

## ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

### HEAD 704 – DRAINAGE

#### Civil Engineering – Drainage and erosion protection

**110CD – Drainage improvement in Tsuen Wan, Kwai Chung and Tsing Yi – urban drainage improvement works**

**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 **110CD** and **111CD**, entitled “Drainage improvement in Tsuen Wan and Kwai Chung – consultants’ fees and investigations”, to Category A at an estimated total cost of \$68.8 million in money-of-the-day prices; and
- (b) the retention of the remainder of **110CD** and **111CD** in Category B.

**/PROBLEM .....**

## PROBLEM

Tsuen Wan and Kwai Chung are susceptible to frequent flooding due to the inadequate capacity of the existing drainage systems in the areas.

## PROPOSAL

2. The Director of Drainage Services (DDS), with the support of the Secretary for Works, proposes to upgrade part of **110CD** and **111CD** to Category A for engaging consultants to undertake site investigations, impact assessments and detailed design for drainage improvement works to the Tsuen Wan and Kwai Chung drainage catchments. The total estimated cost of the proposed consultancy is \$68.8 million in money-of-the-day (MOD) prices (\$3.5 million for **110CD** and \$65.3 million for **111CD**).

## PROJECT SCOPE AND NATURE

3. Item **110CD** involves the replacement and rehabilitation of about 950 metres of existing drains in Kwai Chung.

4. Item **111CD** comprises the construction of a drainage tunnel 5.35 kilometres in length and 6.5 metres in diameter to divert stormwater from the steep upper rural catchments, above Tsuen Wan and Kwai Chung urban areas, away from the existing downstream drainage systems.

5. The scope of the consultancy that we now propose to upgrade to Category A under the above-mentioned items comprises –

- (a) site investigations and surveys;
- (b) physical modeling of hydraulic structures, including tunnel intakes and outlet structures;
- (c) Environmental Impact Assessment;
- (d) Traffic Impact Assessment; and
- (e) detailed design, preparation of tender documents and assessment of tenders for the construction works.

At this stage, we intend to start the proposed consultancy for both items **110CD** and **111CD** under one consultancy agreement in November 2001 for completion in May 2006.

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6. The layout plans for the project are at Enclosures 1 and 2.

## JUSTIFICATIONS

7. 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 urbanization over the past decades has turned the natural ground into impermeable paved areas. Rainwater which would previously dissipate naturally through ground filtration can no longer do so. This has led to increased 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 drainage systems as a whole cannot meet the required flood protection standard. Flooding occurs frequently during heavy rainstorms.

8. To address the flooding problem for the whole drainage catchment, we have 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 reveals that due to the topography and extensive coverage of the upland catchments, large quantity of stormwater flows from the uplands can accumulate in a short period during heavy rainstorms, resulting in overloading of the drainage systems at the lower urbanized areas. Apart from causing flooding, traffic disruption and damage to property, the fast and large flows from the hills may also impose potential risk to life.

9. 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, so as to intercept and convey all the upland flows directly to the sea, and thus reduce the risks of flooding in the urban areas. By diverting these flows away, we would largely reduce the need for drainage upgrading works in the congested and urbanized Tsuen Wan and Kwai Chung, and minimize associated traffic disruption and public disturbance caused. Moreover, the Study recommends the replacement and rehabilitation of some drains associated with capacity and structural deficiencies in Kwai Chung. Upon completion of the drainage tunnel and drainage improvement works, the flood protection level in most areas in Tsuen Wan and Kwai Chung will be enhanced and the risks of flooding during heavy rainstorms will be substantially reduced.

10. Due to the lack of in-house staff resources and expertise, DDS proposes to employ consultants to carry out site investigations, surveys, traffic and other studies, impact assessments, physical modeling, preliminary and detailed design to facilitate the implementation of the proposed works.

**/FINANCIAL .....**

**FINANCIAL IMPLICATIONS**

11. We estimate the cost of the proposed consultancy to be \$68.8 million in MOD prices (see paragraph 12 below), made up as follows –

	<b>\$ million</b>		
	<b>110CD</b>	<b>111CD</b>	
(a) Site investigations and surveys	1.3	25.2	
(b) Physical modeling of intake and outlet structures	-	3.1	
(c) Consultants' fees –	1.7	26.2	
(i) supervision of site investigations and surveys	0.1	1.5	
(ii) Environmental Impact Assessment	-	2.0	
(iii) Traffic Impact Assessment	0.2	1.2	
(iv) detailed design, preparation of tender documents and assessment of tenders	1.4	21.5	
(d) Contingencies	0.3	4.9	
Sub-total	3.3	59.4	(in September 2000 prices)
(e) Provision for price adjustment	0.2	5.9	
Total	3.5	65.3	(in MOD prices)

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A breakdown by man-months of the estimates for consultants' fees is at Enclosure 3.

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

Year	\$ million (Sept 2000)		Price adjustment factor	\$ million (MOD)	
	110CD	111CD		110CD	111CD
2001 – 2002	0.4	3.0	1.02550	0.4	3.1
2002 – 2003	1.7	19.0	1.05627	1.8	20.1
2003 – 2004	0.9	13.0	1.08795	1.0	14.1
2004 – 2005	0.3	9.2	1.12059	0.3	10.3
2005 – 2006	-	9.2	1.15421	-	10.6
2006 – 2007	-	6.0	1.18884	-	7.1
	3.3	59.4		3.5	65.3

13. We have derived the MOD estimates on the basis of the Government's latest forecast of trend labour and construction prices for the period 2001 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 consultants will supervise the site investigations and surveys which will be under a re-measurement contract to be awarded by the Government through a competitive tendering process. We will adopt re-measurement form of contract for site investigations and surveys as we cannot determine in advance the exact extent of the required work.

14. The proposed consultancy and investigation work will not give rise to any recurrent expenditure.

## PUBLIC CONSULTATION

15. We presented the findings and recommendations of the study under **76CD** "Stormwater Drainage Master Plan Study in Tsuen Wan, Kwai Chung and Tsing Yi" 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 supported the implementation of the projects.

16. On 5 March 2001, we consulted the LegCo Panel on Planning, Lands and Works on **110CD** and **111CD**. Members raised no objection to the implementation of the projects. Nevertheless, some Members requested the Administration to provide more details of the projects, including the background for the need to improve the existing drainage systems, assessment on the restriction in land uses due to the proposed tunnels and whether it is feasible to store the storm water runoff intercepted by the proposed tunnels. In response, we have already submitted a supplementary information paper to the Panel and a copy of the paper is at Enclosure 4 for Members' reference.

17. Members also noted that we would submit the proposal to the Public Works Subcommittee for discussion in April 2001.

### **ENVIRONMENTAL IMPLICATIONS**

18. The proposed consultancy for detailed design, impact assessments and site investigation works will not cause any adverse environmental implications. We completed a Preliminary Environmental Review (PER) for both projects in March 2000. The Director of Environmental Protection vetted the PER and agreed with the conclusions. **110CD**, the proposed urban drainage improvement works, is not a designated project under the Environmental Impact Assessment (EIA) Ordinance. The PER concluded that the project would not result in long term environmental impacts. During construction, we will control noise, dust and site runoff nuisances through the implementation of mitigation measures, such as the use of silenced construction plant to reduce noise generation and water-spraying to reduce emission of fugitive dust in relevant works contracts.

19. **111CD**, the proposed Tsuen Wan drainage tunnel, is a designated project under Schedule 2 of the EIA Ordinance; an environmental permit is required for the construction and operation of the project. We will carry out an EIA study to meet the requirements of the Ordinance. We will incorporate all the measures recommended in the EIA study report into the detailed design and relevant works contract, and will apply for an environmental permit before the project construction work commences.

20. The proposed design consultancy will not generate any construction and demolition (C&D) material. The site investigation will generate a minimal amount of C&D material. We will require the consultant to fully consider measures to minimize the generation of C&D material and to reuse/recycle C&D material as much as possible at construction stage.

/LAND .....

**LAND ACQUISITION**

21. The consultancy does not require land acquisition.

**BACKGROUND INFORMATION**

22. We commissioned **76CD** “Stormwater Drainage Master Plan Study in Tsuen Wan, Kwai Chung and Tsing Yi” in 1996 and completed the study 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 under two projects, namely **110CD** “Drainage improvement in Tsuen Wan, Kwai Chung and Tsing Yi – urban drainage improvement works” and **111CD** “Drainage improvement in Tsuen Wan, Kwai Chung and Tsing Yi – Tsuen Wan drainage tunnel”.

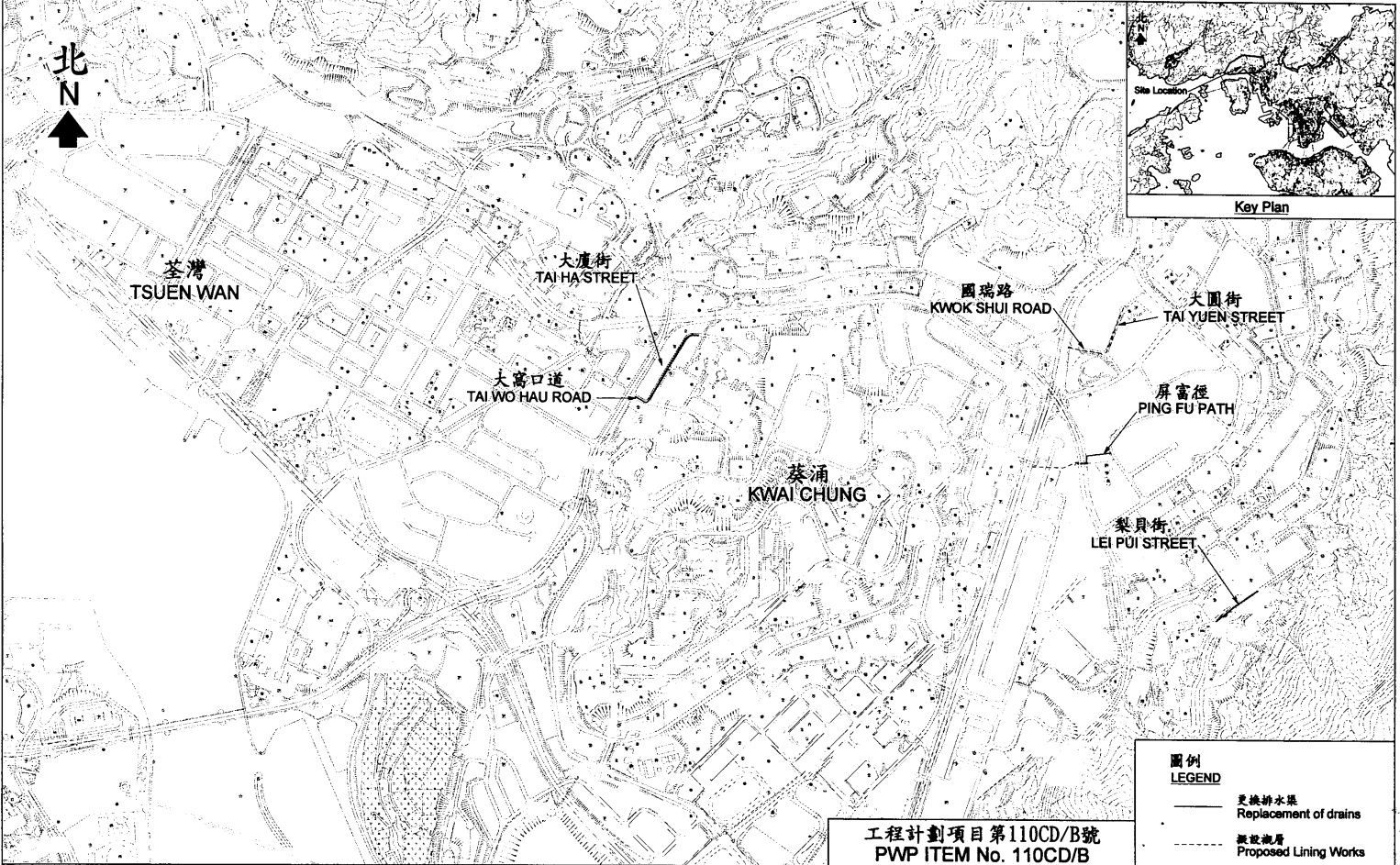
23. We upgraded **110CD** and **111CD** to Category B in September 2000 at estimated costs of \$69.8 million and \$1,114 million (in September 2000 prices) respectively. At this stage, we intend to start the proposed design consultancy for both packages under one consultancy agreement in November 2001 for completion in May 2006, which would save both administration cost and time. As the project involves specialized tunnelling works, we need to allow sufficient time to carry out extensive and detailed site investigations. This would facilitate the appropriate design of the drainage tunnel and enable construction to proceed safely, efficiently and in a controlled manner.

24. We plan to commence the urban drainage improvement works in Kwai Chung in October 2004 for completion in October 2006. Construction of the drainage tunnel and intake/outlet structures will commence in June 2006 for completion in May 2011, subject to the prior enactment of the relevant legislation to provide for the easement and the rights over land for construction, maintenance and operation of the drainage tunnel and associated issues.

25. We estimate that the consultancy will create some 35 new jobs. These will comprise 17 professional/technical staff and 18 labourers, totalling 1 500 man-months.

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Works Bureau  
April 2001

(pwsc0350rev.doc)



圖例 LEGEND	
	更換排水管 Replacement of drains
	擬設襯層 Proposed Lining Works

圖則名稱  
drawing title

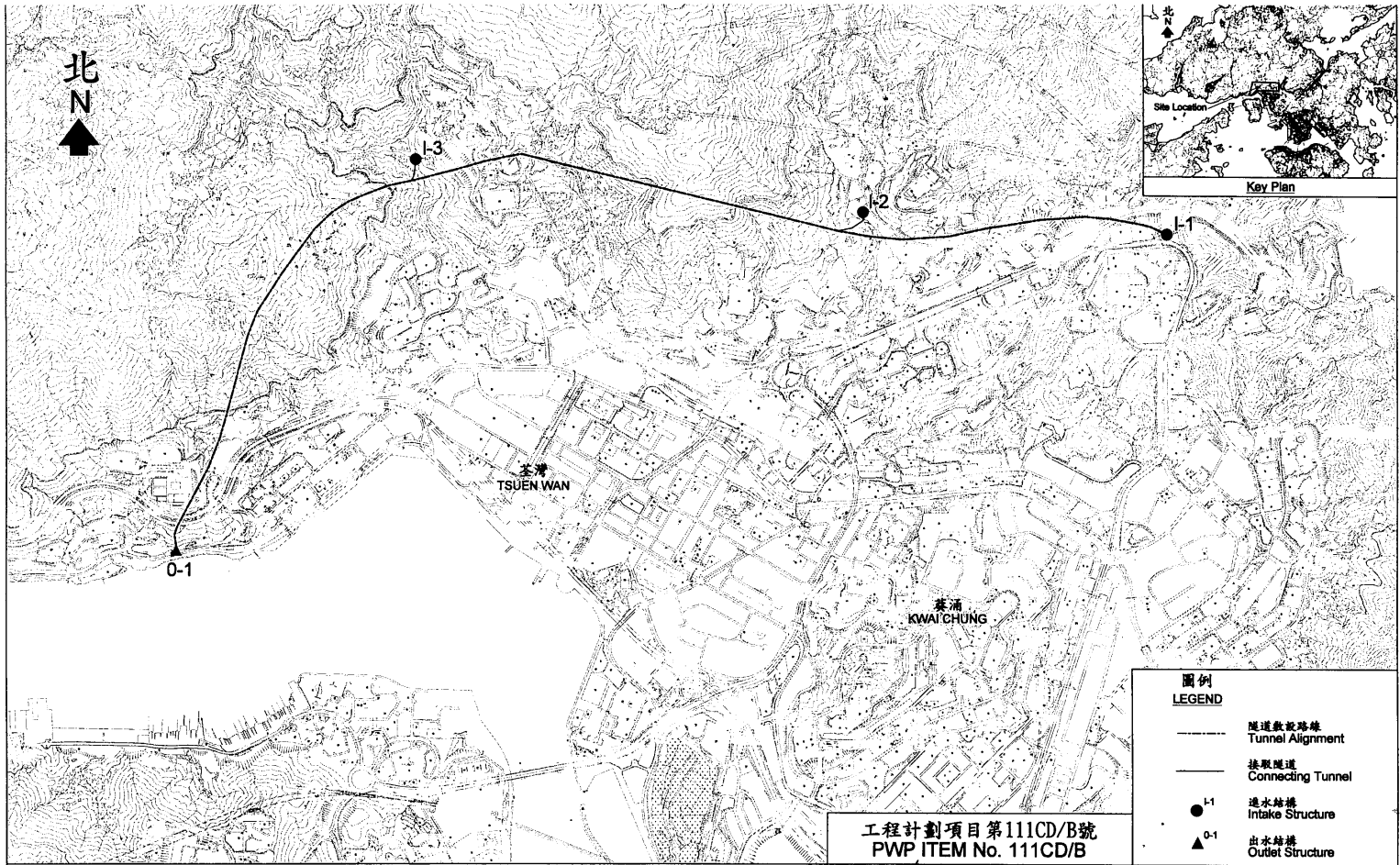
荃灣、葵涌及青衣雨水排放系統改善計劃  
市區雨水排放系統改善工程  
DRAINAGE IMPROVEMENT IN TSUEN WAN, KWAI CHUNG AND TSING YI  
URBAN DRAINAGE IMPROVEMENT WORKS

工程計劃項目第110CD/B號 PWP ITEM No. 110CD/B	
繪圖 drawn by	T.C. CHAN
日期 date	28 - 02 - 2001
批准 approved	Y.T.D. CHEUNG
日期 date	21 - 03 - 2001
辦事處 office	顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION

圖則 drawing no.	比例 scale
DCM/2001/030	N.T.S.
香港特別行政區政府渠務署 DRAINAGE SERVICES DEPARTMENT GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION	

附件 1 Enclosure 1





**圖例**  
**LEGEND**

- 隧道敷設路線  
Tunnel Alignment
- 接駁隧道  
Connecting Tunnel
- I-1 進水結構  
Intake Structure
- ▲ O-1 出水結構  
Outlet Structure

工程計劃項目第111CD/B號  
PWP ITEM No. 111CD/B

圖則名稱  
drawing title

荃灣、葵涌及青衣雨水排放系統改善計劃  
荃灣雨水排放隧道  
DRAINAGE IMPROVEMENT IN TSUEN WAN, KWAI CHUNG AND TSING YI  
TSUEN WAN DRAINAGE TUNNEL


繪圖 drawn by	<i>T.C. Chan</i> T.C. CHAN	日期 date	28 - 02 - 2001
批准 approved	<i>Y.T.D. Cheung</i> Y.T.D. CHEUNG	日期 date	21 - 03 - 2001
繪圖處 office	顧問工程管理部 CONSULTANTS MANAGEMENT DIVISION		

圖號  
drawing no.

DCM/2001/031

比例  
scale

N.T.S.

 DRAINAGE SERVICES DEPARTMENT  
GOVERNMENT OF THE HONG KONG SPECIAL ADMINISTRATIVE REGION  
香港特別行政區政府渠務署

**Enclosure 3 to PWSC(2001-02)2**

**110CD – Drainage improvement in Tsuen Wan, Kwai Chung  
and Tsing Yi – urban drainage improvement works**

**Breakdown of estimates for consultants' fees**

			<b>Estimated man- months</b>	<b>Average MPS* salary point</b>	<b>Multiplier Factor</b>	<b>Estimated fee (\$ million)</b>
<b>Consultants' staff costs</b>						
(i)	Supervision of site investigations and surveys	Professional	0.5	38	1.7	0.05
		Technical	2.3	14	1.7	0.07
(ii)	Environmental Impact Assessment	Professional	0.1	38	2.4	0.01
		Technical	0.2	14	2.4	0.01
(iii)	Traffic Impact Assessment	Professional	1.1	38	2.4	0.15
		Technical	1.1	14	2.4	0.05
(iv)	Detailed design, preparation of tender documents and tender assessment	Professional	6.5	38	2.4	0.90
		Technical	9.8	14	2.4	0.45
<b>Total consultants' staff costs</b>						1.69
<b>Out-of-pocket expenses</b>						
(i)	Site investigations and surveys					1.30

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

**Breakdown of estimates for consultants' fees**

			Estimated man- months	Average MPS* salary point	Multiplier Factor	Estimated fee (\$ million)
<b>Consultants' staff costs</b>						
(i)	Supervision of site investigation and surveys	Professional	9.0	38	1.7	0.88
		Technical	19.0	14	1.7	0.62
(ii)	Environmental Impact Assessment	Professional	11.0	38	2.4	1.52
		Technical	11.0	14	2.4	0.50
(iii)	Traffic Impact Assessment	Professional	5.5	38	2.4	0.76
		Technical	9.5	14	2.4	0.43
(iv)	Detailed design, preparation of tender documents and tender assessment	Professional	98.4	38	2.4	13.59
		Technical	172.5	14	2.4	7.90
<b>Total consultants' staff costs</b>						26.20
<b>Out-of-pocket expenses</b>						
(i)	Site investigations and surveys					25.20
(ii)	Physical modeling of intake/outlet structures					3.10
						28.30

\* MPS = Master Pay Scale

**Notes**

1. A multiplier of 2.4 is applied to the average MPS point to arrive at the full staff cost including the consultants' overheads and profit, as the staff will be employed in the consultants' offices. A multiplier factor of 1.7 is applied in the case of site staff supplied by the consultants. (As at 1.4.2000, MPS pt. 38 = \$57,525 per month and MPS pt. 14 = \$19,055 per month).

2. Out-of-pocket expenses are actual costs incurred. The consultants are not entitled to any additional payment for overheads or profit in respect of these items.
3. 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 lump-sum fee bid system.

**Information Paper for Legislative Council  
Panel on Planning, Lands and Works**

**Supplementary Note on  
Proposed Drainage Tunnels and Drainage Improvement Works  
in Northern Hong Kong Island, Lai Chi Kok and Tsuen Wan**

**Introduction**

In discussing the paper on the five drainage improvement project items **103CD**, **104CD**, **108CD**, **110CD** and **111CD** at the LegCo Panel on Planning, Lands and Works meeting on 5 March 2001, Members requested the Administration to provide the following supplementary information -

- (a) Why had the drainage systems in the urban areas not been improved at the same time of the reclamation projects?
- (b) Why is there a need to improve the drainage systems now?
- (c) Has any assessment been conducted on the restriction in land uses due to the proposed drainage tunnels?
- (d) Is it feasible to store the stormwater runoff intercepted by the proposed drainage tunnels?

**Improvement of drainage systems under reclamation projects**

2. During the implementation of the major reclamation projects in Northern Hong Kong Island, West Kowloon and Tsuen Wan in the late eighties and the early nineties, Government has undertaken a series of local hinterland drainage improvement works to mitigate the adverse effects on the existing hinterland drainage systems due to the reclamations. It was to ensure that each reclamation project would not have any adverse effect on the hinterland drainage system caused by the reclamation itself. Global improvement of the hinterland drainage system as a whole to cope with the hinterland urbanization was outside the scope of the reclamation project and would need to be carried out under a separate project.

3. To address the flooding problem arising from the hinterland urbanization (not the reclamation) over the years, we commissioned a series of studies from June 1994 to May 2000 to examine the adequacy of the existing

drainage systems and develop long term cost-effective drainage improvement measures for Northern Hong Kong Island, West Kowloon and Tsuen Wan. The studies recommended a combination of innovative drainage tunnel interception/transfer schemes and conventional drainage upgrading works with a view to minimizing the public disruptions and resolving the practical difficulties/constraints associated with extensive drainage upgrading works in heavily built-up areas. The five drainage improvement project items **103CD**, **104CD**, **108CD**, **110CD** and **111CD** are to provide a global improvement of the hinterland drainage system to cope with the hinterland urbanization (not the reclamation) in Northern Hong Kong Island, West Kowloon and Tsuen Wan.

#### **Need to improve drainage systems now**

4. The existing drainage systems in Northern Hong Kong Island, Lai Chi Kok, Sham Shui Po, Tsuen Wan and Kwai Chung were respectively built some 50, 40 and 30 years ago to meet the flow requirements at that time. Owing to rapid development and changes in land use over the years, some natural ground and slopes have been paved over and become impermeable. The rapid urbanization in the Western, Central and Wanchai Mid-Levels, Shek Kip Mei and So Uk areas, northern Tsuen Wan and northern Kwai Chung areas over the years has resulted in significant increase in surface runoff and overloading of the existing drainage systems. As such, many areas in Northern Hong Kong Island, Lai Chi Kok, Sham Shui Po, Tsuen Wan and Kwai Chung are prone to flooding during heavy rainstorms.

5. As a result of increase in runoff due to urbanization over the years, the existing drainage systems in Northern Hong Kong Island, Lai Chi Kok and Sham Shui Po, Tsuen Wan and Kwai Chung now only have a general flood protection level of around 5 to 20 years return period. To prevent further aggravation of the flooding situation and to meet the community's increased expectations for higher flood protection standard, we need to improve the drainage systems in these areas.

#### **Assessment on restriction in land uses due to proposed drainage tunnels**

6. During the feasibility study stage, we have conducted preliminary assessments on restriction in land uses due to the proposed drainage tunnels. The proposed tunnel alignments will generally be located away from existing buildings and the tunnels will generally be constructed underground in sound rock stratum and well below the foundations of existing buildings and future development.

7. During the detailed design stage, we will critically review the tunnel routes and carry out further assessment on the effect on land uses due to the proposed drainage tunnels. The restriction in land uses due to the proposed drainage tunnels will be kept to the absolute minimum.

8. We will draft and enact relevant legislation in order to provide easements over land for the purpose of the construction, maintenance and operation of the proposed drainage tunnels. Before commencement of construction, each drainage tunnel project will be gazetted under the proposed legislation which will provide channels for objections and appeals from the public before authorisation.

**Feasibility of storing stormwater runoff intercepted by proposed drainage tunnels**

9. The proposed drainage tunnels are to intercept and convey the surface runoff from the upper catchments directly to the sea, thus reduce the flooding risk in the hinterland areas in the lower catchments. At present, the surface runoff will be drained to the sea through the hinterland areas and flooding will occur because of the inadequate capacity of the existing drainage systems.

10. A significant large storage area in the downstream side is needed if the surface runoff is to be collected and stored for future use. The land use constraints in the fully urbanized areas, such as Northern Hong Kong Island, Lai Chi Kok, Sham Shui Po, Tsuen Wan and Kwai Chung, make the construction of large storage facilities practically impossible.