results in reclamation that cannot be put to use for harbour-front enhancement.
- 3.9.6 The areas of reclamation of this “quasi no-reclamation”, or “shallow water”, idea, can be compared with the saving in land formation along the shoreline that would otherwise be required under the conventional approach of having cut-and-cover tunnel in reclamation. This could be viewed as ‘water area saved’, as shown in Figures 3.11 and 3.12, and is the area of land (reclamation) that is not required if the tunnel structure were to be left unprotected below sea level, albeit offset against the reclamation areas of the protective breakwaters and the reclamation areas of the tunnel structure above seabed level.
- 3.9.7 When examining the areas of reclamation of the “shallow water idea” and the conventional approach having cut-and-cover tunnel in reclamation, the following observations are made:

| Location | “Shallow Water Idea” | | Offset against conventional approach of cut-and-cover tunnel in reclamation |
|-------------|--|---|---|
| | Reclamation for Protective Breakwaters | Area of tunnel structure above seabed (= ‘reclamation’) | Water Area Saved (area of land formation not required if “shallow water idea” is implemented) |
| Wan Chai | 2.5ha | 1.5ha | 4.5ha |
| North Point | 0.7ha | 0.2ha | 0.5ha |

3.9.8 In view of the above concerns/issues, and without any material benefit in terms of real reduction of reclamation, the “quasi no-reclamation” idea with the provision of shallow water above the Trunk Road tunnel structure is not considered a practical or reasonable idea to be pursued.

3.10 Conclusion of the Review of No-Reclamation Alignments

3.10.1 All suggested alignments for the Trunk Road, and forms of construction, have been examined with a view to determining if there are any that do not require any reclamation for the Trunk Road construction.

3.10.2 It is concluded that there are no “no-reclamation” alignments for the Trunk Road, and even offshore or inland alignments are not feasible. Consequently, it must be accepted that at least some reclamation will be required for Trunk Road construction.

4 TRUNK ROAD FORM OF CONSTRUCTION

4.1 Introduction

4.1.1 In reviewing Trunk Road tunnel options, cut-and-cover tunnel construction is considered to be a technically feasible form of construction for implementation of the Trunk Road. Determination of the practicable and feasible form of tunnel construction has taken into account alternative construction methods that may be considered appropriate along the different sections of the WDII project area. Possible variations of Trunk Road cut-and-cover tunnel are examined, with a view to determining practically feasible tunnel ideas that can be consolidated with harbour-front enhancement ideas for carrying forward to the Realization Stage of this project.

4.1.2 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 appears to be little public support for a flyover option, it is the opinion of the Sub-committee on WDII Review that this option should be given further consideration insofar as it does represent 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.

4.1.3 The possible Trunk Road option arising from these investigations is also examined in respect of flexibility for future submerging of the IEC. The intention being that any Trunk Road scheme that is proposed now will not inhibit such a possibility, for longer term planning for the enhancement of the harbour-front, albeit that this may not arise in the foreseeable future and would need to be justified by relevant social, environmental and economic considerations.

4.2 Alternative Tunnel Construction Methods

4.2.1 As described previously, the Trunk Road crossing over the MTR tunnel, at the western end of the HKCEC water channel, and the shallow tunnel (above seabed level) passing through the HKCEC water channel, means that the most practical construction approach in this area will be to construct the Trunk Road as a cut-and-cover tunnel after reclamation along the shoreline to the west of the HKCEC and the water body 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 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 an 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.

- 4.2.4 Through the PCWA basin and the CBTS, where the Trunk Road tunnel lies below seabed level, immersed tube or cut-and-cover tunnel construction may be considered. In this case, for cut-and-cover tunnel, temporary reclamation formed to facilitate the tunnel construction 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. Factors to be considered 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 CHT 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.
- 4.2.5 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 CBTS, cut-and-cover tunnel in reclamation will again be the feasible form of construction.
- 4.2.6 Deep bored tunnel construction has also been examined (see Section 3.4), but is not recommended due to reduced traffic performance and the need for a larger area of reclamation along the North Point shoreline.
- 4.2.7 In summary, cut-and-cover tunnel construction is considered to be the practical and feasible form of construction for implementation of the Trunk Road through the HKCEC water channel, along the Wan Chai shoreline and through the CBTS. Permanent reclamation will be required at the HKCEC, along the Wan Chai shoreline and at the eastern end of the CBTS, for the cut-and-cover tunnel, where it lies above the seabed level.

4.3 Trunk Road Tunnel Variations

Trunk Road Tunnel Variation 1

- 4.3.1 Examination of possible Trunk Road tunnel options leads first to Trunk Road Tunnel Variation 1, shown conceptually in **Figure 4.1**. 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.
- 4.3.2 The Trunk Road tunnel passes beneath the CHT 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. The low level of the Trunk Road tunnel means that the tunnel structure lies entirely below the seabed level of the PCWA basin and the CBTS, only rising up above seabed level to ground level to the east of the CBTS, where the Trunk Road then rises up to connect with the existing elevated IEC. Permanent reclamation in the PCWA basin and in the CBTS 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.
- 4.3.3 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.
- 4.3.4 Looking beyond the Trunk Road itself to the need and opportunities for harbour-front enhancement, combining harbour-front enhancement with the functional elements of the Trunk Road leads to a consolidated conceptual scheme, that can be used as the basis for the development of a Concept Plan for the harbour-front under the WDII project. An indicative illustration of what the Consolidated Harbour-Front and Trunk Road Tunnel (Variation 1) scheme might look like, after some broad landscape treatment, is shown in **Figure 4.2**. Further details of this consolidated scheme and associated waterfront opportunities are discussed in the following Section 5.

Trunk Road Tunnel Variation 2

- 4.3.5 A further variation of the Trunk Road tunnel idea is derived by taking on board one of the written submissions from the public, shown earlier in **Figure 3.8**. One of the major features of this submission is the reconstruction of Victoria Park Road further to the south (within the existing Victoria Park) so as to free up more waterfront space along the southern edge of the CBTS. A landscaped deck is provided over the ground level roads to extend Victoria Park to the waterfront. The Trunk Road tunnel is also aligned further south to connect directly into the IEC at the eastern side of the CBTS, with the existing IEC connections to Victoria Park Road reconstructed as tunnel through the south-eastern corner of the typhoon shelter.

- 4.3.6 Although ‘conceptually correct’, the submission does need to be more fully developed with the incorporation of a ‘functionally correct’ Trunk Road layout, leading to ‘Trunk Road Tunnel Variation 2’.
- 4.3.7 To turn the written submission as shown in Figure 3.8 into a functional Trunk Road option, the following factors affecting the configuration of the Trunk Road and its layout need to be considered, with the road layout adjusted as necessary to meet the functional and safety requirements of the Transport Planning & Design Manual (TPDM):
- (i) Trunk Road lane configuration: traffic demand requires a dual 3-lane configuration for the mainline generally, while merging and weaving constraints mean that there will need to be some localised widening to accommodate the entry of slip roads as separate lanes.
 - (ii) Cross-sectional tunnel dimensions: the correct width of Trunk Road tunnel structure must be allowed for, including allowance for lane configuration, road shoulders, tunnel structure, etc.
 - (iii) Conflict with the rock anchors at the CHT portal: the tunnel must be pulled back (southwards) to go around the anchorage zone, so as to avoid the conflict.
 - (iv) Slip Road 8: provision needs to be made for this slip road which caters for traffic from the Causeway Bay and Tin Hau area entering the westbound Trunk Road, going to Central and western Hong Kong Island. However, an eastbound slip road for traffic exiting the Trunk Road in this area, as indicated in the written submission, is not essential and therefore does not need to be provided.
 - (v) Road design standards: highway design standards for the Trunk Road as well as for the proposed reconstruction of Causeway Bay Flyover and Gloucester Road Flyover, including adequate headroom clearances, must be incorporated in the road layout.
- 4.3.8 The resulting road layout for Trunk Road Tunnel Variation 2 is illustrated in **Figure 4.3**.
- 4.3.9 Similar to the case for Trunk Road Variation 1 above, harbour-front enhancement is combined with the functional elements of the Trunk Road to give a consolidated conceptual scheme. **Figure 4.4** gives an indicative illustration of what the Consolidated Harbour-Front and Trunk Road Tunnel (Variation 2) scheme might look like, after some broad landscape treatment.

Trunk Road Tunnel Variation 3

- 4.3.10 The inland diversion of the alignment in Trunk Road Tunnel Variation 2 to avoid conflict with the rock anchors at the CHT approach ramp structure introduces reverse curves in the road tunnel. Reverse curves in a major highway tunnel are not appropriate. Even where minimum highway design standards can be met, the abrupt changes in curvature and super-elevation will lead to a sudden change in steering attitude of a vehicle negotiating these curves, which could take drivers by surprise. Moreover, vehicles slowing to negotiate the reverse curves will also reduce the traffic performance of the entire Trunk Road. This is an undesirable situation and, especially in tunnels, leads to safety concerns. Situations where vehicles need to slow to negotiate changes in

road alignment, especially where drivers may be caught unaware, create the potential for accidents; the more so where, in tunnels, following vehicles cannot change lanes to avoid vehicles in front of them. The consequences of accidents in tunnels are far more severe than open road situations. As such, these reverse curves should be avoided if at all possible.

- 4.3.11 Instead of pulling back the tunnel to go around the anchorage zone, conflict with the CHT rock anchors could also be avoided by straightening up the Trunk Road alignment at the CHT, and having the tunnel pass beneath the CHT portal rock anchor zone, similar to the Trunk Road Tunnel Variation 1. By so doing, the alignment concerns of Tunnel Variation 2, expressed above, can be overcome.
- 4.3.12 **Figure 4.5** shows the resulting Trunk Road Tunnel Variation 3 road layout.
- 4.3.13 Core features of Tunnel Variation 2 (and the public submission from which this has been derived) are retained in Tunnel Variation 3. These include the idea of reconstructing Victoria Park Road further to the south to free up more waterfront space and the construction of a landscaped deck over the ground level roads to extend Victoria Park to the waterfront, as well as the reconstruction of the existing IEC connections to Victoria Park Road as tunnel through the south-eastern corner of the typhoon shelter. The direct connection of the Trunk Road to the IEC at the eastern end of the CBTS is also retained.
- 4.3.14 The difference between these two Trunk Road tunnel variations in terms of harbour-front enhancement is simply the lesser extent of reclamation in the CBTS, with Trunk Road Tunnel Variation 3 not having any reclamation at the south-western corner of the typhoon shelter.
- 4.3.15 Again, combining harbour-front enhancement with the functional elements of the Trunk Road gives a consolidated conceptual scheme. **Figure 4.6** gives an indicative illustration of what the Consolidated Harbour-Front and Trunk Road Tunnel (Variation 3) scheme might look like, after some broad landscape treatment. This scheme is similar to that of Trunk Road Tunnel (Variation 2), except that in this case there would be no change to the existing situation for the promenade in the south-western corner of the CBTS.

4.4 Major Issues of the Trunk Road Tunnel Variations

- 4.4.1 Examination of the land use, engineering and environmental aspects of the design and construction of the Trunk Road tunnel variations leads to the following issues that are highlighted as being of particular concern:
- more reclamation due to filling in of the corners of the CBTS (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).

Area of Reclamation

- 4.4.2 All the Trunk Road tunnel variations (Variations 1, 2 and 3) require reclamation along the North Point shoreline for cut-and-cover tunnel and tunnel portal construction. However, Tunnel Variations 2 and 3 also result in reclamation in one or more of the corners of the CBTS, which is not required for the Trunk Road Tunnel Variation 1.
- 4.4.3 Tunnel Variation 2 requires reclamation in the south-western corner of the typhoon shelter for shallow cut-and-cover Trunk Road tunnel construction, and in the south-eastern corner of the typhoon shelter for reconstruction of the IEC and the Victoria Park Road connections in tunnel. Tunnel Variation 3 requires reclamation in the south-eastern corner of the typhoon shelter for reconstruction of the IEC and the Victoria Park Road connections in tunnel.
- 4.4.4 These additional areas of reclamation will need to be justified in meeting the 'overriding public need test' as required by the CFA ruling on the PHO, bearing in mind that an alternative Trunk Road tunnel option is available that does not require these more extensive areas of reclamation.

Road Diversions and Traffic Impacts

- 4.4.5 Construction of cut-and-cover tunnel across the entrance to the CHT for Trunk Road Tunnel Variation 2 will require major traffic diversions and result in severe disruption at the CHT portal and approach roads area, affecting both northbound and southbound CHT traffic. With the roads in this area already operating well over capacity, major traffic diversions in this area would quite likely result in a gridlock situation during peak hours, for both the Hong Kong Island-bound traffic and the Kowloon-bound traffic. The CHT is an extremely important strategic network link, and gridlock here would have far-reaching effects; this situation is considered intolerable.
- 4.4.6 Instead, with the Trunk Road passing beneath the CHT portal rather than across the entrance to the CHT, for Trunk Road Tunnel Variations 1 and 3, traffic diversions and disruption at the CHT portal area are avoided.
- 4.4.7 Extensive temporary road diversions will also be required to facilitate the tie-in to the IEC and the demolition of a considerable length of the existing IEC along the North Point shoreline, for Tunnel Variations 2 and 3. The existing IEC will, in effect, need to be reconstructed as a new (albeit temporary) road of similar proportions to the existing, from the Tong Shui Road interchange to Victoria Park Road. Victoria Park Road and Gloucester Road will also require extensive road diversions for their reconstruction.

- 4.4.8 These road diversions will inevitably result in traffic impacts and severe disruption to traffic flows. In particular, traffic diversion ‘black spots’ would be expected at the Tong Shui Road interchange on the IEC, at Victoria Park Road / Hing Fat Street junctions and at the Victoria Park Road / Gloucester Road interface area (including Gloucester Road northbound and Inner Gloucester Road). And, as noted in para 4.4.5 above, Tunnel Variation 2 will also have a traffic diversion black spot at the CHT.
- 4.4.9 **Figure 4.7** illustrates schematically the areas of major road diversions and the expected traffic diversion black spots for Tunnel Variations 2 and 3. Figure 4.6 also shows the comparative case for the Trunk Road Tunnel Variation 1. As can be seen, the extent of temporary road diversions is very much less for Trunk Road Tunnel Variation 1 and, with the IEC road diversions not intruding into the Tong Shui Road interchange and with the existing IEC connections through to Victoria Park Road being retained, and no reconstruction of Victoria Park Road and the Gloucester Road and Causeway Bay flyovers, there are no particular traffic diversion black spots.

Demolition of Victoria Park

- 4.4.10 For both Tunnel Variations 2 and 3, the existing Victoria Park Road will be realigned further southwards (inland) to allow more area along the Causeway Bay promenade for an extension of Victoria Park to the harbour-front promenade. These new roads will intrude into the entire northern part of the park and construction of the new roads will require the demolition and reconstruction of this northern part of Victoria Park. In particular, the entire existing raised ‘knoll’ area in the north-western part of the park will need to be demolished. **Figure 4.8** shows the extent of the intrusion into Victoria Park.
- 4.4.11 The construction works will cause severe disruption to park users and will remove a large part of the existing leisure area from public use for several years during the construction period. Whilst the new deck over the reconstructed Victoria Park Road will enable the extension of the park to the waterfront and, in terms of area, generally give back the existing area lost to road construction, the existing knoll area of the park is heavily wooded with large mature trees and these cannot be readily replaced on the new deck over Victoria Park Road.

Impacts on Existing Highway Structures

- 4.4.12 For both Tunnel Variations 2 and 3, the existing IEC (from Victoria Park Road to Tong Shui Road interchange outside City Garden in North Point) will need to be demolished and reconstructed as underpass and at-grade roads. The new Causeway Bay Flyover (currently under construction) and the existing Gloucester Road Flyover will also be demolished and reconstructed to suit the realigned Victoria Park Road layout.
- 4.4.13 Apart from the resulting traffic impacts due to this demolition of highway structures (as discussed above), there will be a major generation of public fill material to be disposed of and noise and air quality impacts to nearby residences during the demolition period.

- 4.4.14 In any event, the soundness of a decision to demolish existing road bridges (and especially, in the case of the Causeway Bay Flyover, where these have only recently been constructed) simply to reconstruct them 100m away, is debateable.

Demolition of Police Officers' Club

- 4.4.15 For Tunnel Variation 2, the Trunk Road alignment will pass beneath the Police Officers' Club (POC). Conflict with the POC foundations, and the cut-and-cover form of construction for this shallow tunnel, mean that the POC will need to be demolished.

Air Quality at the Tunnel Portal

- 4.4.16 Polluted air emissions from road tunnel portals is always a major concern, especially where there are nearby residential uses. The area of concern for all three tunnel variations is at the eastern tunnel portal at North Point, where there are existing residential buildings close to the shoreline. For Tunnel Variations 2 and 3, the Trunk Road tunnel portal will be located on the line of the existing IEC, in even closer proximity to the residential buildings than Tunnel Variation 1. In the case of Tunnel Variation 1, the portal is located to the north of the existing IEC highway structure, which will provide some shielding and buffer, and there is a greater separation between the tunnel portal and the residential units; there would therefore be a lesser degree of air quality impacts.
- 4.4.17 Although the acceptability or otherwise of the tunnel portal layout, from the environmental point of view, has yet to be determined, the potential adverse air quality impacts should be borne in mind when examining the appropriateness of these tunnel variation options.

4.5 Comparison of the Trunk Road Tunnel Variations

- 4.5.1 **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.
- 4.5.2 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.
- 4.5.3 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 PCWA basin and in the CBTS. In the CBTS, 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.

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 (incl WDII works & CWB in WDII) | Total Construction | HK\$20B | HK\$28B | HK\$25B |
| | Total Annual Recurrent | HK\$110M | HK\$125M | HK\$123M |

4.5.4 As can be seen, neither Tunnel Variation 2 nor 3 perform as well as the Trunk Road Tunnel Variation 1. The major issues associated with the Tunnel Variations 2 and 3 include additional reclamation due to filling in of the corners of the CBTS, 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. 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.

4.6 Trunk Road Flyover

4.6.1 **Figure 4.9** shows a Trunk Road flyover option. Same as for the 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. 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.

4.6.2 The road then rises up onto elevated road structure to cross over the PCWA basin, then over Kellett Island (and the CHT portal), and stays on elevated structure to the connection with the existing IEC at the eastern side of the CBTS, at a level of around +14mPD. No permanent reclamation (land formation) is required in the PCWA basin, the CBTS or along the North Point shoreline.

4.6.3 The flyover alignment is kept to the south of the typhoon shelter to minimise physical intrusion into the mooring areas and disruption to the marine users. For this alignment, the new elevated road must tie directly into the IEC at the location of the Hing Fat Street slip roads, with new connections to Victoria Park Road replacing the existing elevated road through the south-eastern corner of the CBTS. The same slip road connections to the local road network in Wan Chai North and in Causeway Bay are provided as for the tunnel option, and the Trunk Road maintains the same overall dual 3-lane configuration.

4.6.4 The net extent of reclamation along the Wan Chai shoreline, which is shown indicatively in Figure 4.9, is considered the minimum for Trunk Road tunnel and portal construction, under the flyover option.

4.6.5 Harbour-front enhancement is somewhat more limited for the Trunk Road flyover option, and is essentially restricted to making use of the land formation along the Wan Chai shoreline. Even here, though, the new waterfront area is partly occupied by the tunnel portal which constrains the extent of leisure area. The PCWA basin cannot be properly used as a marine recreational facility due to the highway bridge piers occupying the water area and the low headroom clearance of the flyover. In Causeway Bay, the new elevated road running along the northern side of Victoria Park and the Causeway Bay promenade makes implementation of a landscaped deck over Victoria Park Road, for an extension of Victoria Park to the waterfront, impractical.

4.6.6 Nevertheless, harbour-front enhancement can be combined with the functional elements of the Trunk Road to give a consolidated conceptual scheme. Similar to the case for Trunk Road tunnel variations above, **Figure 4.10** gives an indicative illustration of what the Consolidated Harbour-Front and Trunk Road Flyover scheme might look like, after some broad landscape treatment.

Comparison of Tunnel and Flyover Options

4.6.7 **Table 4.2** overleaf 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. Further elaboration of this issue is given in the following paragraphs.

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

4.6.8 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 greater 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.

4.6.9 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 come up with an option that may serve best to protect and preserve the Harbour. **Figures 4.11** and **4.12** illustrate these affected areas of the Harbour, for the tunnel and flyover options respectively. These areas, for the tunnel and flyover options, are estimated to be as follows:

| Affected Area of Harbour | Tunnel Option ¹ | Flyover Option |
|--|-----------------------------------|-----------------------|
| (a) Land formed ² | 15 ha | 11.5 ha |
| (b) Flyover structures over water ³ | 0.5 ha | 3 ha |
| (c) Affected water area ⁴ | - | 4 ha |

Notes:

- 1 Tunnel Variation 1 is used for comparison purposes.
- 2 Land formed by conventional reclamation.
- 3 The plan area of elevated highway structures that cross over water.
- 4 Areas of the Harbour obstructed by Trunk Road structures, or where marine uses are restricted.

4.6.10 The areas of land formed as given above are the areas of permanent reclamation, and include a notional allowance for reprovisioning requirements (for the Wan Chai ferry pier, salt water pumping station, cooling water pumping stations, etc) associated with each of these tunnel and flyover options. These reprovisioning requirements and any associated reclamation will be firmed up when the more detailed Concept Plans are developed, along with possible smoothing out of sharp corners along the shoreline.

4.6.11 It should also be noted that there will be a requirement for temporary works (including temporary reclamation) to facilitate the Trunk Road tunnel construction and for temporary traffic diversions. These temporary works will be required in the PCWA basin and in the CBTS. In the CBTS, the extent of the temporary works, for both the tunnel and flyover options, will be such that at least some of the existing moorings will need to be relocated outside the typhoon shelter during the construction period.

4.6.12 These temporary works areas are over and above the permanent works areas (para 4.6.9 (a) and (b) above), but are not considered as “areas affecting the Harbour” when comparing the alternative options insofar as these are temporary (for the duration of the construction period) and solely for the purpose of achieving the end product (ie in order to ultimately achieve minimum reclamation). The temporary works won’t cause permanent damage to the Harbour. Only the residual areas of the permanent works are assigned to the Trunk Road options as “areas affecting the Harbour”.

Table 4.2 Comparison of Tunnel and Flyover Options

| | | Tunnel Option | 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 |
| | 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 |

| | | Tunnel Option | Flyover Option |
|--|------------------------|--|--|
| 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 <i>(including WDII works & CWB in WDII)</i> | Total Construction | HK\$20B | HK\$11B |
| | Total Annual Recurrent | HK\$110M | HK\$75M |

4.6.13 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).

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

4.6.15 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). Add to this the visual aspects of the flyover option (viewed in terms of “preserving the Harbour”), and the Trunk Road tunnel option is clearly the option that would serve best to protect and preserve the Harbour.

4.7 Trunk Road Tunnel – Engineering Proposals

4.7.1 The Trunk Road Tunnel Variation 1 concept (illustrated in Figure 4.1 earlier) has been developed in more engineering detail so as to confirm its engineering feasibility. The Trunk Road tunnel layout through the WDII project area is shown in **Figure 4.13**. This scheme is considered to represent a practically feasible Trunk Road option, that meets minimum reclamation requirements.

4.7.2 The vertical profile of the Trunk Road tunnel scheme, including the section of the Trunk Road through CRIII, is given in **Figure 4.14**.

4.8 Flexibility for Future Submerging of the IEC

4.8.1 There have been suggestions from the public that the existing IEC should be submerged (to be replaced with tunnel structures) to reduce the visual impacts along the Causeway Bay and North Point shoreline. For Tunnel Variations 2 and 3, the existing IEC (from Victoria Park Road to outside City Garden in North Point) is suggested to be demolished and reconstructed as underpass and at-grade roads. However, for the Trunk Road Tunnel Variation 1, the existing IEC is retained.

4.8.2 The possibility of converting the existing elevated IEC into tunnel form in the future, for the Trunk Road Tunnel Variation 1, has been investigated, to ascertain whether, in the event of implementation of this Trunk Road tunnel scheme, any long term proposals for submerging the IEC, beyond the ambit of the WDII project, are not precluded. In examining the highway alignment aspects of such a variation, **Figure 4.15** shows a possible arrangement for reconstructing the existing IEC (from Victoria Park Road to outside City Garden in North Point) under the Trunk Road Tunnel Variation 1 proposal.

4.8.3 Comparing the Trunk Road tunnel schemes in respect of a possible future demolition and reconstruction of the IEC from North Point eastwards, from a highway alignment point of view, the Trunk Road Tunnel Variation 1 scheme will allow this opportunity and, indeed, Tunnel Variation 1 is preferred in this respect, as an extension of the Trunk Road tunnel further eastwards to replace the existing elevated IEC could be carried out with less traffic disruption than would be the case for Tunnel Variations 2 and 3.

4.8.4 It should be stressed, though, that the feasibility of the future submerging of the IEC will depend upon factors other than just the examination of the localised area of highway connection to the IEC, above. The feasibility of such a scheme still needs careful consideration, which will require much more detailed investigation of planning, engineering, traffic, marine and environmental impacts and issues.

5 HARBOUR-FRONT ENHANCEMENT

5.1 The Public's Vision

5.1.1 During the Envisioning Stage consultation, a number of harbour-front enhancement ideas were put forward by the public for consideration. These harbour-front enhancement ideas have been reviewed together with Trunk Road ideas, for the derivation of consolidated harbour-front and Trunk Road ideas. The consolidated ideas would then form the basis of the preparation of the Concept Plan(s) for the development and enhancement of the harbour-front of Wan Chai, Causeway Bay and the adjoining areas in the Realisation Stage of this project.

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

- a keen desire for a high quality and vibrant waterfront with good accessibility;
- 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 CBTS.

5.1.3 In the following paragraphs, the harbour-front enhancement ideas put forward by the public are reviewed in relation to the possible Trunk Road tunnel option. Practical and reasonable opportunities for harbour-front enhancement are identified that can be incorporated in the preparation of the Concept Plan(s) in the following Realization Stage.

5.1.4 On the other hand, harbour-front enhancement ideas that require reclamation (or represent reclamation in respect of occupying an area of the Victoria Harbour sea), where this requirement is not provided for by necessary reclamation formed for Trunk Road construction, are not pursued at this stage. The need for reclamation for these harbour-front enhancement ideas will need to be justified in their own right under the PHO, and should therefore be pursued separately to the WDII project proposals.

5.2 Proposed Harbour-front Enhancement Ideas

5.2.1 In view of the obvious need for enhancing the existing harbour-front of Wan Chai, Causeway Bay and adjoining areas, the emphasis in public submissions and public engagement exercises has tended to focus on the land and marine uses that would improve the quality, public amenity and accessibility of the waterfront areas.

5.2.2 Of the harbour-front enhancement ideas that have been received from the public at public forums and charrettes and through written submissions, during the course of the Envisioning Stage consultation process, those that are considered reasonable and worthwhile to pursue include:

- (i) making use of the land formation along the Wan Chai shoreline (required for all Trunk Road schemes) for harbour-front enhancement;
- (ii) developing the PCWA basin into a vibrant marine recreational facility;
- (iii) extending Victoria Park to the harbour-front by decking over Victoria Park Road; or possibly by moving Victoria Park Road southwards into Victoria Park, which would be reconstructed with wide landscaped deck over the roads, thereby creating more waterfront promenade space;
- (iv) preserving the existing CBTS as far as possible;
or (as a variation on this theme)
- (v) limited reclamation at the two corners of the CBTS, to enhance these areas as landscaped promenade, whilst still retaining the main body of the typhoon shelter and its cultural significance;
- (vi) constructing a boardwalk along the North Point shoreline.

5.2.3 **Figure 5.1** highlights these harbour-front enhancement ideas.

5.2.4 These ideas have been examined together with Trunk Road functional requirements to determine, through a holistic approach to harbour-front and transport planning, how the harbour-front enhancement ideas can be combined with the functional needs of the Trunk Road to form a consolidated harbour-front concept.

5.2.5 A practically feasible Trunk Road tunnel option has been proposed in Section 4 above (Figure 4.13). This tunnel option is used as the basis for consolidation of the harbour-front enhancement ideas suggested through public consultation.

5.3 Opportunities for Harbour-front Enhancement

5.3.1 The harbour-front enhancement ideas received from the public (listed above) have been combined with the functional form of the Trunk Road tunnel to examine various opportunities for harbour-front enhancement, making use of the minimum necessary areas of reclamation together with possible shoreline treatment. The following consolidated ideas for harbour-front enhancement and public enjoyment have been identified.

5.3.2 At the connection with CRIII and the HKCEC, reclamation is required for Trunk Road tunnel construction. The area to the west of the HKCEC could be developed as a 'cultural district', with spaces for arts and cultural fairs, performance venues, and the like. This could extend to the HKCEC Extension promenade as an 'expo promenade' that would include the Golden Bauhinia Square.

5.3.3 Subject to more detailed land use planning evaluation, a landscaped deck could extend from the Hong Kong Academy of Performing Arts (HKAPA) across the ground level roads to the waterfront, linking up the existing and the new cultural and entertainment harbour-front areas.

- 5.3.4 Another landscaped deck could extend from the Arts Centre and public garden outside the Grand Hyatt Hotel, over Road P2 to the promenade at the west side of the HKCEC Extension. The possibility of linking this up with the HKCEC Atrium Link and roof garden could be examined, turning this landscaped deck into a leisure and informal exhibition area.
- 5.3.5 Along the Wan Chai shoreline, reclamation is also required for Trunk Road tunnel construction, providing opportunity for the creation of a 'green leisure zone'. A landscaped recreational promenade could be developed incorporating harbour-front cafes and the like to add vibrancy to the waterfront. The reprovisioned Wan Chai ferry pier would be located on this waterfront.
- 5.3.6 Primary accessibility is envisaged via a landscaped deck that could be constructed over the existing Wan Chai North PTI (subject to land use planning considerations), connecting the existing podium level pedestrian circulation system of Harbour Centre, Great Eagle Centre, China Resources Building, HKCEC and other hinterland development, across Hung Hing Road (which is realigned to tie in with Road P2), to the waterfront and the ferry pier.
- 5.3.7 The PCWA basin would not be reclaimed, and could be turned into a 'marine recreational zone', for public use, and with mooring facilities for visiting sailing ships providing sight-seeing opportunities for local residents and visitors alike.
- 5.3.8 There is no residual reclamation in the CBTS for this Trunk Road tunnel option, providing positive response to the suggestion of preserving the CBTS as far as possible and retaining its cultural heritage value (this area could be regarded as the CBTS 'cultural heritage zone'). Whilst some reclamation in the corners of the typhoon shelter would provide further opportunity for waterfront enhancement, such reclamation is not necessary for this Trunk Road scheme and would therefore need to be justified in its own right under the PHO; this is not pursued here.
- 5.3.9 A landscaped deck over Victoria Park Road enables Victoria Park to be extended to the harbour-front from the existing raised 'knoll' area at the north-western corner of the park; however, in view of the limited promenade area available to provide a landing for this connection at the waterfront, staircase and lift access from the deck to the promenade need to be provided.
- 5.3.10 An additional connection is proposed to link up the marine recreational zone at the PCWA basin to the CBTS cultural heritage zone, via a pedestrian bridge over the CHT portal area. A bold aesthetic design is called for, to focus attention away from the surrounding road infrastructure. This bridge will enhance the existing limited, and traffic impacted, pedestrian route from the Wan Chai shoreline to the CBTS.
- 5.3.11 Along the North Point shoreline, where reclamation is required for Trunk Road tunnel construction, another leisure zone along the new shoreline could be created. Harbour-front leisure facilities with views out across the harbour would need to be integrated with landscaping to buffer the road infrastructure behind.

- 5.3.12 A boardwalk could be extended from this North Point leisure zone, along the North Point shoreline, although possible marine access restrictions and future plans for this stretch of shoreline should be borne in mind. This idea may need to be taken up with harbour-front enhancement planning for the North Point waterfront.
- 5.3.13 **Figure 5.2** provides an illustration of the consolidated ideas for harbour-front enhancement and Trunk Road tunnel, with the incorporation of the above waterfront opportunities and some broad-brushed landscape treatment.
- 5.3.14 **Figures 5.3 to 5.5** illustrate similar consolidated harbour-front enhancement ideas for the alternative Tunnel Variations 2 and 3, and for the Trunk Road Flyover.

5.4 Achieving the Public's Vision for Harbour-front Enhancement

- 5.4.1 Feedback from the public during the Envisioning Stage consultation indicates a desire for having the Trunk Road in tunnel, with acceptance of necessary reclamation along the Wan Chai shoreline that can be used for harbour-front enhancement, and the PCWA basin is turned into a marine recreational facility, but having no (or minimal) reclamation in the CBTS which should be preserved as far as possible. Victoria Park should be extended to the harbour-front by decking over Victoria Park Road.
- 5.4.2 These harbour-front suggestions from the public have been combined with the functional form of the Trunk Road tunnel to identify consolidated ideas for harbour-front enhancement. These include:
- a cultural district to the west of the HKCEC, for arts and cultural fairs, performance venues, and an expo promenade;
 - a green leisure zone along the Wan Chai shoreline, with landscaped recreational promenade;
 - a marine recreational zone at the PCWA basin, for public use;
 - a cultural heritage zone at the CBTS, preserving the existing typhoon shelter, and with a landscaped deck providing an extension of Victoria Park to the waterfront;
 - another leisure zone along the North Point shoreline, with a possible boardwalk extension along the North Point shoreline.
- 5.4.3 These practical and reasonable ideas for harbour-front enhancement can be further developed and incorporated in the preparation of the more detailed Concept Plan(s) for the project.

6 EFFECTS OF GROUND LEVEL HIGHWAY INFRASTRUCTURE

6.1 Introduction

- 6.1.1 In the previous section, harbour-front enhancement ideas were examined together with Trunk Road functional requirements to determine, through holistic consideration of harbour-front and transport planning, how the harbour-front enhancement ideas can be combined with the functional needs of the Trunk Road for the derivation of consolidated harbour-front and Trunk Road ideas.
- 6.1.2 Associated with the Trunk Road are various essential elements of highway infrastructure at ground level, such as tunnel ventilation and administration buildings, the Road P2 ground level road, slip road connections from the Trunk Road to the local road network in the Wan Chai North area, and a slip road connection to Trunk Road in the Causeway Bay area, which ensure functionality and adequate connectivity of the Trunk Road and the local road network.
- 6.1.3 This highway infrastructure and ground level road connections have been incorporated in the determination of consolidated ideas for harbour-front enhancement. Nevertheless, in view of the emphasis of the HER on harbour-front enhancement and improved accessibility, concerns have been expressed that, this ground level highway infrastructure, in particular the slip roads as they rise up from the Trunk Road tunnel to ground level roads, may compromise the HEC's harbour planning principles by taking up valuable waterfront land use space and affecting pedestrian accessibility.
- 6.1.4 This section examines the impacts of these roads on the harbour-front planning intentions, to determine whether the HEC's harbour planning principles would be compromised by the presence of these roads.

6.2 Tunnel Ventilation Buildings, Road P2 and Slip Road Connections

- 6.2.1 Provision of essential transport infrastructure is a key element of the WDII project. The need for the Trunk Road has been demonstrated in a district traffic study to relieve the existing east-west corridor (Connaught Road Central / Harcourt Road / Gloucester Road) which is already operating beyond its capacity.
- 6.2.2 The district traffic study also confirmed that, in addition to the Trunk Road, a complementary ground level road system comprising an east-west Road P2 and intermediate slip road connections are essential to achieve the objectives of implementing the Trunk Road, that is, to divert traffic away from the existing east-west corridor in order to provide relief to the corridor and to the local road network.
- 6.2.3 The need for Road P2 and the slip roads has also been confirmed by the Expert Panel, who recognise the need for Road P2 as an important *ad interim* measure in addressing traffic congestion in the Central reclamation area, and who further support the provision of slip roads at the HKCEC area and at the Victoria Park Road / Gloucester Road / Hing Fat Street passageway to magnify the benefits of the Trunk Road.

6.2.4 With the Trunk Road proposed in tunnel over most of its length, tunnel ventilation is an important element in the design and operation of the Trunk Road. Mechanical ventilation systems are required, with clean air being pumped into the tunnel and polluted air being extracted through ventilation buildings. Operation of the tunnel systems also requires a substantial administrative function, which requires administration and operative rooms in an administration building. Planning for the Trunk Road must include these infrastructural facilities.

Tunnel Ventilation Buildings

6.2.5 The ventilation system for the Trunk Road tunnel requires the construction of three buildings: the West Ventilation Building, located at the west portal in CRIII; the Central Ventilation Building, located near the central portion of the Trunk Road tunnel; and the East Ventilation and Administration Building, located at the east portal at the eastern end of WDII.

6.2.6 Ventilation systems requirements have been examined for the new longer Trunk Road tunnel than was originally proposed, and the land requirements for these ventilation and administration buildings reviewed for the upgraded ventilation systems. For the tunnel ventilation of the new Trunk Road tunnel, the West Ventilation Building will continue to occupy the same footprint as the original proposal (although the building height may need to be increased by one floor). The Central Ventilation Building will be a two-storey building that will occupy an area of approximately 0.1ha. This will be located in the highway amenity area in between ground level roads (Road P2 and Slip Road 3), away from the waterfront area and just to the west of the HKCEC, as highlighted in **Figure 6.1**. The East Ventilation Building, which is combined with the Administration Building, will be a three-storey building that will occupy an area of approximately 0.3ha. This building will be located over the footprint of the tunnel structure as to rises to the east portal on the North Point shoreline, as highlighted in **Figure 6.2**.

6.2.7 The ventilation building locations have been chosen such that they can provide for the essential engineering ventilation requirements, without which the Trunk Road tunnel cannot operate, and to minimise as far as possible the impacts on the harbourfront, by locating these facilities within road amenity areas or over the tunnel structures at the portal, where waterfront activities would be limited in any event.

Road P2

6.2.8 The major element of the future ground level road system is Road P2, which runs east-west from CRI to connections with the existing road network in Wan Chai North. Road P2 is a dual 2-lane primary distributor that serves both local east-west movements and the distribution of north-south traffic movements.

6.2.9 In the Central area, Road P2 will relieve the already intolerable traffic congestion at Man Po Street, Man Yiu Street, Man Cheung Street and Connaught Place, by drawing traffic away from the Connaught Road Central bottleneck. If this congestion continues to worsen, it will seriously affect the operations of Exchange Square, Hong Kong Airport Express / Tung Chung Line MTR Station, One and Two International Finance Centres,

hotel developments, ferry piers and other commercial developments in the area. The gridlock will in turn cause traffic blockages in other roads feeding into the area, including Pedder Street and Queen's Road Central.

- 6.2.10 Moving eastwards, 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. Road P2 enables eastbound connection from the CRI and CRIII areas to the Trunk Road and (extending along Hung Hing Road and Victoria Park Road) to Causeway Bay.
- 6.2.11 Deteriorating north-south traffic conditions (between the Admiralty and Wan Chai hinterland areas and the northshore and east-west corridor) are due to the current distribution of this traffic along Harcourt Road / Gloucester Road, where major weaving and merging movements on this congested corridor cause delays, and short north-south connecting roads to the northshore area with closely spaced and congested junctions (eg Fleming Road, where blockages at the junctions with Hung Hing Road and Harbour Road causes tailbacks all the way back to Hennessy Road). Road P2 will provide an alternative distribution routeing for the north-south traffic, and the new junctions with the north-south connecting roads along Road P2, with their improved capacity, will relieve the current congestion problems on these roads.
- 6.2.12 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. The area occupied by Road P2 within the WDII project area, albeit within the footprint of the Trunk Road tunnel, is around 1.1ha.
- 6.2.13 The new junction with Fleming Road / Hung Hing Road will improve traffic conditions along Fleming Road, by moving critical bottleneck junctions (Fleming Road / Hung Hing Road and Fleming Road / Harbour Road) further apart to overcome the current congestion caused by tailbacks along Fleming Road through Harbour Road. **Figure 6.1** highlights the Road P2 layout in the WDII project area.
- 6.2.14 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. This slight realignment of Hung Hing Road provides additional space at the PTI to relocate the existing bus terminus at Expo Drive East, thus freeing up the area adjacent to the Golden Bauhinia Square for waterfront promenade, while 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.

Slip Roads 1, 2 and 3

- 6.2.15 The slip road connections in Wan Chai North are also indicated in **Figure 6.1**. Three slip road connections are proposed, to tie into the ground level road layout:

- 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.

If this slip road is not built, the traffic would have to use Gloucester Road eastbound and Queensway. Overloaded traffic conditions would occur in particular along Gloucester Road eastbound along the section between Fenwick Street and Fleming Road.

- 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 the eastern districts of Hong Kong Island.

If this slip road is not built, the traffic would have to use Gloucester Road eastbound and Hung Hing Road. As a result, both these roads would be congested, in particular Gloucester Road along the section between Fleming Road and Tonnochy Road.

- Slip Road 3, for traffic from the IEC (ie from North Point and the 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.

If this slip road is not built, the traffic would have to use Victoria Park Road westbound, Gloucester Road westbound and inner Gloucester Road. This diverted traffic would overload Victoria Park Road westbound as well as inner Gloucester Road, with little change from today's congested conditions. In addition, diverted traffic would use Tonnochy Road Flyover to access Wan Chai North, with traffic flow on Harbour Road increasing as a result and the junctions with Fenwick Pier Street and Fleming Road overloaded.

6.2.16 These Wan Chai North slip roads (Slip Roads 1, 2 and 3) 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; 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.

6.2.17 The need for an accessible Trunk Road is supported by traffic studies that indicate a high level of demand for the Wan Chai North slip road access onto and off the Trunk Road. Traffic forecasts indicate a peak hour traffic demand for the three slip roads as high as the flows on some sections of Gloucester Road today. Without access to the Trunk Road, this traffic will remain on the Connaught Road Central / Harcourt Road / Gloucester Road corridor.

Slip Road 8

- 6.2.18 The slip road connection in Causeway Bay is indicated in **Figure 6.2**, which also shows the proposed landscaped deck over Victoria Park Road, based on the consolidated ideas for harbour-front enhancement and Trunk Road tunnel (as described in Section 5 and illustrated in Figure 5.2). In order to avoid intrusion into the typhoon shelter, and associated reclamation, the slip road is proposed as a tunnel running along the northern boundary of Victoria Park.
- 6.2.19 Slip Road 8 is proposed for traffic from Causeway Bay, Tai Hang, Fortress Hill and Tin Hau areas to enter the westbound Trunk Road tunnel, going to Central and the western districts of Hong Kong Island. The slip road will divert the heavy traffic flows away from the busy local roads. The only other access to the eastern end of the Trunk Road is via the IEC, with the closest connection to the local road network being at Tong Shui Road, in North Point. Traffic from the Causeway Bay, Tai Hang, Fortress Hill and Tin Hau areas therefore needs Slip Road 8 to access the Trunk Road, otherwise all traffic from these areas going to Central would have to continue using Gloucester Road / Harcourt Road / Connaught Road Central.
- 6.2.20 The need for an accessible Trunk Road is supported by traffic studies that indicate a high level of demand for this slip road. The addition of Slip Road 8 to the road network not only allows traffic from the Causeway Bay and Tin Hau areas going to the Central and Western districts to bypass the congested Gloucester Road, it also results in an overall reduction of traffic on the Gloucester Road westbound corridor. The relief provided to the existing roads in Causeway Bay, in particular, will be significant: reduced traffic along Gloucester Road, especially in the section outside Excelsior Hotel / Sino Plaza, will largely resolve the current congestion problems in this area and on local roads feeding into this area. Without Slip Road 8, the section of Gloucester Road outside the Excelsior Hotel will continue to operate over capacity, as will roads feeding into this area, such as Gloucester Road Flyover. The current congested situation in this area will continue, even with the Trunk Road itself in place.

6.3 The Effects of Slip Roads 1, 2 and 3 on Harbour Planning

- 6.3.1 As an overview to harbour-front planning, the HEC has established a number of harbour planning principles which should be followed when examining Trunk Road and harbour-front enhancement schemes (refer to section 1.2). There is a concern that the slip roads may compromise these harbour planning principles, specifically by sterilising valuable waterfront space that could otherwise be used for quality waterfront development, and by affecting accessibility by cutting off pedestrian access to and along the harbour-front.
- 6.3.2 **Figure 6.3** illustrates the accessibility potential of the consolidated ideas for the Wan Chai North area. In addition to a continuous east-west waterfront promenade, a number of north-south linkages could possibly be provided:
- ♦ via a landscaped deck over Road P2 from the HKAPA (subject to further land use planning assessment) to the waterfront at the western end of WDII and linking to the CRIII waterfront;

- via a landscaped deck over Road P2 from the Arts Centre and public garden outside the Grand Hyatt Hotel, to the promenade at the west side of the HKCEC Extension;
- through the HKCEC Atrium Link from the existing podium level walkway system in Wan Chai to the HKCEC Extension and surrounding waterfront;
- via a landscaped deck over the existing Wan Chai North PTI (subject to land use considerations) and over Road P2 to the Wan Chai waterfront and ferry pier;
- via a proposed footbridge over Road P2 connecting the existing Wan Chai Training Pool podium to the Wan Chai leisure waterfront;
- via a proposed footbridge along Wan Shing Street and over Hung Hing Road, that can link up with existing footbridges back into Causeway Bay.

6.3.3 These grade separated connections can be supplemented by at-grade pedestrian connections at the signalised junction of Road P2 / Fleming Road.

6.3.4 As can be seen from Figure 6.3, none of the Slip Roads 1, 2 or 3 (highlighted in the figure) impinge upon these proposed pedestrian connections or waterfront access routes. The slip roads are located outside the main access desire lines in landscaped amenity areas. The presence of the slip roads does not affect harbour-front accessibility.

6.3.5 **Figure 6.4** shows the Wan Chai North area without the slip roads, to illustrate whether there would be any significant gain in harbour-front planning terms. The main activity nodes in this area are highlighted, being a cultural and entertainment zone to the west of the HKCEC, an Expo Promenade to the north of the HKCEC Extension and a green leisure zone along the Wan Chai shoreline to the east of the HKCEC Extension.

6.3.6 These activity nodes link back directly to the hinterland with connections as discussed above, and are linked to each via the continuous waterfront promenade access.

6.3.7 The areas that would otherwise be occupied by the slip roads are indicated: as can be seen, they do not affect, and are not affected by, the activity nodes or their linkages. The slip road areas would remain as landscaped highway amenity areas, not waterfront activity areas. The area occupied by the ground level slip roads is not significant, in total only around 0.65ha. The absence of the slip roads does not result in any enhancement of the activity nodes or entertainment or leisure zones. There would therefore be no major gain in harbour-front planning terms, if the slip roads were to be omitted.

6.3.8 On the other hand, the inclusion of the slip roads will improve vehicle access to Wan Chai North and the future waterfront, but without forming barriers to pedestrian access to the waterfront.

6.4 The Effects of Slip Road 8 on Harbour Planning

6.4.1 As for the case with Slip Roads 1, 2 and 3, there is a concern that the slip road in Causeway Bay may compromise HEC's harbour planning principles, by sterilising waterfront space that could otherwise be used for quality waterfront development, and by affecting accessibility by cutting off pedestrian access to and along the harbour-front.

- 6.4.2 **Figure 6.5** illustrates the accessibility potential of the consolidated ideas for the Causeway Bay area (incorporating the Trunk Road tunnel base idea). In addition to a continuous east-west waterfront promenade, the major north-south linkage is provided via the landscaped deck that creates an extension of Victoria Park to the Causeway Bay waterfront.
- 6.4.3 This grade separated connection would be supplemented by at-grade pedestrian connections at the signalised junctions at Victoria Park Road / Hing Fat Street, providing access from the Tin Hau area.
- 6.4.4 As can be seen from Figure 6.5, Slip Road 8 (highlighted in the figure) does not impinge upon any of these proposed pedestrian connections or waterfront access routes. The slip road is located outside the waterfront area and the presence of the slip road does not affect harbour-front accessibility.
- 6.4.5 **Figure 6.6** shows the Causeway Bay waterfront area without the slip road, to illustrate whether there would be any significant gain in harbour-front planning terms. The primary activity routes in this area are highlighted, being the main pedestrian flow paths along the waterfront and back into Victoria Park.
- 6.4.6 The area that would otherwise be occupied by the slip road is indicated: as can be seen, this does not affect, and is not affected by, the activity routes (or pedestrian flow paths). Although there is a small loss of park space (around 0.2ha) along the northern boundary of Victoria Park, there would therefore be no major gain in harbour-front planning terms, if the slip road were to be omitted.

6.5 Summary of Ground Level Highway Infrastructure Impacts

- 6.5.1 Trunk Road tunnel ventilation requires the provision, within the WDII project area, of a Central Ventilation Building and an East Ventilation and Administration building. These buildings, which house essential infrastructure without which the tunnel cannot operate, are located within road amenity areas or over the footprint of the Trunk Road tunnel structure in less sensitive waterfront promenade areas. These facilities will not compromise harbour-front accessibility or planning.
- 6.5.2 Road P2 is an essential element of the new road network, serving local east-west traffic movements and the distribution of north-south movements. Road P2 is planned to run within the footprint of the Trunk Road, to minimise the area sterilised by highway infrastructure. The road does not impinge upon the new waterfront promenade area, and pedestrian connections over the top of Road P2 ensure that the road does not compromise harbour-front accessibility.
- 6.5.3 Three slip road connections (Slip Roads 1, 2 and 3) to the Trunk Road are proposed in Wan Chai North, for traffic from Central and western Hong Kong Island, and for traffic from the IEC and eastern Hong Kong Island, to/from Wan Chai and surrounding areas. The slip roads enable traffic to be diverted away from the Connaught Road Central / Harcourt Road / Gloucester Road corridor and ensure that the Trunk Road is properly

and effectively utilised. These slip roads tie into a ground level road layout, of which Road P2 is the major component.

- 6.5.4 A slip road connection (Slip Road 8) to the Trunk Road is also proposed in Causeway Bay, taking traffic from the Causeway Bay, Tai Hang, Fortress Hill and Tin Hau areas to Central and the western districts of Hong Kong Island.
- 6.5.5 The effects of these slip roads on harbour-front accessibility and harbour-front planning have been examined. The location of the slip roads is such that they do not impinge upon any proposed pedestrian connections or waterfront access routes. Therefore, the presence of the slip roads does not affect harbour-front accessibility. Neither does the presence of the slip roads affect the envisaged waterfront activity nodes or their linkages, and there would be no major gain in harbour-front planning terms if the slip roads were to be omitted. Rather, the slip roads provide a beneficial improvement in terms of vehicular access to Wan Chai North, Causeway Bay and the waterfront area.