For discussion **PWSC(1999-2000)65**
on 20 October 1999

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 709 - WATERWORKS
Water Supplies - Combined fresh/salt water supply
90WC - Replacement and rehabilitation of water mains, stage 1 phase 1

Members are invited to recommend to Finance Committee -

(a) the upgrading of part of **90WC**, entitled "Replacement and rehabilitation of water mains, stage 1 phase 1B - investigation", to Category A at an estimated cost of $66.3 million in money-of-the-day prices; and

(b) the retention of the remainder of **90WC**, retitled "Replacement and rehabilitation of water mains, stage 1 phase 1", in Category B.

PROBLEM

Ageing fresh and salt water mains throughout the territory are prone to frequent bursts and leaks. This causes disruption to water supplies and traffic, thus inconveniencing the public. We need to replace or rehabilitate those water mains which are reaching the end of their service life to improve the condition of the water supply network and to maintain a reasonable level of service to consumers.

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PROPOSAL

2. The Director of Water Supplies (DWS), with the support of the Secretary for Works, proposes to upgrade part of **90WC** to Category A at an estimated cost of $66.3 million in money-of-the-day (MOD) prices for the engagement of engineering consultants to carry out investigations and impact assessments for the phase 1B of the replacement and rehabilitation works under **90WC**.

PROJECT SCOPE AND NATURE

3. The full scope of works under **90WC** comprises the replacement or rehabilitation, throughout the territory, of approximately 250 kilometres of fresh water mains and 100 kilometres of salt water mains, as well as the associated valves and fittings. In order to achieve early improvement, we plan to implement the proposed works in two phases as follows -

(a) Phase 1A

This phase of the works comprises the replacement or rehabilitation of –

(i) approximately 30 kilometres of fresh water mains of diameter ranging from 150 millimetres to 450 millimetres in Yuen Long, Sheung Shui, Fanling, Tai Po and Sha Tin areas; and

(ii) approximately 4 kilometres of salt water mains of diameter ranging from 150 millimetres to 400 millimetres in Tai Po and Sha Tin areas.

We are currently carrying out the detailed design of the phase 1A works using in-house staff.

(b) Phase 1B

This phase of the works comprises the replacement or rehabilitation of -

(i) approximately 220 kilometres of fresh water mains ranging in diameter from 150 millimetres to 1 400 millimetres throughout the territory; and

/(ii) …..

(ii) approximately 100 kilometres of salt water mains ranging in diameter from 150 millimetres to 1 000 millimetres throughout the territory.

We plan to engage consultants to carry out the investigations and impact assessments for the phase 1B works between January 2000 and February 2001.

4. The part of **90WC** we now propose to upgrade to Category A is for the investigations and impact assessments consultancy for the phase 1B works described in paragraph 3(b) above. The scope of the proposed consultancy includes -

(a) site investigations and surveys;

(b) traffic impact assessments;

(c) drainage impact assessments;

(d) environmental reviews;

(e) preliminary design of the replacement or rehabilitation works; and

(f) pilot trials on the new replacement and rehabilitation techniques.

JUSTIFICATIONS

5. Hong Kong's fresh water and salt water supplies are provided through a network of water mains which is approximately 5 700 kilometres in length. Most of these water mains are underground. In keeping with the development of urban areas and new towns, about 45% of the water mains were laid some 30 years ago. They are approaching the end of their service life and have become increasingly difficult and costly to maintain.

6. At present, we carry out piece-meal and small-scale replacement works for some aged water mains on an ad-hoc basis. However, we are experiencing an increasing number of mains bursts due to the deteriorating condition of the mains. From 1994 to 1997, there were about 19 000 pipe failures,

/including …..

including 1 300 bursts and 17 700 leaks per year. This number has increased by about 35% to 25 700 in 1998, comprising 1 800 bursts and 23 900 leaks. We estimate that the loss of water due to such failures is 230 million cubic metres per year.

7. In view of the considerable length of water mains approaching the end of their service life, we engaged consultants to carry out an Underground Asset Management Study (the Study) in February 1996 to develop a comprehensive and cost-effective management plan for the water supplies network. We completed the Study in end 1997. Taking into account the capital cost of the replacement and rehabilitation works, savings in the maintenance cost and the implication of water lost through leakage and mains bursts, the Study recommended the replacement or rehabilitation of some 3 000 kilometres of aged water mains in stages over a period of twenty years in order to prevent further deterioration of the water supply network. We estimate that the number of pipe failures per year will reduce from the current level of 25 700 to 15 000 (1 000 bursts and 14 000 leaks) with a corresponding reduction in the loss of fresh water from 230 million to 180 million cubic metres per year upon the completion of the recommended twenty year replacement and rehabilitation programme. Otherwise, the reticulation system will continue to deteriorate and the number of pipe failures per year will increase to 40 000 in twenty years' time. The corresponding loss of fresh water will then be about 630 million cubic metres per year. We, therefore, need to implement the replacement and rehabilitation programme as soon as possible to bring about early improvement. We have selected about 250 kilometres of fresh water mains and about 100 kilometres of salt water mains with significant burst and leakage problems but no major land clearance problem for replacement and rehabilitation in stage 1 phase 1.

8. Having examined ways and means of implementing the replacement and rehabilitation programme, we conclude that we can only redeploy existing staff in Water Supplies Department to carry out the detailed design of the phase 1A works as detailed in paragraph 3(a) above. In view of this and the complexity of phase 1B of the works, we need to engage engineering consultants to carry out investigations and impact assessments for the proposed replacement and rehabilitation works so as to enable the detailed design to proceed. We also plan to carry out pilot trials on the new techniques to determine their suitability in Hong Kong.

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FINANCIAL IMPLICATIONS

9. We estimate the cost of the proposed consultancy for the investigations and impact assessments to be $66.3 million in MOD prices (see paragraph 10 below), made up as follows -

			$ million	
(a)	Consultants' fees for		30.4	
	(i)	supervision of site investigations and surveys	4.1	
	(ii)	traffic impact assessments	3.7	
	(iii)	drainage impact assessments	1.0	
	(iv)	environmental reviews	1.4	
	(v)	preliminary design	18.7	
	(vi)	supervision of pilot trials	1.5	
(b)	Site investigations and surveys		16.0	
	(i)	boreholes and trial pits	11.6	
	(ii)	non-destructive site investigations	4.4	
(c)	Pilot trials on new replacement and rehabilitation techniques		10.3	
(d)	Contingencies		5.6	
		Sub-total	62.3	(at December 1998 prices)

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		$ million	
(e)	Provision for price adjustment	4.0	
	Total	66.3	(in MOD prices)

A breakdown by man months of the estimate for consultants' fees is at the Enclosure. The estimated construction cost for phase 1B of the project is $2,589.8 million at December 1998 prices.

10. Subject to approval, we will phase the expenditure as follows -

Year	**$ million (Dec 1998)**	**Price adjustment factor**	**$ million (MOD)**
1999 - 2000	6.1	1.02625	6.3
2000 – 2001	50.6	1.06217	53.8
2001 - 2002	5.6	1.09934	6.2
	62.3		66.3

11. We have derived the MOD estimates on the basis of Government's latest forecast of trend labour and construction prices for the period 1999 to 2002. We will tender the proposed consultancy for the investigations and impact assessments on a lump sum basis. The consultants will in turn arrange contractors for the non-destructive site investigations and pilot trials on a re-measurement basis through a competitive tendering process. The consultants will adopt this form of contract as they cannot determine in advance the exact extent of site investigations and pilot trials. We will not allow for price adjustment in the consultancy agreements as the consultancy period of each agreement will not exceed 12 months. As regards the boreholes and trial pits, we will tender the works under a standard re-measurement contract with no provision for price adjustment because the contract period will not exceed 21 months.

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12. The proposed consultancy will not give rise to any recurrent expenditure as it entails consultancy services and site investigation works only.

PUBLIC CONSULTATION

13. We consulted the LegCo Panel on Planning, Lands and Works on the stage 1 phase 1B investigation project on 13 May 1999. Members had no adverse comments on the project.

14. We will consult the relevant district boards during the consultancy and will keep them informed of the progress of the works in due course.

ENVIRONMENTAL IMPLICATIONS

15. The proposed investigations and impact assessments consultancy will not have any environmental implications. As regards the site investigations and stage 1 phase 1 works, we completed a Preliminary Environmental Review (PER) in December 1997 and concluded that the works would have no long term environmental impact. The Director of Environmental Protection vetted the PER and agreed that an Environmental Impact Assessment would not be necessary. We will control noise, dust and site run-off nuisances during construction through the implementation of mitigation measures in the relevant works contracts.

LAND ACQUISITION

16. The proposed consultancy does not require land acquisition.

BACKGROUND INFORMATION

17. We upgraded **90WC** as the stage 1 phase 1 works for the replacement and rehabilitation of about 350 kilometres of water mains to Category B in October 1998.

18. In order to minimise water supply disruption to consumers as well as the incidence of road openings for emergency repairs, we plan to carry out the replacement and rehabilitation programme in stages. We propose to implement the stage 1 phase 1 of the programme, which covers the improvement works detailed in paragraph 3 above, in the next seven years.

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19. As regards the phase 1A works, we are carrying out the detailed design by using in-house staff. We aim to commence the construction works of phase 1A in November 2000 for completion in 2005.

20. The proposed investigations and impact assessments consultancy for the phase 1B works are scheduled to start in January 2000 for completion in February 2001. We aim to proceed with the detailed design for the phase 1B works in 2001 with a view to commencing the construction works in 2003 for completion in 2007.

21. We will continue in earnest to plan and implement the improvement works and stage 1 phase 2 and other subsequent stages with a view to completing the whole replacement and rehabilitation programme in twenty years' time.

Works Bureau
October 1999

(PWSC0140/WIN5)

Enclosure to PWSC(1999-2000)65

90WC - Replacement and rehabilitation of water mains, stage 1 phase 1

Breakdown of estimates for consultants' fees

Consultants' staff costs			Estimated man months	Average MPS* salary point	Multiplier factor	Estimated fee ($ million)
(a)	Consultants' fees for					
(i)	supervision of site investigations and surveys	Professional	21	40	2.4	3.2
		Technical	18	16	2.4	0.9
(ii)	traffic impact assessments	Professional	9	40	2.4	1.3
		Technical	47	16	2.4	2.4
(iii)	drainage impact assessments	Professional	5	40	2.4	0.8
		Technical	3	16	2.4	0.2
(iv)	environmental reviews	Professional	7	40	2.4	1.1
		Technical	7	16	2.4	0.3
(v)	preliminary design	Professional	103	40	2.4	15.5
		Technical	63	16	2.4	3.2
(vi)	supervision of pilot trials	Professional	6	40	2.4	0.9
		Technical	12	16	2.4	0.6
				Total consultants' staff costs		30.4
Out-of-pocket expenses						
(b)	Non-destructive site investigations					4.4
(c)	Pilot trials on new replacement and rehabilitation techniques					10.3
				Total out-of-pocket expenses		14.7

* MPS = Master Pay Scale

Notes

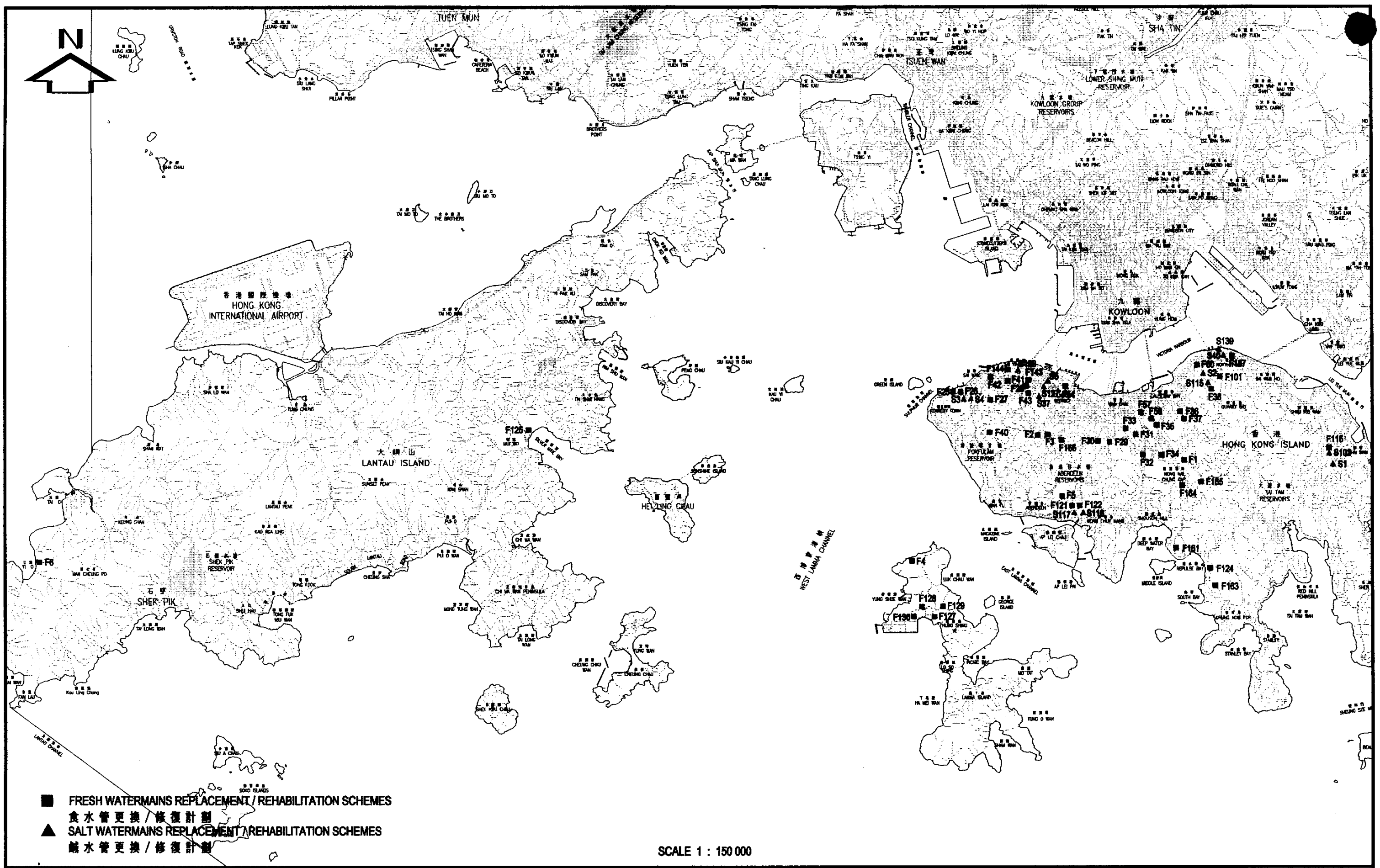
1. A multiplier factor of 2.4 is applied to the average MPS point to arrive at the full staff costs including the consultants' overheads and profit, as the staff will be employed in the consultants' offices. (At 1.4.1998, MPS pt. 40 = $62,780 per month and MPS pt. 16 = $21,010 per month)

2. Out-of-pocket expenses are the 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 Water Supplies. 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.

4. Water Supplies Department will tender the works for the boreholes and trial pits under a standard re-measurement contract with no provision for price adjustment because the contract period will not exceed 21 months (see paragraph 11 of the paper).

(PWSC0140/WIN5)



APPROVED CE / PM 10/2/99	P.W.P. NEW ITEM —— REPLACEMENT AND REHABILITATION OF WATERMAINS, STAGE 1 PHASE 1B – INVESTIGATION (SHEET 1 - HONG KONG & ISLANDS) 新工務計劃項目 —— 更換及修復水管工程第1階段第1B期 -- 勘測 (圖一 -- 香港及離島區) (CAT 'A' Submission) (甲級工程)	WATER SUPPLIES DEPT. HONG KONG SKETCH NO. 03798 / 156 / 001

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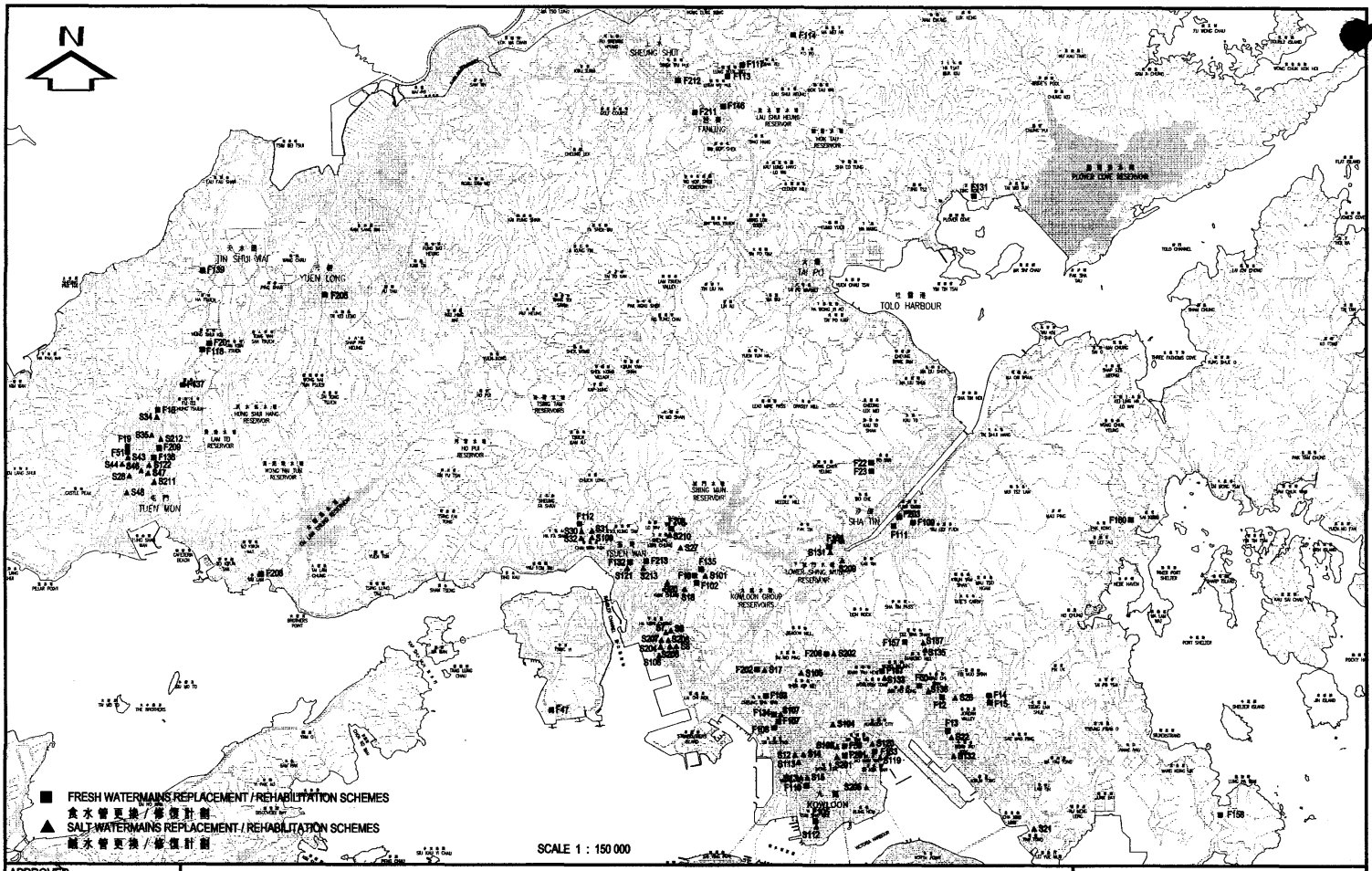

APPROVED CE / PM 10/2/199	P.W.P. NEW ITEM — REPLACEMENT AND REHABILITATION OF WATERMAINS, STAGE 1 PHASE 1B – INVESTIGATION (SHEET 2 - KOWLOON AND NEW TERRITORIES) 新工務計劃項目——更換及修復水管工程第1階段第1B期—勘測 (圖二—九龍及新界區) (CAT 'A' Submission) (甲級工程)	WATER SUPPLIES DEPT. HONG KONG SKETCH NO. 03798 / 156 / 002

REF. 98-156-01-02.DWG