Appendix A

Reclamation for the Flyover Option

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Civil Engineering and Development Department

SA2 to Agreement No. CE 54/2001 (CE)

Wan Chai Development Phase II Design and Construction for Trunk Road Tunnel Option

RECLAMATION FOR THE FLYOVER OPTION

October 2008

Document Ref. CCM_FL1 (081015)

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SA2 to Agreement No. CE 54/2001(CE)
WAN CHAI DEVELOPMENT PHASE II
DESIGN & CONSTRUCTION FOR TRUNK ROAD TUNNEL OPTION

RECLAMATION FOR THE FLYOVER OPTION

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1 INTRODUCTION

1.1 The Trunk Road Scheme

1.1.1 A comprehensive planning and engineering review of development and reclamation proposals for the Wan Chai Development Phase II project ("the WDII Review") has been conducted to assess individually the purpose and extent of each proposed reclamation by reference to the Overriding Public Need Test in accordance with the Court of Final Appeal ("CFA") judgment handed down on 9 January 2004 in respect of the judicial review on the Draft Wan Chai North Outline Zoning Plan No. S/H25/1 ("the draft OZP"). The WDII Review also makes recommendations on the revised alignment for the Trunk Road (comprising the Central-Wan Chai Bypass ("CWB") and Island Eastern Corridor Link ("IECL")) and at-grade roads, the extent of reclamation and the land uses for the review area covered by the assignment.

1.1.2 Under the WDII Review and through an extensive public engagement process, a Trunk Road scheme (known as the Trunk Road Tunnel Variation 1, or "Trunk Road Tunnel") has been developed that satisfies the traffic and functional requirements for the Trunk Road. The Trunk Road scheme also accommodates harbour-front enhancement ideas that have been proposed by the public, and the scheme with the Trunk Road in tunnel is supported by the public.

1.2 Cogent and Convincing Materials for the Trunk Road Scheme

1.2.1 The CFA ruled that the presumption against reclamation in the Protection of the Harbour Ordinance ("PHO") can only be rebutted by establishing an overriding public need for reclamation ("the Overriding Public Need Test"), and that there must be cogent and convincing materials available to enable the decision-maker to be satisfied that the test is fulfilled for rebutting the presumption against reclamation.

1.2.2 A report that was prepared in February 2007 sets out the process by which the Trunk Road scheme and its associated reclamation were derived and presents the "cogent and convincing materials" in support of the proposed reclamation required for such scheme under the PHO. That report, namely, the Cogent and Convincing Materials Report ("CCM Report") provided a full package of materials which explained how the presumption against reclamation was intended to be rebutted by an overriding public need for reclamation for the purposes of the PHO as clarified in the CFA judgment. The CCM Report sought to explain how the Overriding Public Need Test was intended to be complied with, why the extent of reclamation was justified, and provided an account of the process of identifying the alignment that would best serve to protect and preserve the Harbour.

1.2.3 The CCM Report has been widely distributed to relevant public bodies and key stakeholders as part of the consultation leading to the gazettal of the Trunk Road scheme, reclamation scheme for WDII and the amendments to the relevant draft OZPs. The CCM Report has also been uploaded onto the website of the Government [1] where it can be viewed by the public or downloaded.

1.3 Temporary Works for the Construction of the Trunk Road

1.3.1 Temporary works will be required for the implementation of the Trunk Road scheme. Of particular relevance in respect of the CFA ruling on the presumption against reclamation in the PHO are the temporary works that impinge upon the water areas of the Harbour. These include temporary reclamation for the Trunk Road construction through the ex-Public Cargo Working Area ("ex-PCWA") and Causeway Bay Typhoon Shelter ("CBTS"), temporary bridge construction for temporary traffic arrangements at the connection with the existing Island Eastern Corridor ("IEC") and temporary reprovisioning of mooring area for boats displaced by the construction works in the CBTS to facilitate the construction of the sub-seabed tunnel.

1.3.2 In October 2007, Society for Protection of the Harbour sought, through a judicial review, a declaration that the PHO and the presumption against reclamation contained therein apply to the proposed temporary reclamation works referred to in the road scheme for the Trunk Road gazetted under the Roads (Works, Use and Compensation) Ordinance on 27 July 2007. The ruling of the Court of First Instance ("CFI"), delivered on 20 March 2008, is that the PHO and the presumption against reclamation contained therein do apply to the proposed temporary reclamation works referred to in the road scheme for the Trunk Road gazetted under the Roads (Works, Use and Compensation) Ordinance on 27 July 2007.

1.3.3 In the light of the CFI judgment on temporary reclamation, the need and extent of temporary reclamation for both the Tunnel Option, on the basis of Tunnel Variation 1 as described in the CCM Report, and the Flyover Option has to be taken into account for reconfirming, if appropriate, the conclusion of the CCM Report.

1.3.4 Highways Department ("HyD") has, separately, reviewed the cogent and convincing materials that demonstrate the temporary reclamation for the construction of the Trunk Road Tunnel in the CBTS and ex-PCWA will meet the Overriding Public Need Test. Reference could be made to the report titled "Construction of the Trunk Road Tunnel in Causeway Bay Typhoon Shelter and ex-Wan Chai Public Cargo Working Area", prepared by HyD.

[1] http://www.devb-plb.gov.hk/reclamation/eng/ccm/cogent.htm

1.4 Purpose of this Report

1.4.1 Whilst the area of permanent reclamation for the Trunk Road Tunnel has been clearly defined in the CCM Report, and the need for and area of temporary reclamation within the CBTS and ex-PCWA for the Tunnel Option are being reviewed by HyD, the area of permanent and temporary reclamation for the Flyover Option needs to be reviewed to ensure consistency.

1.4.2 In this Report, the extent of permanent reclamation for the Flyover Option is reviewed, as well as the extent of temporary reclamation required to facilitate the construction of the Flyover Option. The mooring area affected by the construction of the Flyover Option is also assessed to determine the impacts on the existing CBTS moorings and any consequential temporary reclamation that may be required for reprovisioning of these affected moorings.

2 THE FLYOVER OPTION

2.1 Derivation of the Trunk Road Alignment and Form of Construction

2.1.1 A detailed examination of Trunk Road's needs and constraints, including an exhaustive investigation into the need for reclamation for the Trunk Road construction and of alternative schemes that might do away with reclamation or, at least, minimise reclamation, has been carried out. A Report on Trunk Road Alignments and Harbour-front Enhancement, April 2006, outlines the appraisal of these issues and the conclusions in respect of the feasibility or acceptability of Trunk Road alignments and forms of construction.

2.1.2 The feasible Trunk Road routeing is along the foreshore of Wan Chai and Causeway Bay. After crossing over the MTR Tsuen Wan line, the Trunk Road will run in shallow tunnel through the HKCEC water channel and along the Wan Chai shoreline. Thereafter, the Trunk Road can pass either below the CHT portal in tunnel (i.e. Tunnel Option) or over the top of the CHT portal as flyover (i.e. Flyover Option), continuing as either tunnel or flyover through the CBTS to a connection with the existing elevated IEC to the east of the typhoon shelter.

2.2 The Trunk Road Flyover Layout

2.2.1 Details of the Trunk Road Flyover Option can be found in the Report on Trunk Road Alignments and Harbour-front Enhancement, as well as in the CCM Report. The following paragraphs provide a summary of the main engineering features of the Trunk Road Flyover Option layout.

2.2.2 The Trunk Road starts off at the connection with Central Reclamation Phase III ("CRIII") in cut-and-cover tunnel, crosses over the MTR Tsuen Wan Line tunnel and continues through the Hong Kong Convention and Exhibition Centre ("HKCEC") water channel and along the Wan Chai shoreline, in cut-and-cover tunnel. The Trunk Road needs to stay in tunnel through the HKCEC water channel to avoid conflict with the existing HKCEC atrium link bridge and to allow for ground level road access. The Trunk Road can only rise up to ground level along the Wan Chai shoreline.

2.2.3 Towards the eastern end of the Wan Chai waterfront, the Trunk Road tunnel rises up to a tunnel portal and then onto elevated road structure to cross over the ex-PCWA basin, then over Kellett Island and the Cross Harbour Tunnel ("CHT") portal, and stays on elevated structure over the full length of the CBTS and connects to the existing elevated IEC at the eastern side of the CBTS at a level of around +14mPD.

2.2.4 The flyover alignment is kept to the southern part 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.

2.2.5 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.

2.2.6 The layout of the Flyover Option is shown in **Figure 2.1**.

2.3 Permanent Reclamation for the Flyover Option

2.3.1 An indicative area of around 11.5ha of permanent reclamation was found in preliminary studies to be required for the Trunk Road Flyover Option construction, as reported in the Report on Trunk Road Alignments and Harbour-front Enhancement. This earlier indicative estimate of reclamation also made allowance for reprovisioning of affected facilities and allowed for some flexibility in defining the reclamation edge in order to cater for uncertainties of the seawall design at that time. Similar to the case of the Trunk Road Tunnel Option, as reported in the Minimum Reclamation Report which forms Annex O of the CCM Report, the extent of reclamation for the Flyover Option can be refined to ensure that it is the minimum necessary for the implementation of the Trunk Road scheme, including seawall construction details determined from more detailed engineering design and detailed reprovisioning requirements that do not require reclamation.

2.3.2 A detailed examination of reclamation requirements indicates that reclamation in the area to the west of the HKCEC Extension, through the HKCEC water channel and along the Wan Chai shoreline, for the Trunk Road Flyover Option, will be similar to that for the Tunnel Option, with the same cut-and-cover tunnel construction. Although the Trunk Road rises up to elevated road along the Wan Chai shoreline, reclamation is still required for the cut-and-cover tunnel as it rises to ground level, and for the ground level tunnel portal. The tunnel structural width and the extent of seawall protection in front of the tunnel will be the same for both tunnel and flyover options. There is a small difference in extent of permanent reclamation between the Tunnel and Flyover Options at the eastern end of the Wan Chai shoreline: where the Tunnel Option dips below the seabed just before reaching the existing seawall of the ex-PCWA, the new permanent seawall and reclamation can be cut back to leave a small basin and, in so doing, minimise the extent of reclamation. This is not possible for the Flyover Option where the tunnel structure will rise to the ground level portal at this area, and the new seawall copeline will continue eastwards to the ex-PCWA breakwater.

2.3.3 The area of land formed for the Flyover Option at the HKCEC and along the Wan Chai shoreline, based on the detailed assessment of land formed for the Tunnel Option (as presented in the Minimum Reclamation Report at Annex O of the CCM Report) is thus about 9.8ha. This area of land formation (permanent reclamation) is shown in **Figure 2.1**.

2.3.4 The reduction from the earlier indicative estimate of 11.5ha arises mainly from a smaller reclamation area at HKCEC West due to the modification of the interface with CRIII and as additional reclamation is not required for reprovisioning of facilities such as cooling water pumping chambers, salt water pumping station, etc.

2.3.5 The flyover across the ex-PCWA basin and through the CBTS does not require any land formation in these areas, and the elevated connection to the IEC at the eastern side of the CBTS means that no new land needs to be formed along the North Point shoreline.

2.3.6 However, foundations are required to support the bridge columns which, in turn, support the elevated deck structure. Over water, the foundations would be constructed by steel tubular piles in the seabed, with concrete pile caps on top of the steel piles that will support the bridge piers; these pile caps would be constructed at around water surface level (partly above and partly below water level). Bridge protection would be by dolphins that are also constructed with steel piles in the seabed and a concrete capping at water surface level. These substructures of the elevated Trunk Road inside the ex-PCWA basin and CBTS, including pile caps and protective dolphins, will physically occupy the water area of the ex-PCWA basin and CBTS.

2.3.7 Whilst the pile caps and protective dolphin structures are not land formed with soil, they are solid structures fixed rigidly and permanently to the seabed (or, they can be viewed as solid structures rising up from the seabed to above water level), and these will permanently occupy the water area of the Harbour. The pile caps form a solid platform in the water on which the road structure rests. To all intents and purposes they can be considered as ‘forming land’ (this view is reinforced if one were to look at this area of the Harbour before and after construction of the Trunk Road, to see first open water and then solid mass replacing what was water), and they are therefore considered as reclamation in respect of the PHO.

2.3.8 In view of the similarity of road form and the geometrical and locational context of the flyover, and visual aspects, the form of elevated road structure and construction method for the Trunk Road through the CBTS are reasonably assumed, for the purpose of this review, to be similar to the existing elevated IEC structure that runs along the North Point shoreline and across the south-eastern corner of the CBTS, with the road deck supported on bridge piers which in turn are founded on foundation pile caps. However, whereas the existing IEC bridge deck is constructed using

pre-stressed u-beams with spans of around 30m, in order to minimise the number of pile caps in the water (bearing in mind now the PHO implications), pre-stressed segmental box girder construction is now assumed for the new flyover section across the ex-PCWA basin and through the CBTS, with a longer span of around 60m, where this span is considered to approach the limit of cost effective and efficient bridge design. Of course, while there would be a lesser number of pile caps for this longer bridge span, the size of the pile caps will be larger than those of the existing IEC bridge structure.

2.3.9 The pile caps and dolphins of the Flyover Option through the ex-PCWA basin and CBTS are shown in **Figure 2.2**. The total area of the pile caps and dolphins of the elevated Trunk Road at the water surface in the ex-PCWA basin and in the CBTS is about 0.4ha.

2.3.10 Other forms of elevated road structure, especially long span bridge, have also been considered. The form of the elevated road structure is a function of, amongst other factors, the functional requirements and purposes of the highway structure, the physical and visual connection to the existing IEC bridge structure, and aesthetic scale and proportion of the bridge structure. (Scale is the perceived size of individual members relative to their context. If a structure or some of its elements is too large or too small, the structure or the element will appear out of scale.) Longer spans would result in greater superstructure depth, which, in terms of scale of the structure, would be disproportionately large in this site context. The more substantial and bulky superstructure would also be visually more intrusive. In addition, foundations (pile caps) would be larger due to the larger loads, so while longer spans may result in fewer pile caps, they will individually occupy more water area.

2.3.11 The feasibility of a long span cable-stayed bridge was reviewed during the course of the WDII Review and during the public engagement on the Trunk Road options, but was not considered appropriate in this site context due to, amongst other reasons, the technical impracticality of this form of structure for the curved Flyover Option alignment through the eastern part of the CBTS, the technical feasibility of the connection of Slip Road 8 with the cable-stayed structure and the massive support pylons and foundations that would be required. After all, the functional requirements and purpose of the highway structure should not be compromised by an out of context application of structural form or design.

2.3.12 For completeness, the idea of purposely designing the bridge foundations to lie entirely below seabed, in which case reclamation associated with the pile caps and dolphins may be reduced or avoided completely, has also been considered. The conclusion is that it is not a practical or cost-effective approach. Substantial cofferdams would be required to enable the submarine concrete construction of the pile caps and the bridge piers, resulting in construction work being carried out in an undesirable situation

especially when compared with conventional pile cap construction at about sea level. With pile caps below seabed, the bridge piers have to be much longer and would result in a more massive and bulky structure in order to maintain the stability of the whole structure. The bridge piers extending through water to the seabed would be more susceptible to structural deterioration in the marine environment and they will still be susceptible to damage from ship impact (or, for that matter, from impact by any object in the water). The protective dolphins would still be required.

2.3.13 In summary, the end product for this Flyover Option is permanent reclamation (comprising land formation and substructures that physically occupy the water area of the Harbour) at the HKCEC, along the Wan Chai shoreline, in the ex-PCWA basin and in the CBTS, of about 10.2ha.

3 TEMPORARY WORKS REQUIRED FOR CONSTRUCTION OF THE FLYOVER OPTION

3.1 Temporary Works in the CBTS and ex-PCWA for Flyover Option

3.1.1 Construction of the Trunk Road Flyover requires first the construction of the foundations, namely the piles and pile caps, to support the bridge columns which, in turn, support the elevated deck structure. Temporary works are required for the concrete pile cap and dolphin construction, under a conventional approach. These are the surrounding formwork and, in this case because the concrete construction would be at the water surface or partially under water, containment of the pile cap and formwork within what could best be described as a 'cofferdam' structure to keep the water out of the concreting area. These temporary structures would lie partially submerged at the water surface, and they would provide temporary working platform or 'land' access for construction workers and equipment, displacing the water in the area; they would therefore constitute temporary reclamation in the context of the PHO.

3.1.2 An alternative method of construction for the pile caps and dolphins would be to use prefabricated concrete formwork, which would be lifted into place on the foundation piles and within which the concrete pile cap is constructed; the prefabricated concrete formwork would become part of the permanent pile cap structure. With this system, temporary works that may be considered as temporary reclamation under the PHO, as described in the paragraph above, would not be required. In view of the requirements of the PHO to seek reasonable alternatives to reclamation, it is assumed that, providing the necessary construction access is available, a prefabricated formwork system would be used (this would need to be specified in the construction contract) and therefore no temporary reclamation for the construction of the pile caps and dolphins is assigned to the Flyover Option.

3.2 Temporary Works in the CBTS for Temporary Traffic Arrangements

3.2.1 As mentioned in Section 2.2 above, for the Flyover Option, the new elevated Trunk Road has to connect to the IEC at the location of the Hing Fat Street slip roads. The section of the existing IEC structure joining Victoria Park Road and the slip road from Hing Fat Street to the IEC have to be demolished and rebuilt for such connection. Temporary traffic diversions have to be arranged during the construction works to maintain the traffic flow. Due to space limitation and the constraints of existing development in the vicinity of the tie-in to the IEC that make inland traffic diversions not feasible, most of the road diversions would have to be provided at the south-eastern corner of the CBTS. Alternative traffic diversions, in particular for the more efficient diversion of Hing Fat Street traffic, have been considered but would result in greater intrusion into the

CBTS. Temporary works, including temporary reclamation in the south-eastern corner of the typhoon shelter, will be required to facilitate these road diversions during the construction period.

3.2.2 Complex temporary traffic arrangements would be required for keeping the traffic flowing during construction of the Flyover Option. **Figure 3.1** indicates the temporary road diversions that would need to be put in place. Amongst these, Temporary Road A would be constructed to divert eastbound traffic from Victoria Park Road to IEC and to divert traffic on the at-grade Victoria Park Road away from the works area for demolishing the existing IEC and for constructing the Trunk Road mainline flyover. Also, Temporary Road B would be constructed to divert traffic from Hing Fat Street to IEC to enable the reconstruction of that slip road. Temporary Road A lies mainly within the CBTS area and Temporary Road B also protrudes into the CBTS area. Both of these are ground level roads, requiring temporary reclamation to cross the existing water body.

3.2.3 The new eastbound carriageway of the IEC, joining temporarily to Temporary Road A, has to be built before the existing IEC can be demolished in stages for constructing the Flyover Option mainline structures. However, Temporary Road A together with the new eastbound carriageway of the IEC will run across the front of the new Flyover Option mainline structures as well as the existing IEC structures to be demolished. Temporary reclamation would also be required to provide access from Victoria Park Road for the construction and demolition works that need to be undertaken in the south-eastern corner of the CBTS. These works cannot be carried out using marine access, as marine access would be cut off by the ground level Temporary Road A and the new eastbound IEC structure.

3.2.4 A small area in front of the A King Shipyard site is not directly required for traffic diversions or construction works, but if this is not filled in, it would become an isolated pond into which existing drainage culverts R and S would continue to discharge. To avoid the resultant pollutant build-up and associated health and odour problems, this pond would need to be filled in and the discharges from culverts R and S temporarily diverted to the outside of the temporary reclamation.

3.2.5 The resultant temporary reclamation would fill in the south-eastern corner of the typhoon shelter, with an area of about 3.3ha, as shown in **Figure 3.1**.

3.2.6 These temporary road diversions and the temporary reclamation (together with the temporary drainage extensions) would be removed by the contractor on completion of Trunk Road construction and the existing seabed reinstated.

Overriding Public Need for the Temporary Traffic Arrangements

3.2.7 There is no alternative to the temporary traffic arrangements. There is an overriding public need to maintain the traffic flows through this area, as the consequence of not doing so would be major disruption of traffic along the north shore of Hong Kong Island and indeed this part of the road network would become inoperable. There is thus an overriding public need for the temporary traffic arrangements.

Alternative to Temporary Reclamation for Temporary Traffic Arrangements

3.2.8 Alternatives to the temporary reclamation have been examined. A possible alternative would be to construct all the temporary roads on piled structures and use piled deck as an alternative to the temporary reclamation. In effect, replacing the 3.3ha of temporary land formation by soil filling with a steel deck structure covering the water and supported on a closed spaced grid of piled foundations into the seabed. The idea being that the sea is not "filled in". This is not a reasonable alternative and is not a practical engineering solution. The deck would need to be opened up to construct the foundations of the new bridge structures and access for construction of pile caps at the water level, with the pile cap works being carried out below the deck, would be restricted through the deck openings. There would be higher construction costs and programme delays compared with the approach using temporary reclamation. Qualitative appraisal indicates that water quality would be a major concern, as the mass of close spaced piles supporting the deck would have the effect of inhibiting flows under the deck, while outfalls from culverts R and S could not be diverted outside the covered corner of the typhoon shelter and their discharges would be largely trapped below the deck. For these reasons, a piled deck scheme for the temporary works and traffic diversions in the south-eastern corner of the CBTS would not be practically feasible and is not regarded as a reasonable alternative to the more conventional approach of filling in the south-eastern corner of the CBTS.

3.2.9 Moreover, construction of the deck would completely cover this water area of the harbour "for the purpose of forming land" on which men would be walking and construction plant standing. The deck would be contiguous with and physically connected alongside the existing shoreline, and would therefore effectively be a seaward extension of the existing land (indeed, a person walking from the existing land onto the platform would not realise that he was crossing the shoreline). The deck, lying just above the water surface, would cut off visual and physical contact with the existing water area; the sea underneath the deck would, for all practical purposes, be inaccessible to marine traffic. In view of the above, the piled deck structure is considered to fall within the definition of "reclamation" in the PHO. As such, it would not be an alternative to the temporary reclamation.

3.2.10 The only reasonable and practically feasible manner in which the temporary traffic arrangement could be implemented in order to maintain traffic flows through this area of construction, and to facilitate the construction and demolition works of the Flyover Option, would be by temporary filling in of the south-eastern corner of the CBTS, as shown in Figure 3.1.

Minimum Extent of Temporary Reclamation

3.2.11 The temporary traffic arrangement scheme that is presented is the one that requires the minimum extent of reclamation. This is achieved by confining the traffic diversions to the inshore area as much as possible, even though this would give rise to some traffic congestion black spots. Alternative routing of some of the traffic diversions to provide smoother traffic flows would require the extension of the temporary roads further out into the CBTS, with associated increase in the extent of temporary reclamation, and has therefore not been pursued.

3.2.12 Vertical temporary seawall, by blockwork construction, is assumed in order to minimise the intrusion of the temporary reclamation into the CBTS. A minimum separation between the temporary roads and the copeline of the temporary seawall of 6m has been determined. This is the minimum separation required to allow for pedestrian passageway alongside the temporary roads and for access for the contractor's construction and maintenance vehicles without impeding the diverted traffic flows.

3.3 Temporary Works at North Point for Temporary Traffic Arrangements

3.3.1 The Tunnel Option requires the installation of noise barriers along the new roads at the tie-in to the IEC to around City Garden, as a noise mitigation measure identified generally in accordance with the requirements of the Environmental Impact Assessment Ordinance. For the purpose of comparative appraisal of temporary reclamation areas for the Tunnel and Flyover Options, installation of noise barriers is also assumed for the Flyover Option along the existing IEC to a similar extent as would be provided for the Tunnel Option, so that both Trunk Road options would provide a similar level of benefit to North Point residents. However, it should be borne in mind that the actual extent of noise barriers required along the North Point shoreline beyond the physical tie-in of the Flyover Option to the existing IEC, in the event that the Flyover option were to be implemented, would be subject to further detailed assessment including noise assessment under the Environmental Impact Assessment Ordinance. Along the North Point shoreline, reconstruction of the existing flyover structure would be for strengthening of the structure to accommodate the noise barriers, but the existing form and layout of the IEC would not change, and therefore there would be no additional permanent reclamation

associated with this reconstruction. However, a temporary diversion of the elevated IEC will be required to enable the reconstruction of the existing flyover structure with noise barriers, as shown in **Figure 3.1**.

3.3.2 Similar to the explanation given in paragraph 2.3.7, concrete pile caps would need to be constructed in the Harbour for the temporary diversion of the IEC and, in this case, these would be regarded as temporary reclamation. Assuming prefabricated formwork is used for the pile cap construction, this area of temporary reclamation would be about 0.1ha.

3.3.3 These temporary works would be demolished and removed by the contractor on completion of the reconstruction of the IEC, along with the demolition of the temporary traffic diversion.

3.4 Minimum Extent of Temporary Reclamation for Flyover Option

3.4.1 In the preceding paragraphs, temporary reclamation has been shown to be required for the Flyover Option construction through the CBTS and along the North Point shoreline. This temporary reclamation is for the purpose of enabling the construction of the foundations for the flyover bridge and for temporary traffic diversions.

3.4.2 The estimation of temporary reclamation area is based on the actual physical area of works at the water surface and a minimum separation from the temporary road diversions to the temporary seawall copeline of the temporary reclamation through the south-eastern corner of the CBTS.

3.4.3 The overall minimum temporary reclamation requirements for the Trunk Road Flyover Option in the ex-PCWA basin, in the CBTS and along the North Point shoreline, in terms of total working areas to be formed during the course of construction, are:

(i) CBTS
(reclamation for temporary traffic arrangements
and to facilitate flyover construction) : 3.3ha

(ii) North Point
(temporary bridge foundations) : 0.1 ha

3.4.4 The total temporary reclamation area required for the construction of the Flyover Option is thus 3.4ha.

3.4.5 Staging of the temporary works has been considered. However, as the whole of the temporary traffic arrangements scheme would be required at any one time, so too would the associated temporary reclamation (i.e. the temporary reclamation could not, practically speaking, be implemented in stages). Moreover, the temporary traffic arrangements at the south-eastern corner of the CBTS would be concurrent with those at North Point, so the

temporary reclamation associated with the temporary bridge foundations would need to be in place at the same time as the temporary reclamation for traffic diversions in the CBTS. These temporary works would be in place for the overall period of construction of the works through the CBTS and the connection with the IEC, around 4 years.

3.4.6 Therefore, the temporary reclamation area required for the construction of the Flyover Option that will be in place at any one time would be approximately 3.4ha. This is considered to be the minimum overall extent of temporary reclamation required to facilitate the construction of the Trunk Road Flyover Option across the seabed of the ex-PCWA basin, the CBTS and along the North Point shoreline.

4 AFFECTED MOORING AREA

4.1 Existing Moorings in CBTS

4.1.1 The CBTS provides shelter for pleasure and operational vessels together with some dwelling vessels and miscellaneous local craft. As at April 2008, around 570 vessels of various types, at private licensed moorings and at anchorage areas, use the CBTS as a base. Details of the CBTS private mooring allocations, as at 19 March 2008, have been provided by Marine Department, while visual surveys were conducted during March/April 2008 to establish the type and numbers of vessels which occupy the anchorage areas.

4.1.2 The layout of the existing typhoon shelter is shown in **Figure 4.1**. As shown in Figure 4.1, the layout of the typhoon shelter comprises three distinct mooring/anchorage areas:

- The south-western triangle ("RHKYC Mooring Area") contains moorings licensed to the Royal Hong Kong Yacht Club ("RHKYC") for pleasure vessels. There are currently 152 private moorings in this mooring area, which occupy a water area of around 3ha.
- The northern triangle ("Private Mooring Area") contains moorings licensed by Marine Department for private vessels. There are currently 152 private moorings in this mooring area, which occupy a water area of around 4.4ha.
- The south-eastern triangle ("Anchorage Area"), occupying a water area of approximately 2.6ha, is mainly used as an anchorage by work boats, floating workshops and various local/miscellaneous craft, including motor launches and ferry vessels, small passenger sampans, fishing craft, rowing boats, and some pleasure vessels of various types (including junks, speed boats, etc). The floating Tin Hau Temple is currently moored within this anchorage area. The surveys have indicated that around 200 vessels are located in this anchorage area.

4.1.3 Outside of these designated mooring areas, a further 12 private licensed moorings are found elsewhere in the typhoon shelter; around 4 to 6 pilot craft occupy a small area in the south-eastern corner of the typhoon shelter, under the IEC road structure; around 25 small boats are moored up alongside the seawall of the Causeway Bay Promenade (to the south of the Anchorage Area); and around 30 miscellaneous small craft including dwelling vessels occupy the south-western corner of the typhoon shelter to the south of the RHKYC Mooring Area (outside the Police Officers' Club).

4.2 Construction Stage Impacts on CBTS Moorings

4.2.1 The construction of the Flyover Option in the CBTS will occupy part of the water area and hence affect the existing mooring and anchorage areas in the typhoon shelter. **Figure 4.2** illustrates the water areas that will be occupied by the Flyover Option construction in the CBTS. The temporary reclamation in the south-eastern corner of the typhoon shelter will be in place for the whole of the construction period of the works in the CBTS. However, construction of the flyover foundation piles, piles caps and bridge piers can be carried out sequentially and in stages. By so doing, occupation of the water area will be reduced and the impacts on the moorings in these water areas lessened.

4.2.2 The water areas occupied by the Flyover Option construction works are defined by the physical intrusion of the works (temporary reclamation and flyover bridge foundation and pile cap construction) and an allowance for a 20m contractor's works area, this being the minimum area that the contractor would need to physically occupy to carry out his works.

4.2.3 As shown in Figure 4.2, around 1.5ha of the Anchorage Area will be occupied by the temporary reclamation for Flyover Option construction. This will affect around 150 local vessels that currently occupy that part of the anchorage area. In addition, the pilot boats under the IEC will need to be relocated, as will the 25 or so small boats that are moored up alongside the seawall to the south of the Anchorage Area.

4.2.4 In the RHKYC Mooring Area, a maximum of around 0.6ha of the mooring area will be occupied at any one time, affecting about 30 boats at that time. The part of the RHKYC Mooring Area to the south of the flyover structure will not be physically occupied by the contractor, but boat moorings in this area will be restricted due to access constraints during the flyover construction.

4.2.5 Thus, a total of around 2.1ha of the designated mooring and anchorage areas of the CBTS, plus the boats anchored in the southern part of the typhoon shelter outside the designated Anchorage Area (local craft and pilot boats), would be affected and would need to be temporarily reprovisioned. In addition, there would be restricted access to the southern part of the RHKYC Mooring Area at the south-western corner of the typhoon shelter. Altogether, over 200 boats would be directly affected by the Flyover Option construction works and would need to be relocated.

4.3 Temporary Reprovisioning of Affected Moorings

4.3.1 The affected mooring and anchorage areas will need to be temporarily reprovisioned during the construction of the Flyover Option. The number of boats that would need to be relocated outside the CBTS could be reduced by first filling up the existing vacant mooring spaces in the Private

Mooring Area. The 30 boats on private moorings in the RHKYC Mooring Area that would be affected by the flyover construction works could be accommodated in this manner. (Filling up the vacant mooring spaces with the boats from the Anchorage Area would result in a mix of vessel types on fixed and anchored moorings which is considered not appropriate – the anchorage and mooring vessels should be separated.) That would leave the local craft in the 1.5ha affected area of the Anchorage Area, as well as those anchored outside the designated Anchorage Area, to be relocated outside the CBTS. Full on-site reprovisioning within the CBTS is not possible, as there is not sufficient space in the CBTS to accommodate all the affected Anchorage Area boats, unless unaffected private moorings in the RHKYC and Private Mooring Areas were relocated outside the CBTS in their stead.

4.3.2 HyD are, separately, reviewing the effects of the Trunk Road Tunnel construction through the CBTS on the existing private moorings and anchorage area and reviewing practically feasible alternatives for the temporary reprovisioning of these affected moorings and anchorages. These include off-site reprovisioning options involving temporary relocation of the pleasure boats in the Private Mooring Area or in the RHKYC Mooring Area to other typhoon shelters or sheltered anchorages outside the Harbour (for example to Aberdeen Typhoon Shelter (South)), or relocation of the local craft in the Anchorage Area to other typhoon shelters (most likely to Aberdeen Typhoon Shelter (West)). On-site reprovisioning options under review by HyD include reprovisioning of affected vessels in a temporary typhoon shelter to be constructed outside the existing CBTS or temporary use of the ex-PCWA basin, but both of these options would involve temporary reclamation for breakwater protection and therefore would have PHO implications (i.e. they should not be pursued if there is a feasible “no reclamation” option).

4.3.3 For the Flyover Option case, the option of using the ex-PCWA basin as temporary anchorage area would not be feasible as, apart from the PHO implications of the temporary breakwater, flyover construction works would be taking place in the ex-PCWA basin at the same time as the temporary reclamation in the CBTS, that requires relocation of the Anchorage Area boats, would be in place. Otherwise, any of the other temporary reprovisioning options being reviewed by HyD could also be adopted for the reprovisioning of CBTS users affected by the Flyover Option construction, particularly in view that the overall extent of affected moorings and anchorages to be reprovisioned under the Flyover Option is smaller than that under the Tunnel Option.

4.3.4 Therefore, for the temporary reprovisioning of the boats in the total affected 2.1ha of the designated mooring and anchorage areas of the CBTS, and particularly the boats in the 1.5ha affected Anchorage Area (as well as those outside the designated Anchorage Area), which may need to be relocated outside the CBTS, the findings of HyD’s review in respect of the

approach for temporary reprovisioning of the affected moorings and anchorages could be taken on board in determining suitable temporary reprovisioning schemes for the mooring and anchorage areas affected by the Flyover Option.

4.4 Operational Stage Impacts on CBTS Moorings

4.4.1 Unlike the Trunk Road Tunnel Option where, upon completion of construction, the CBTS will be reinstated to its existing condition with no loss of mooring or anchorage area, the Flyover Option will have a permanent impact on the existing use of the CBTS.

4.4.2 **Figure 4.3** illustrates impact of the Flyover Option on the existing mooring and anchorage areas after completion of construction. There will be a permanent loss of around 1.1ha of the Anchorage Area due to the occupation of this area by numerous pile caps of the Flyover Option mainline and slip roads and the low level connection from Victoria Park Road to IEC Eastbound, and the passageway that must be maintained to the south of the Anchorage Area for fire safety reasons. There will also be limited access for the boats that currently moor along the seawall to the south of the designated Anchorage Area.

4.4.3 There will be a permanent loss of around 0.6ha of the RHKYC Mooring Area due to the occupation of this area by the pile caps of the Flyover Option mainline. In addition, some 0.6ha of the southern part of the RHKYC Mooring Area will be limited for use by small vessels due to restricted access by headroom clearance limitations of the flyover structure and blocked access in the fairway to this area by the pile caps of the Flyover Option. This blocked fairway access will also partially restrict access to the existing landing steps at the south-western corner of the CBTS.

4.4.4 This overall loss of around 1.7ha of designated anchorage and mooring areas and restricted use of the southern part of the CBTS will be caused by the structures of the Flyover Option in the existing water area of the CBTS, and it will be a permanent loss. Consequently, some of the boats at the affected anchorages and moorings, once relocated outside CBTS, may not be able to return even after the Trunk Road is built. Permanent reprovisioning arrangements for these affected boats would be subject to further study and consultation with stakeholders, should the Flyover Option be pursued.

5 CONCLUSIONS

5.1 The Flyover Option and its Permanent Reclamation

5.1.1 A Flyover Option has been identified as an alternative to the Trunk Road Tunnel, that runs from the connection with CRIII and through the HKCEC water channel in the form of tunnel, but rises up to a ground level portal along the Wan Chai shoreline and then rises up onto elevated flyover structure over Kellett Island and the CHT portal and through the CBTS, connecting with the existing elevated IEC at the eastern side of the CBTS.

5.1.2 Permanent reclamation would be required for the Flyover Option, comprising land formation at the HKCEC and along the Wan Chai shoreline, and the flyover substructures that physically occupy the water area of the Harbour in the ex-PCWA basin and CBTS.

5.1.3 A total of about 10.2ha of permanent reclamation is associated with the Flyover Option.

5.2 Temporary Reclamation Required for the Flyover Option

5.2.1 Temporary reclamation would be required at the south-eastern corner of the CBTS for temporary traffic diversions and to facilitate the Flyover Option construction and demolition works. Along the North Point shoreline, temporary diversion of the existing IEC would require temporary flyover foundations in the Harbour.

5.2.2 The total temporary reclamation area required for the construction of the Flyover Option arising from the above would be about 3.4ha. This is considered to be the minimum overall extent of temporary reclamation required to facilitate the construction of the Trunk Road Flyover Option in the ex-PCWA basin, in the CBTS and along the North Point shoreline. This temporary reclamation would be in place for a duration of around 4 years.

5.3 Affected Mooring Area

5.3.1 A total of around 2.1ha of the existing designated mooring and anchorage areas of the CBTS, plus the boats anchored in the southern part of the typhoon shelter outside the designated Anchorage Area (local craft and pilot boats), would be affected by the Flyover Option construction works and would need to be temporarily reprovisioned. Altogether, over 200 boats would be directly affected by the Flyover Option construction works and would need to be relocated.

5.3.2 There would be a permanent loss of around 1.7ha of the designated mooring and anchorage areas and permanently restricted use of the southern part of the CBTS, caused by the structures of the Flyover Option, after construction. Some of the boats that would be relocated off-site during construction would likely not be able to return to the CBTS after the Trunk Road is built.