

## **ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE**

### **HEAD 704 – DRAINAGE**

#### **Civil Engineering – Drainage and erosion protection**

#### **111CD – Drainage improvement in Tsuen Wan, Kwai Chung and Tsing Yi – Tsuen Wan drainage tunnel**

Members are invited to recommend to Finance Committee the upgrading of **111CD** to Category A at an estimated cost of \$1,259.5 million in money-of-the-day prices for the implementation of a drainage tunnel project in Tsuen Wan and Kwai Chung.

### **PROBLEM**

Due to the inadequate capacity of the existing drainage system, some areas in Tsuen Wan and Kwai Chung are susceptible to flooding during heavy rainstorms.

### **PROPOSAL**

2. The Director of Drainage Services, with the support of the Secretary for the Environment, Transport and Works, proposes to upgrade **111CD** to Category A at an estimated cost of \$1,259.5 million in money-of-the-day (MOD) prices for the implementation of a drainage tunnel project in Tsuen Wan and Kwai Chung.

**/PROJECT .....**

**PROJECT SCOPE AND NATURE**

3. The scope of **111CD** comprises the construction of -
- (a) a drainage tunnel of about 5 kilometres (km) in length and of 6.5 metres (m) in diameter from Kwai Chung to Tsuen Wan;
  - (b) an outfall portal; and
  - (c) three intakes, about 80 m of associated connection adits and ancillary works.

———— A layout plan showing the location of the proposed works is at Enclosure 1.

4. We plan to start construction in October 2007 for completion in September 2011.

**JUSTIFICATION**

5. The drainage catchments of Tsuen Wan and Kwai Chung cover some major residential and industrial developments and their extensive upland catchment. The drainage systems in these areas were built several decades ago to meet the flow requirements and standards at that time. Developments over past decades have turned natural ground and slopes in these areas into paved areas, resulting in significant increase in surface run-off thus overloading the existing urban drainage systems. Flooding often occurs during heavy rainstorms causing traffic disruption and nuisance to the public.

6. The traditional approach to increase the capacity of the existing drainage systems in these highly urbanised areas is to enlarge existing drains or box culverts or construct additional ones. This will involve extensive pipelaying works in built-up areas. However, due to congestion of underground utilities in such areas, it is often impracticable to find sufficient room in the ground to lay any new drains. It will therefore necessitate the diversion of other existing utilities, if possible, to make room for the enlarged drains, thereby prolonging the construction period substantially. The construction will also require extensive road opening in the busy roads causing serious disruption to traffic, disturbance to the public and business operations, and other nuisances like dust and noise for a prolonged period. To minimise the above potential problems and disturbance, we propose to reduce the risk of flooding in the built-up areas by constructing the proposed drainage tunnel to intercept the surface run-off in mid-hill, which will then be conveyed for discharge into the sea without passing through the existing drainage system further downstream.

7. By diverting the upland flows to the proposed drainage tunnel, the residential and industrial developments in Tsuen Wan and Kwai Chung will be better protected from flooding. The extent of drainage upgrading works required in the congested lower catchment urban areas will also be drastically reduced. Traffic disruptions and disturbances to the public would be minimised, with the living environment of our society to be generally improved. Upon completion of the proposed works, the general standard of flood protection in Tsuen Wan and Kwai Chung will be enhanced to withstand a rainstorm with a return period<sup>1</sup> of one in 50 years.

## FINANCIAL IMPLICATIONS

8. We estimate the project cost of the proposed works to be \$1,259.5 million in MOD prices (see paragraph 9 below), made up as follows –

|  | <b>\$ million</b>                  |
|--|------------------------------------|
| (a) Construction works                       | 1,016.0                            |
| (i) drainage tunnel                          | 800.0                              |
| (ii) outfall portal                          | 63.0                               |
| (iii) intakes, adits and the ancillary works | 153.0                              |
| (b) Consultants' fees for                    | 93.0                               |
| (i) contract administration                  | 3.0                                |
| (ii) site supervision                        | 90.0                               |
| (c) Environmental mitigation measures        | 12.0                               |
| (d) Contingencies                            | 100.0                              |
|  | -----                              |
| Sub-total                                    | 1,221.0 (in September 2006 prices) |

/(e) .....

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<sup>1</sup> "Return period" means the average number of years during which a certain severity of flooding will occur once, statistically. A longer return period means a rarer chance of occurrence of a more severe flooding.

|                                    |                         |
|------------------------------------|-------------------------|
| (e) Provision for price adjustment | 38.5                    |
|                                    | <hr/>                   |
| Total                              | 1,259.5 (in MOD prices) |
|                                    | <hr/>                   |

A breakdown of the estimates for the consultants' fees by man-months is at Enclosure 2.

9. Subject to approval, we will phase the expenditure as follows –

| Year      | \$ million<br>(Sept 2006) | Price<br>adjustment<br>factor | \$ million<br>(MOD) |
|-----------|---------------------------|-------------------------------|---------------------|
| 2007-2008 | 19.0                      | 0.99900                       | 19.0                |
| 2008-2009 | 189.0                     | 1.00649                       | 190.2               |
| 2009-2010 | 290.0                     | 1.01656                       | 294.8               |
| 2010-2011 | 319.0                     | 1.02672                       | 327.5               |
| 2011-2012 | 161.0                     | 1.03699                       | 167.0               |
| 2012-2013 | 98.0                      | 1.05514                       | 103.4               |
| 2013-2014 | 73.0                      | 1.07624                       | 78.6                |
| 2014-2015 | 72.0                      | 1.09777                       | 79.0                |
|           | <hr/>                     |                               | <hr/>               |
|           | 1,221.0                   |                               | 1,259.5             |
|           | <hr/>                     |                               | <hr/>               |

10. We have derived the MOD estimates on the basis of Government's latest forecasts of trend rate of change in the prices of public sector building and construction output for the period 2007 to 2015. We will adopt a design-and-build contract in order to shorten the time required by allowing part of the detailed design and construction to be carried out in parallel and with a view to achieving a cost-effective design by utilising contractors' specialist knowledge in tunnelling. The contract will provide for price adjustments because the contract period will exceed 21 months.

11. We estimate the annual recurrent expenditure arising from this project to be about \$2 million.

**/PUBLIC .....**

**PUBLIC CONSULTATION**

12. We consulted the Environmental and Health Affairs Committee of the Tsuen Wan District Council on 2 November 2006, and the Planning and Environmental Hygiene Committee of the Kwai Tsing District Council on 19 December 2006. Both Committees supported the proposed works. We also consulted the Tsuen Wan West Area Committee, Tsuen Wan Rural Area Committee and Tsuen Wan East Area Committee on 11, 14 and 15 December 2006 respectively. The three Area Committees had no objection to the proposed works.

13. We gazetted the proposed works under the Foreshore and Sea-bed (Reclamations) Ordinance on 3 March 2006 and did not receive any objection. The scheme was authorised on 9 June 2006.

14. We briefed the Legislative Council Panel on Planning, Lands and Works at its meetings on 5 March 2001 and 4 January 2002 on the proposed drainage tunnel scheme. We also submitted information papers to the Panel on 27 April 2004 and 13 July 2005 on the progress of the proposed scheme. We consulted the Panel again on the proposed works by circulation of an information paper on 12 March 2007. Members had no objection to the proposed works.

**ENVIRONMENTAL IMPLICATIONS**

15. The project is a designated project under Schedule 2 of the Environmental Impact Assessment Ordinance (EIAO) (Cap. 499) and an environmental permit is required for construction and operation of the project. The EIA Report for the project, which concluded that the environmental impact of the project could be controlled to within the criteria under the EIAO and Technical Memorandum on EIA Process, was approved under the EIAO in August 2005. We shall implement the measures recommended in the approved EIA report. We have included \$12 million (in September 2006 prices) for implementing the environmental mitigation measures.

16. For short-term impacts during construction, we will control noise, dust and site run-off within standards and guidelines through implementation of mitigation measures such as the use of temporary noise barriers and silenced construction plants to reduce noise generation, water-spraying to reduce emission of fugitive dust, and strict control on diversion of stream flows in the works contract. We will incorporate the EIA recommendations into the works contract for implementation and conduct environmental monitoring and auditing to ensure the effectiveness of the mitigation measures.

17. We have considered reducing the tunnel diameter, tunnel length and extents of intake and outfall structures, as well as maximising the use of construction and demolition (C&D) materials by reusing the excavated soil material for landscaping and excavated rock for architectural finishes, in the planning and design stages to reduce the generation of C&D materials where possible. In addition, we will require the contractor to reuse inert C&D materials including excavated soil for backfilling on site or in other suitable construction sites as far as possible, in order to minimise the disposal of C&D materials to public fill reception facilities<sup>2</sup>. We will encourage the contractor to maximise the use of recycled or recyclable C&D materials, as well as the use of non-timber formwork to further minimise the generation of construction waste.

18. We will also require the contractor to submit waste management plans (WMP) for approval. The WMP will include appropriate mitigation measures to avoid, reduce, reuse and recycle C&D materials. We will ensure that the day-to-day operations on site comply with the approved WMP. We will control the disposal of public fill and C&D waste to public fill reception facilities and landfills respectively through a trip-ticket system. We will require the contractor to separate public fill from C&D waste for disposal at appropriate facilities. We will record the disposal, reuse and recycling of C&D materials for monitoring purposes.

19. We estimate that the project will generate about 673 600 tonnes of C&D materials. Of these, we will reuse about 9 400 tonnes (1.4%) on site and deliver about 635 900 tonnes (94.4%) to public fill reception facilities for subsequent reuse. In addition, we will dispose of about 28 300 tonnes (4.2%) at landfills. The total cost for accommodating C&D materials at public fill reception facilities and landfill sites is estimated to be about \$20.7 million for this project (based on a unit cost of \$27/tonne for disposal at public fill reception facilities and \$125/tonne at landfills<sup>3</sup>).

## TRAFFIC IMPACTS

20. We have aligned the proposed drainage tunnel to be located away from busy roads and assessed the traffic impacts due to the proposed works to be minimal. We have drawn up a preliminary temporary traffic management

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<sup>2</sup> Public fill reception facilities are specified in Schedule 4 of the Waste Disposal (Charges for Disposal of Construction Waste) Regulation. Disposal of public fill in public fill reception facilities requires a licence issued by the Director of Civil Engineering and Development.

<sup>3</sup> The estimate has taken into account the cost for developing, operating and restoring the landfills after they are filled and the aftercare required. It does not include the land opportunity cost for existing landfill sites (which is estimated at \$90/m<sup>3</sup>), nor the cost to provide new landfills (which is likely to be more expensive) when the existing ones are filled.

scheme for construction of the drainage tunnel and consulted the relevant parties including Transport Department (TD) and Hong Kong Police Force (HKPF). The scheme is considered acceptable.

21. We will establish a Traffic Management Liaison Group (TMLG) under the works contract to discuss, scrutinise and agree on the proposed temporary traffic arrangements. We will invite representatives from TD, HKPF, Highways Department, District Offices, various public transport operators and utility undertakings to attend the TMLG meetings and every temporary traffic arrangement has to be agreed by the TMLG before implementation. The TMLG will also take into account all relevant factors such as site restrictions, existing and future traffic conditions, pedestrian safety, access to building/shop fronts and provision of emergency vehicular access in considering the temporary traffic arrangements.

## LAND ACQUISITION

22. The project will affect four private lots. We have obtained voluntary agreements and exercised the existing rights under relevant land leases for the construction, implementation and maintenance of the proposed drainage tunnel. No land resumption is required for the project. The clearance cost is estimated to be \$1.5 million which will be charged to **Head 701 - Land Acquisition**.

## BACKGROUND INFORMATION

23. In September 2000, we included **111CD** in Category B of the Public Works Programme.

24. In March 2002, we upgraded part of **111CD** to Category A as **121CD** "Drainage improvement in Tsuen Wan, Kwai Chung and Tsing Yi – preliminary design and investigations" at an estimated cost of \$45.1 million for engaging consultants to carry out the preliminary design and investigations for the proposed tunnel project.

25. In February 2006, we commissioned a separate consultancy to carry out reference design, prepare contract documentation and assist in the tendering process under the design and build procurement approach for **111CD**, at an estimated cost of \$11.0 million for completion in September 2007. We charged the amount to block allocation Subhead **4100DX** "Drainage works, studies and investigations for items in Category D of the Public Works Programme".

/26. ....

26. Of the about 1 033 trees within the project boundary, about 598 trees will be preserved. The proposed works will involve the removal of 435 trees including about 351 trees to be felled and 84 trees to be replanted within the project site. All trees to be removed are not important trees<sup>4</sup>. We will incorporate planting proposals as part of the project, including planting of about 1 700 trees, 9 000 shrubs and 35 000 square metres of grassed area.

27. We estimate that the proposed works will create about 200 jobs (135 for labourers and another 65 for professional/technical staff) providing a total employment of 7 500 man-months.

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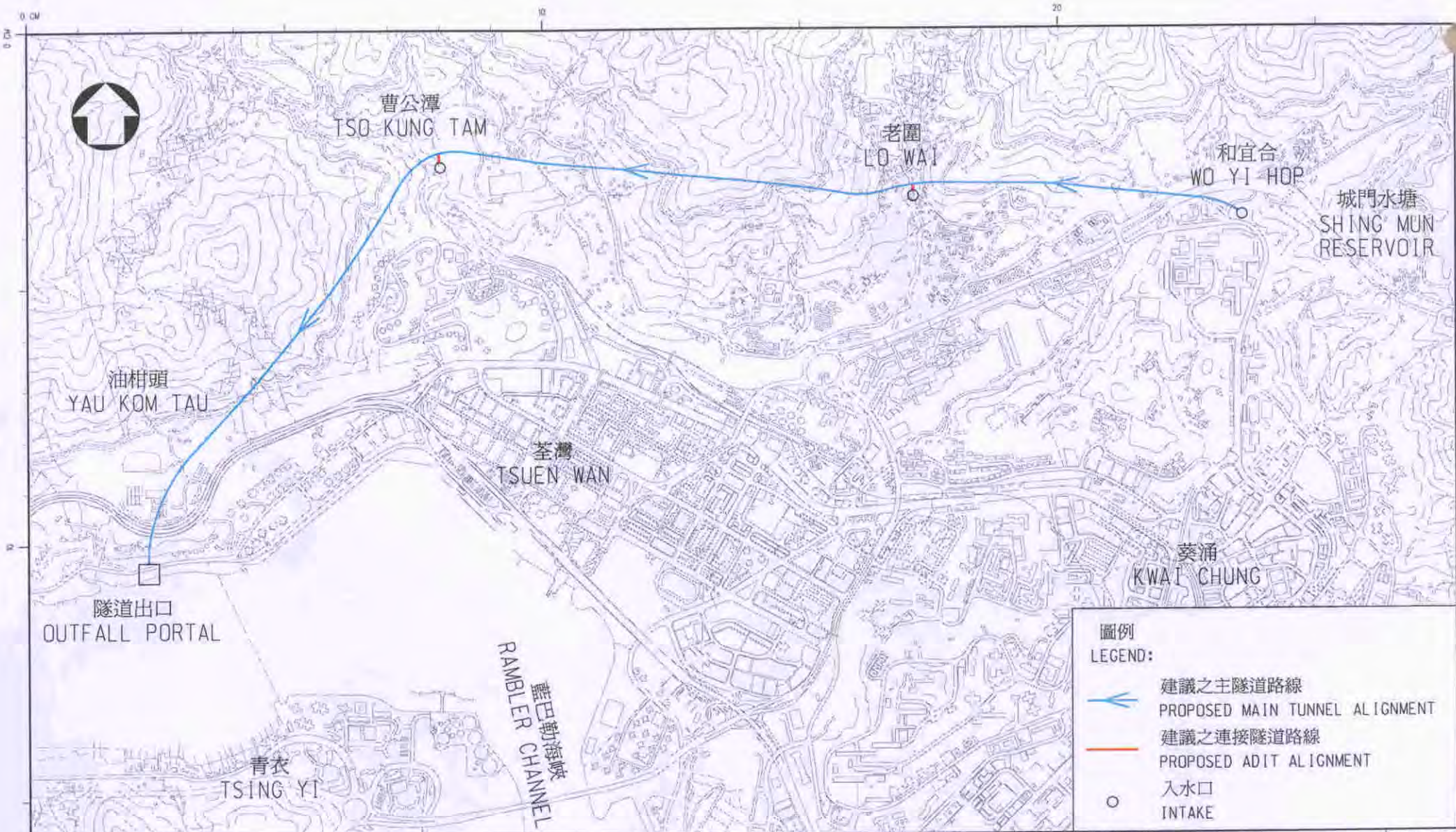
Environment, Transport and Works Bureau  
May 2007

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<sup>4</sup> “Important trees” refer to trees in the Register of Old and Valuable Trees, or any other trees that meet one or more of the following criteria –

- (a) trees over 100 years old or above;
- (b) trees of cultural, historical or memorable significance e.g. Fung Shui trees, trees as landmark of monastery or heritage monument, and trees in memory of important persons or event;
- (c) trees of precious or rare species;
- (d) trees of outstanding form (taking account of overall tree sizes, shape and any special features) e.g. trees with curtain like aerial roots, trees growing in unusual habitat; or
- (e) trees with trunk diameter equal or exceeding 1.0 m (measured at 1.3 m above ground level), or with height/canopy spread equal or exceeding 25 m.





**圖例**  
LEGEND:

- 建議之主隧道路線  
PROPOSED MAIN TUNNEL ALIGNMENT
- 建議之連接隧道路線  
PROPOSED ADIT ALIGNMENT
- 入水口  
INTAKE

圖別名稱 drawing title  
 工務計劃項目第111CD號  
 荃灣, 葵涌及青衣雨水排放系統改善工程-荃灣雨水排放隧道  
 PWP ITEM NO. 111CD  
 DRAINAGE IMPROVEMENT IN TSUEN WAN, KWAI CHUNG AND  
 TSING YI - TSUEN WAN DRAINAGE TUNNEL

|             |  |         |         |
|-------------|--|---------|---------|
| 繪畫 drawn    | SIGNED C.W. CHAN                           | 日期 date | 02FEB07 |
| 核對 checked  | SIGNED K.K. UY                             | 日期 date | 02FEB07 |
| 批核 approved | SIGNED W.K. HO                             | 日期 date | 02FEB07 |
| 部門 office   | 顧問工程管理部<br>CONSULTANTS MANAGEMENT DIVISION |         |         |

|   |          |
|---|----------|
| 圖別編號 drawing no.  | 比例 scale |
| DCM/2007/007  | N.T.S.   |
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**111CD - Drainage improvement in Tsuen Wan, Kwai Chung and Tsing Yi –  
Tsuen Wan drainage tunnel**

**Breakdown of estimates for consultants' fees**

| <b>Consultants' staff costs</b>       |   | <b>Estimated man month</b> | <b>Average MPS* salary point</b> | <b>Multiplier (Note 1)</b> | <b>Estimated fee (\$million)</b> |
|---------------------------------------|---|----------------------------|----------------------------------|----------------------------|----------------------------------|
| (a)                                   | Contract administration (Note 2)                                    |                            |                                  |                            |                                  |
|                                       | Professional  | -                          | -                                | -                          | 2.5                              |
|                                       | Technical   | -                          | -                                | -                          | 0.5                              |
| (b)                                   | Site supervision by resident site staff of the consultants (Note 3) |                            |                                  |                            |                                  |
|                                       | Professional  | 472                        | 38                               | 1.6                        | 41.0                             |
|                                       | Technical   | 1 700                      | 14                               | 1.6                        | 49.0                             |
| <b>Total consultants' staff costs</b> |   |                            |                                  |                            | <b>93.0</b>                      |

\* MPS = Master Pay Scale

**Notes:**

1. A multiplier factor of 1.6 is applied to the average MPS salary point to estimate the cost of resident site staff supplied by the consultants. (As at 1 January 2007, MPS point 38 = \$54,255 per month and MPS point 14 = \$18,010 per month).
2. The consultants' fees for contract administration are based on the lump sum fees calculated in accordance with the consultancy agreement which the Director of Drainage Services has agreed with the consultants undertaking the design and construction of the project. The construction phase of the assignment for the proposed works will only be executed upon Finance Committee's approval to upgrade the proposed works to Category A.
3. We will only know the actual man-months and actual costs after the completion of the construction works.