

For discussion
on 30 January 2002

PWSC(2001-02)98

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 –

- (a) the upgrading of part of **111CD**, entitled "Drainage improvement in Tsuen Wan, Kwai Chung and Tsing Yi – preliminary design and investigations", to Category A at an estimated total cost of \$45.1 million in money-of-the-day prices; and
- (b) the retention of the remainder of **111CD** in Category B.

PROBLEM

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

/PROPOSAL

PROPOSAL

2. The Director of Drainage Services (D of DS), with the support of the Secretary for Works, proposes to upgrade part of **111CD** to Category A for engaging consultants to carry out the following preliminary design and investigations for the proposed works described in paragraph 3 below –

- (a) site investigations and surveys;
- (b) physical modelling tests;
- (c) environmental, traffic and heritage impact assessments;
and
- (d) preliminary design.

The total estimated cost of the proposed consultancy is \$45.1 million in money-of-the-day (MOD) prices.

PROJECT SCOPE AND NATURE

3. The scope of **111CD** comprises the construction of the Tsuen Wan drainage tunnel, about 5.35 kilometres in length and 6.5 metres in diameter, from the junction of Shing Mun Road and Wo Yi Hop Road in Kwai Chung to the south of Yau Kom Tau to divert stormwater from the steep upper rural catchment above Tsuen Wan and Kwai Chung urban areas away from the existing downstream drainage systems.

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

5. We plan to start the proposed consultancy in July 2002 for completion in October 2005.

JUSTIFICATIONS

6. Most of the existing drainage systems in Tsuen Wan and Kwai Chung were designed and constructed more than 30 years ago to meet the flow requirements at that time. Rapid urbanisation and changes in land use over the past decades have turned the natural ground and slopes into paved areas. Rainwater

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which could previously dissipate naturally through ground filtration can no longer do so. This has led to significant increase in surface runoff and overloading of the existing drainage systems. Although we have been making local improvements to the systems to cater for developments from time to time, the overall drainage systems as a whole are still inadequate to meet the required flood protection standard. Flooding often occurs during heavy rainstorms.

7. To alleviate flooding in the Tsuen Wan and Kwai Chung districts and to meet the community's increased expectation for higher flood protection standard, we carried out a comprehensive review of the drainage systems under **76CD** "Stormwater Drainage Master Plan Study in Tsuen Wan, Kwai Chung and Tsing Yi" (the Study). The Study identifies that due to the topography and extensive coverage of the upland catchment, large quantity of stormwater flows from the uplands can accumulate in a short period during heavy rainstorms and overload the downstream drainage systems in the Tsuen Wan and Kwai Chung districts. The Study also finds that in the event of a rainstorm with a return period of or exceeding one in 20 years, flooding would occur along Kwai Chung Road from Kwai Fong to Sheung Kwai Chung and also in the area bounded by Castle Peak Road, Tsuen Wan Road and Texaco Road North in Tsuen Wan District. Apart from traffic disruption and damage to property, the fast and large flows from the hills may also impose potential risk to life.

8. In view of the above, the Study recommends the construction of a drainage tunnel from the junction of Shing Mun Road and Wo Yi Hop Road in Kwai Chung to the south of Yau Kom Tau (Tsuen Wan drainage tunnel) to intercept and convey the upland flows directly to the sea. The main benefit of this proposal is that without the need to implement extensive pipelaying works in the busy streets of the Tsuen Wan and Kwai Chung districts, the general standard of flood protection in Tsuen Wan and Kwai Chung can be raised to withstand at least a rainstorm with a return period of one in 50 years¹.

9. Due to lack of in-house staff resources and expertise, D of DS proposes to employ consultants to carry out site investigations, surveys, physical modelling tests, impact assessments and preliminary design to facilitate the implementation of the proposed drainage improvement works.

/FINANCIAL

¹ "Return period" means the average number of years during which a certain severity of flooding will occur one, statistically. A longer return period means a rare chance of occurrence of a more severe flooding.

FINANCIAL IMPLICATIONS

10. We estimate the cost of the proposed consultancy to be \$45.1 million in MOD prices (see paragraph 11 below), made up as follows –

	\$ million	
(a) Site investigations, surveys and physical modelling tests	28.3	
(b) Consultants' fees –	12.3	
(i) supervision of site investigations and surveys	3.5	
(ii) environmental impact assessment (including heritage impact assessment)	2.1	
(iii) traffic impact assessment	1.2	
(iv) preliminary design	5.5	
(c) Contingencies	4.0	
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Sub-total	44.6	(in September 2001 prices)
(d) Provision for price adjustment	0.5	
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Total	45.1	(in MOD prices)
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_____ A breakdown of the estimates for consultants' fees by man-months is at Enclosure 2.

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

Year	\$ million (Sept 2001)	Price adjustment factor	\$ million (MOD)
2002 – 2003	3.1	0.99700	3.1
2003 – 2004	20.4	1.00398	20.5
2004 – 2005	10.6	1.01101	10.7
2005 – 2006	8.5	1.01808	8.7
2006 – 2007	2.0	1.02521	2.1
	44.6		45.1

12. We have derived the MOD estimates on the basis of the Government's latest forecast of trend labour and construction prices for the period 2002 to 2007. We will tender the proposed consultancy under a lump-sum contract with provision for price adjustment as the consultancy agreement will exceed 12 months. The physical modelling contract will be let on a lump-sum basis without price adjustment. The contract for site investigations and surveys will be let on a re-measurement basis as we cannot determine in advance the exact extent of the required works. All the three contracts will be awarded by the Government following a competitive tendering process and will be supervised by the consultants and site staff employed by the consultants.

13. The proposed consultancy will not give rise to any recurrent expenditure.

PUBLIC CONSULTATION

14. We presented the findings and recommendations of the Study to Tsuen Wan District Council on 2 February 2001 and the Planning and Environmental Protection Committee of the Kwai Tsing District Council on 9 February 2001 respectively. Both Councils supported the findings and recommendations of the Study, including implementation of the proposed project.

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15. On 5 March 2001, we consulted the LegCo Panel on Planning, Lands and Works on the proposed drainage improvement projects for Northern Hong Kong Island, West Kowloon and Tsuen Wan. Members raised no objection to the implementation of the projects. Nevertheless, some Members requested the Administration to provide more details about these projects, including background information on the need to improve the existing drainage systems, and an assessment on the restriction in land uses due to the proposed drainage tunnels. In response, we submitted detailed supplementary information to Members in late March 2001 vide LC Paper No.CB(1)866/00-01.

16. At the Public Works Subcommittee meeting held on 4 April 2001 for discussion of the proposal to upgrade part of **110CD** "Drainage improvement in Tsuen Wan, Kwai Chung and Tsing Yi – urban drainage improvement works" and part of **111CD** "Drainage improvement in Tsuen Wan, Kwai Chung and Tsing Yi – Tsuen Wan drainage tunnel", as a combined item, for investigations and detailed design, Members expressed concerns over the cost-effectiveness of the interception approach in tackling flooding problem in urban areas (i.e., the construction of drainage tunnels to intercept and convey the upland flows directly to the sea to reduce the risk of flooding in urban areas in the lower catchment), and requested the Administration to conduct more thorough consultation with the Panel, the industry and relevant professional bodies. The Administration withdrew the proposal, pending the outcome of further consultation.

17. Since then, we have re-assessed and compared the relative cost of drainage improvement works under two different approaches – the interception approach and the traditional approach (i.e., through pipelaying). We have selected three drainage improvement projects (the drainage improvement projects for Northern Hong Kong Island, Lai Chi Kok and Tsuen Wan) for comparison. It is found that the construction costs of these projects under both approaches are generally comparable. However, taking into account the social costs in terms of disruption to traffic and the environment, the total cost under the traditional approach would be very much higher than the interception approach in all cases. We therefore believe that the interception approach is a more cost-effective option. A table comparing the interception approach and traditional approach to improving the drainage systems in Tsuen Wan and Kwai Chung under **111CD**, in terms of length of drains/tunnel to be constructed, construction cost and construction time, is at Enclosure 3 for Members' reference. We have also consulted the industry, relevant professional bodies and interested parties on our findings. There is general support for implementing the drainage tunnel projects. We will carry out the design work for **110CD** under a separate consultancy (see paragraph 26 below).

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18. We have also carried out a cost-benefit analysis on the three proposed drainage tunnel projects mentioned in paragraph 17 above. In terms of tangible benefits, implementation of the proposed drainage tunnel projects would help minimise flood damages, including damages to properties/goods/merchandise, repair costs, traffic disruption and loss of business, etc. Setting aside intangible elements such as nuisance and other social losses, the result of the analysis shows that the benefit/cost ratio of implementing the proposed Tsuen Wan drainage tunnel is about 1.6².

19. On 4 January 2002, we consulted Members of the LegCo Panel on Planning, Lands and Works on our findings on the interception approach. Experts in hydraulics and representatives from various professional bodies also participated at the meeting. We thoroughly discussed the causes of major flooding in recent years, the technical feasibility of the proposed drainage tunnel projects, the cost-effectiveness as well as cost and benefit of the interception approach. We agreed to provide Members with supplementary information on the possible sedimentation and hygiene issues of the tunnels after the meeting. Noting that the experts and representatives from professional bodies considered the proposal feasible and cost-effective, Members had no objection to the implementation of the proposed drainage projects. We provided the supplementary information to Members on 17 January 2002 vide LC Paper No.CB(1)/833/01-02(1).

ENVIRONMENTAL IMPLICATIONS

20. The tunnel project under **111CD** is a designated project under Schedule 2 of the Environmental Impact Assessment (EIA) Ordinance. An environmental permit is required for the project. We will prepare an EIA report to meet the requirements under the EIA Ordinance. We will incorporate all the measures recommended in the EIA report into the detailed design and relevant works contract, and will apply for an environmental permit before the project construction work commences.

21. The proposed consultancy for preliminary design and site investigation works will not cause any adverse environmental implications. The site investigations under the proposed consultancy will generate minimal amount of construction and demolition (C&D) materials. We will require the consultants to fully consider and propose measures for minimising the generation of C&D materials and for reusing/recycling C&D materials as much as possible when carrying out preliminary design and at construction stage in future.

/LAND

² A project would be considered cost-effective if its benefit/cost ratio is greater than one.

LAND ACQUISITION

22. The proposed consultancy does not require any land acquisition.

BACKGROUND INFORMATION

23. We commissioned the Study in 1996 (see paragraph 7 above) and completed it in July 1999. According to the Study, the drainage systems in Tsing Yi met the current flood protection standard. As regards the drainage systems in Tsuen Wan and Kwai Chung, the Study recommended a series of improvement works and **111CD** is one of the projects recommended in the Study.

24. We upgraded **111CD** to Category B in September 2000 at an estimated cost of \$1,093.6 million (in September 2001 prices).

25. Upon substantial completion of the preliminary design for **111CD** in December 2004, we will proceed with the detailed design work in January 2005 for completion in February 2006. As the project involves specialised tunneling works, we need to allow sufficient time for carrying out detailed site investigations, physical modeling tests and the necessary statutory procedures. This would facilitate the appropriate design of the drainage tunnel and enable construction to proceed safely, efficiently and in a controlled manner in future. Subject to the prior enactment of the relevant legislation³, we plan to start the construction of the drainage tunnel and associated facilities in late 2006 for completion in late 2010.

26. We will carry out the urban drainage improvement works under **110CD** separately. We will engage consultants to carry out the design and prepare the tender documents at an estimated cost of \$3.5 million to be funded under the block allocation **4100DX** "Drainage works, studies and investigations for items in Category D of the Public Works Programme". The proposed consultancy for **110CD** will start in June 2002 for completion in November 2003. This will enable early commencement of the construction works in December 2003 for completion in June 2005.

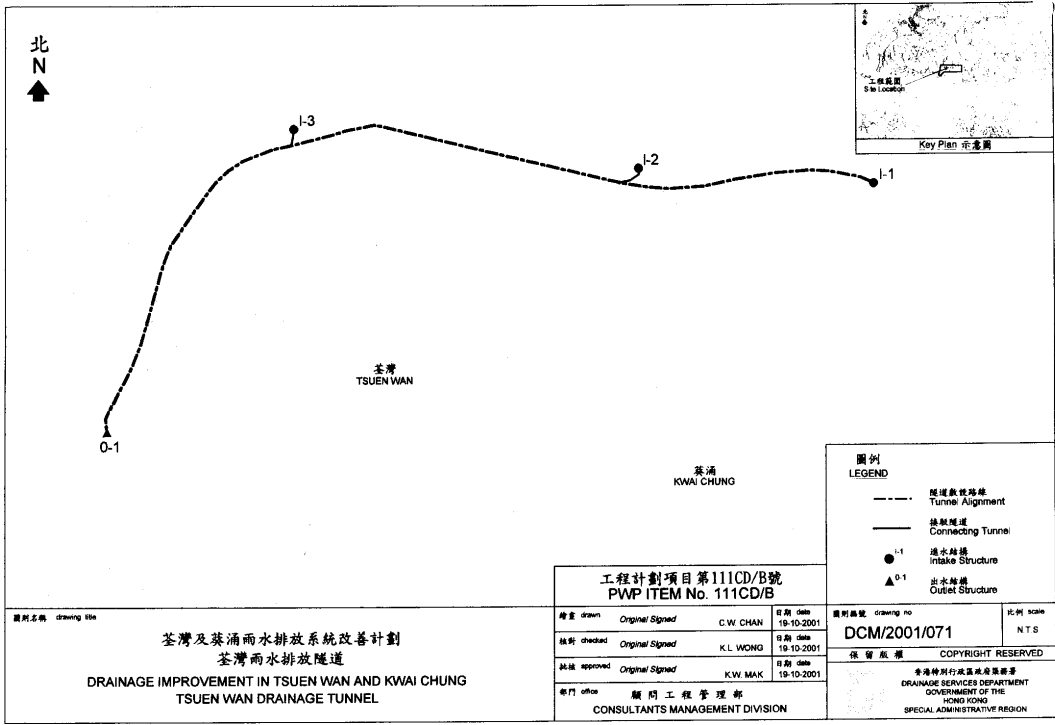
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³ The proposed drainage tunnels will pass under some private lands. The Government will draft and seek enactment of the relevant bill in order to provide easements and other rights over land for the purpose of the construction, maintenance and operation of drainage tunnels. The drainage tunnel project will then be gazetted under the relevant ordinance which will provide channels for objections and appeals from the public, and authorised before commencement of construction. Subject to the approval of this proposed item, we will proceed to draft and seek enactment of the relevant bill. The law drafting and enactment process would normally take about two years to complete.

27. Upon completion of proposed Tsuen Wan drainage tunnel, the flood protection level in Tsuen Wan and Kwai Chung areas will generally be raised to withstand rainstorms with a return period of one in 200 years and one in 50 years for the trunk drains and branch drains respectively, and the chance of flooding during heavy rainstorms will be very small.

28. We estimate that the consultancy will create some 30 jobs, comprising ten professional/technical staff and 20 labourers, totalling 1 000 man-months.

Works Bureau
January 2002



附件 1 Enclosure 1

圖則名稱 drawing title

荃灣及葵涌雨水排放系統改善計劃
荃灣雨水排放隧道
DRAINAGE IMPROVEMENT IN TSUEN WAN AND KWAI CHUNG
TSUEN WAN DRAINAGE TUNNEL

工程計劃項目第111CD/B號 PWP ITEM No. 111CD/B			
繪圖 drawn	Original Signed	C.W. CHAN	日期 date 19-10-2001
核對 checked	Original Signed	K.L. WONG	日期 date 19-10-2001
校核 approved	Original Signed	K.W. MAK	日期 date 19-10-2001
部門 office	顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION		

圖則編號 drawing no.	比例 scale
DCM/2001/071	NTS
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香港特別行政區渠務處 DRAINAGE SERVICES DEPARTMENT GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION	

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

Breakdown of the estimates for the consultants' fees

Consultants' staff costs			Estimated man-months	Average MPS* salary point	Multiplier	Estimated Fee (\$ million)
(i)	Supervision of site investigations and surveys	Professional	18.0	38	2.4	2.6
		Technical	19.0	14	2.4	0.9
(ii)	Environmental Impact Assessment (including Heritage Impact Assessment)	Professional	11.0	38	2.4	1.6
		Technical	11.0	14	2.4	0.5
(iii)	Traffic Impact Assessment	Professional	5.5	38	2.4	0.8
		Technical	9.5	14	2.4	0.4
(iv)	Preliminary design	Professional	27.5	38	2.4	4.0
		Technical	33.0	14	2.4	1.5
Total consultants' staff costs						12.3

* MPS = Master Pay Scale

Notes

1. A multiplier of 2.4 is applied to the average MPS point to estimate the full staff cost including the consultants' overheads and profit, as the staff will be employed in the consultants' offices. (As at 1.4.2001, MPS pt. 38 = \$60,395 per month and MPS pt. 14 = \$19,510 per month).
2. The figures given above are based on estimates prepared by the Director of Drainage Services. We will only know the actual man-months and actual fees when we have selected the consultants through the usual competitive fee bid system.

Table of Comparison - Interception Approach and Traditional Approach

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

	Interception approach (with drainage tunnel)			Traditional approach (through pipelaying)
	Urban drainage works	Tunnel works	Total	Urban drainage works
Length	<1 km	5 km	<1 km of drains + a tunnel of 5 km	7.5 km
Construction cost	<\$100 million	\$700 million	\$800 million	\$1,000 million
Construction time	2 years	4 years	4 years	6 to 10 years