For discussion **PWSC(2001-02)100**
on 30 January 2002

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 704 – DRAINAGE
Civil Engineering – Drainage and erosion protection
108CD – West Kowloon drainage improvement – Lai Chi Kok Transfer Scheme

Members are invited to recommend to Finance Committee –

(a) the upgrading of part of **108CD**, entitled "Lai Chi Kok Transfer Scheme – preliminary design and investigations", to Category A at an estimated cost of $33.3 million in money-of-the-day prices; and

(b) the retention of the remainder of **108CD** in Category B.

PROBLEM

During heavy rainstorms, surface runoff from the West Kowloon hinterland and the potential overflow from the Kowloon group of reservoirs may cause flooding to the Sham Shui Po, Cheung Sha Wan and Lai Chi Kok areas.

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PROPOSAL

2. The Director of Drainage Services (D of DS), with the support of the Secretary for Works, proposes to upgrade part of **108CD** 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 studies and traffic impact assessment; and

(d) preliminary design.

The total estimated cost for the proposed consultancy is $33.3 million in money-of-the day (MOD) prices.

PROJECT SCOPE AND NATURE

3. The scope of **108CD** comprises the construction of –

(a) a main tunnel, about 1.2 kilometres (km) in length and 5.6 metres (m) in diameter, from Wai Man Tsuen to Victoria Harbour near Stonecutters Island;

(b) a branch tunnel, about 2.2 km in length and 4 m in diameter, from north of Chak On Estate to Wai Man Tsuen; and

(c) collector tunnels, about 0.8 km in length and 1.5 m to 2.5 m in diameter, at various locations in Sham Shui Po, Cheung Sha Wan and Lai Chi Kok areas.

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

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

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JUSTIFICATION

6. The drainage catchment in Sham Shui Po, Cheung Sha Wan and Lai Chi Kok including their adjacent hillsides spans across a very large area. We developed the existing drainage systems some 40 years ago to meet the flow requirements at that time.

7. Rapid urbanisation and changes in land use over the past decades have turned natural ground and slopes into paved areas. Rainwater 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. During heavy rainstorms, large quantity of surface runoff coming from the hinterland and the overflow from the Kowloon group of reservoirs can flow into the urban areas downstream in a short period of time and overload the drainage system there. As a result, many parts of these areas are prone to frequent flooding during heavy rainstorms.

8. To alleviate flooding in the drainage catchment in Sham Shui Po, Cheung Sha Wan and Lai Chi Kok and meet the community's increased expectations for higher flood protection standard, we have formulated the Lai Chi Kok Transfer Scheme. The Scheme forms an integral part of the overall flood control strategy for West Kowloon. With this scheme, surface runoff from the West Kowloon hinterland and the potential overflow from the Kowloon group of reservoirs will be intercepted at the upstream and then discharged directly into Victoria Harbour near Stonecutters Island through the proposed drainage tunnels. The main benefit of this proposal (together with the related drainage improvement works in Sham Shui Po, Cheung Sha Wan and Lai Chi Kok as mentioned in paragraphs 24 to 30 below) is that without the need to implement extensive pipelaying works in the busy streets, the general standard of flood protection for Sham Shui Po, Cheung Sha Wan and Lai Chi Kok can be raised to withstand a rainstorm with a return period of one in 50 years[1].

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[1] "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.

9. Due to lack of in-house staff resources and expertise, D of DS proposes to employ consultants to carry out the site investigations, surveys, physical modelling tests, environmental studies, impact assessment and preliminary design to facilitate the implementation of the proposed Lai Chi Kok Transfer Scheme.

FINANCIAL IMPLICATIONS

10. We estimate the cost of the proposed consultancy to be $33.3 million in MOD prices (see paragraph 11 below), made up as follows –

			$ million	
(a)	Site investigations, surveys and physical modelling tests		17.6	
(b)	Consultants' fees		12.3	
	(i) supervision of site investigations and surveys	2.6		
	(ii) environmental studies	1.0		
	(iii) traffic impact assessment	0.5		
	(iv) preliminary design	8.2		
(c)	Contingencies		3.0	
	Sub-total		32.9	(in September 2001 prices)
(d)	Provision for price adjustment		0.4	
	Total		33.3	(in MOD prices)

A breakdown of the estimates for the 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	2.0	0.99700	2.0
2003 - 2004	12.6	1.00398	12.7
2004 - 2005	10.8	1.01101	10.9
2005 - 2006	5.5	1.01808	5.6
2006 - 2007	2.0	1.02521	2.1
	32.9		33.3

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 duration 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 Preliminary Project Feasibility Study Report for the Lai Chi Kok Transfer Scheme to the Sham Shui Po District Council on 7 December 2000. The District Council supported the implementation of the project.

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15. We reported the revised strategy for drainage improvement in West Kowloon including the feasibility study for the Lai Chi Kok Transfer Scheme to the LegCo Panel on Planning, Lands and Works at a meeting on 13 May 1999. 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 Lai Chi Kok, Cheung Sha Wan and Sham Shui Po under **108CD**, in terms of length of drains/tunnel to be constructed,

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construction cost and construction time is at Enclosure 3 for Members' reference. We have also consulted the industry, relevant professional bodies and other interested parties on our findings. There is general support for implementation of the drainage tunnel projects.

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 these 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 benefits/cost ratio of implementing the proposed Lai Chi Kok Transfer Scheme is about 2.6[2].

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 hygienic 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 Lai Chi Kok Transfer Scheme is not a designated project under the Environmental Impact Assessment (EIA) Ordinance. An environmental permit is not required for its construction, operation or decommissioning. We completed a Preliminary Environmental Review (PER) in March 2000 which concluded that the Lai Chi Kok Transfer Scheme will have the environmental benefit of alleviating flooding in the urban area and will not cause long term environmental impact. The Director of Environmental Protection has vetted the PER and agreed with the conclusion.

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

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 the site investigation works and at construction stage in future.

LAND ACQUISITION

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

BACKGROUND INFORMATION

23. We upgraded **59CD** "West Kowloon stormwater drainage improvement" to Category B in December 1993. In June 1994, we upgraded part of **59CD** to Category A as **65CD** "West Kowloon stormwater drainage improvement study – consultants' fees and investigations" at an estimated cost of $15.9 million in MOD prices for engaging consultants to examine the deficiencies of the drainage system in West Kowloon and to develop a drainage master plan for future improvements. We completed the study in December 1995 and the study recommended the implementation of a series of drainage improvement works in West Kowloon in three stages.

West Kowloon drainage improvement, stage 1

24. In April 1996, we engaged consultants to carry out site investigation and detailed design for the West Kowloon drainage improvement stage 1 works under a Category D project **84CD** "West Kowloon stormwater drainage improvement, stage 1 – site investigation and detailed design" with an approved project estimate of $7.4 million. We completed the detailed design work in May 1997.

25. In June 1997, we upgraded part of **59CD** to Category A as **89CD** "West Kowloon drainage improvement, stage 1 works" with an approved project estimate of $464.0 million for the construction of about 5.4 km of drain pipes and about 3.8 km of box culverts. We commenced the construction of the stage 1 drainage improvement works in conjunction with the sewerage improvement works under **290DS** "North West Kowloon sewerage, stage 3 phase 2" in April 1998 for completion in April 2003.

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West Kowloon drainage improvement, stages 2 and 3

26. In April 1997, we upgraded part of **59CD** to Category A as **88CD** "West Kowloon drainage improvement, stage 2 – consultants' fees and investigations" at an estimated cost of $68.0 million in MOD prices for engaging consultants to carry out site investigations and detailed design for the stage 2 drainage improvement works. The consultancy started in June 1997. With a view to minimising the extensive upgrading works required in the congested urban areas, we revised our drainage improvement strategy for the West Kowloon drainage improvement.

27. The revised drainage improvement strategy involves construction of a flood storage scheme at the Tai Hang Tung Recreation Ground (the Tai Hang Tung Storage Scheme), a stormwater transfer tunnel from Kowloon Tong to San Po Kong (the Kai Tak Transfer Scheme) and a second tunnel diverting stormwater away from the West Kowloon hinterland (the proposed Lai Chi Kok Transfer Scheme). As compared with the original design under stages 2 and 3, the revised drainage improvement strategy would help reduce the overall length of drains to be constructed from 94 km to about 48 km, and thus minimise the traffic disruption caused during the implementation stage.

28. In June 1999, we upgraded part of **59CD** to Category A as **99CD** "West Kowloon drainage improvement, stage 2 phase 1 works" at an estimated cost of $1,762.9 million in MOD prices for the construction of about 22 km of drain pipes and about 0.7 km of box culverts in the West Kowloon area. We commenced the construction works in December 1999 for substantial completion in 2004.

29. In June 2000, we upgraded part of **59CD** to Category A as **106CD** "West Kowloon drainage improvement, stage 2 phase 2 and stage 3 phase 1 works" at an estimated cost of $1,767.2 million in MOD prices for the construction of the Tai Hang Tung Storage Scheme, the Kai Tak Transfer Scheme, about 6 km of drain pipes and 3.1 km of box culverts. We started the construction works in January 2001 for completion in June 2007.

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30. Following the award of contracts, the total expenditure for the projects of **99CD** and **106CD** is now expected to be in the order of $3 billion which is about $0.5 billion less than the estimate under the original design. We plan to start the construction of the remaining works under stage 3 in November 2003 with a view to substantially completing all three stages of the drainage improvement works in West Kowloon in December 2007.

Lai Chi Kok Transfer Scheme

31. The estimated cost of the Lai Chi Kok Transfer Scheme is about $773.0 million in September 2001 prices, including $32.9 million for the proposed consultancy.

32. We commenced the feasibility study of the Lai Chi Kok Transfer Scheme in October 1998. As the catchment area of the Kowloon group of reservoirs falls outside the study area of **59CD**, we upgraded the Scheme to Category B as a separate project under **108CD** in September 2000.

33. Upon substantial completion of the preliminary design in 2004, we will proceed with the detailed design work in the same year. Subject to the prior enactment of the relevant legislation[3], we plan to commence the construction works in late 2006 for completion in mid 2010.

34. Upon completion of the West Kowloon drainage improvement projects and the Lai Chi Kok Transfer Scheme, the flood protection level in West Kowloon will generally be raised to withstand rainstorms with a return period of one in 50 years and the chance of flooding during heavy rainstorms will be very small.

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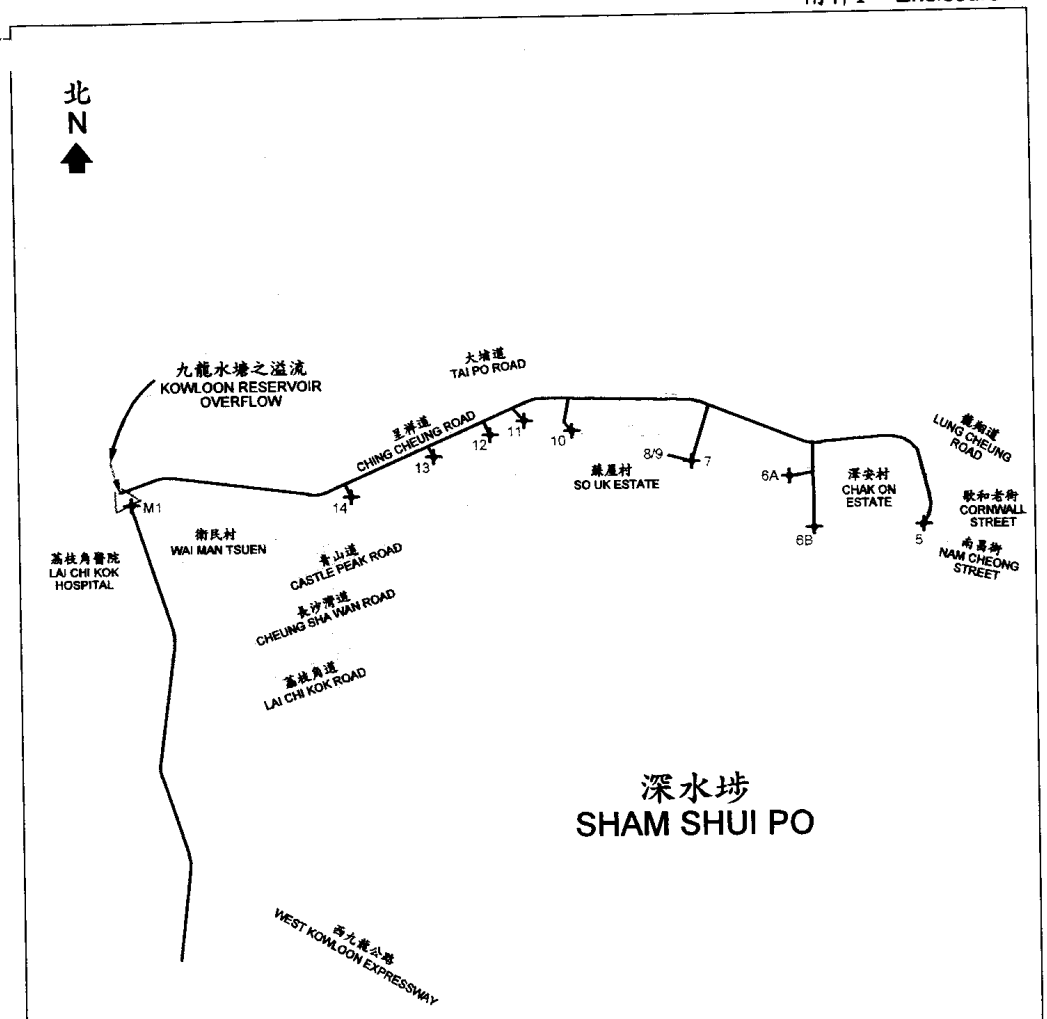
[3] The proposed drainage tunnels will pass under some private lands. The Government will draft and seek enactment of the relevant bill in order to provide easements and other rights over land for the purpose of the construction, maintenance and operation of drainage tunnels. The drainage tunnel project 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.

35. We estimate that the consultancy will create some 20 jobs, comprising ten professional/technical staff and ten labourers, totalling 650 man-months.

Works Bureau
January 2002

(pwsc108cdv1.doc)



圖例
LEGEND

支幹隧道
BRANCH TUNNEL

主幹隧道
MAIN TUNNEL ALIGNMENT

13 集水暨井
INLET SHAFT

△ 滯水池
STILLING BASIN

工務計劃項目第108CD/B號
PWP ITEM NO. 108CD/B

圖則名稱 drawing title
西九龍雨水排放系統改善工程 –
荔枝角雨水轉運計劃 –
擬建之荔枝角雨水轉運計劃路線圖
WEST KOWLOON DRAINAGE IMPROVEMENT -
LAI CHI KOK TRANSFER SCHEME –
PLAN OF THE PROPOSED
LAI CHI KOK TRASFER SCHEME

繪圖 drawn	Original Signed	C.W. CHAN	日期 date 28-09-2001
核對 checked	Original Signed	H.S. WONG	日期 date 28-09-2001
批核 approved	Original Signed	Y.F. KAN	日期 date 28-09-2001

部門 office 工程管理部
PROJECT MANAGEMENT DIVISION

圖則編號 drawing no DPM 0029

比例 scale 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

108CD – West Kowloon drainage improvement – Lai Chi Kok Transfer Scheme

Breakdown of the estimates for the consultants' fees

Consultants' staff costs			Estimated man-months	Average MPS* salary point	Multiplier	Estimated fee ($ million)
(a)	Supervision of site investigations and surveys	Professional	16	38	1.7	1.6
		Technical	30	14	1.7	1.0
(b)	Environmental studies	Professional	6	38	2.4	0.9
		Technical	2	14	2.4	0.1
(c)	Traffic impact assessment	Professional	3	38	2.4	0.4
		Technical	2	14	2.4	0.1
(d)	Preliminary design	Professional	36	38	2.4	5.2
		Technical	65	14	2.4	3.0
					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 costs including the consultants' overheads and profit, as the staff will be employed in the consultants' offices. A multiplier of 1.7 is applied in case of resident site staff supplied by the consultants. (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.

Enclosure 3 to PWSC(2001-02)100

Table of Comparison – Interception Approach and Traditional Approach

108CD – West Kowloon drainage improvement – Lai Chi Kok Transfer Scheme

	Interception approach (with drainage tunnel)			Traditional approach (through pipelaying)
	Urban drainage works	Tunnel works	Total	Urban drainage works
Length	13 km	4 km	13 km of drains + a tunnel of 4 km	35 km
Construction cost	$200 million	$500 million	$700 million	$900 million
Construction time	4 years	4 years	4 to 6 years	6 to 10 years