For discussion **PWSC(2010-11)30**
on 17 January 2011

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 709 – WATERWORKS
Water Supplies – Combined fresh/salt water supply
189WC – Replacement and rehabilitation of water mains, stage 4

Members are invited to recommend to Finance Committee –

(a) the upgrading of part of **189WC**, entitled "Replacement and rehabilitation of water mains, stage 4 phase 1" to Category A at an estimated cost of $6,262.4 million in money-of-the-day prices; and

(b) the retention of the remainder of **189WC** in Category B.

PROBLEM

Ageing fresh and salt water mains throughout the territory are prone to frequent bursts and leaks, disrupting water supplies and traffic flow, and causing inconvenience to the public. We need to replace and rehabilitate water mains approaching the end of their service life to improve the condition of the water supply network and to maintain an acceptable level of service.

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PROPOSAL

2. The Director of Water Supplies, with the support of the Secretary for Development, proposes to upgrade part of **189WC** to Category A at an estimated cost of $6,262.4 million in money-of-the-day (MOD) prices to implement the works in stage 4 phase 1 of the territory-wide water mains replacement and rehabilitation programme (R & R programme).

PROJECT SCOPE AND NATURE

3. The part of **189WC** which we propose to upgrade to Category A comprises the replacement and rehabilitation of water mains in various districts as shown in Enclosure 1, involving –

(a) about 435 kilometres (km) of fresh water mains ranging from 20 to 2 200 millimetres (mm) in diameter including the associated service pipes and connections; and

(b) about 65 km of salt water mains ranging from 25 to 1 200 mm in diameter including the associated service pipes and connections.

4. We will retain the remainder of **189WC** in Category B, which includes the replacement and rehabilitation of approximately 302 km of fresh water mains and 48 km of salt water mains scattered throughout the territory. Funding for the remainder of **189WC** (which also represents the final phase of works under the R & R programme) will be sought to dovetail with the implementation programme of the project.

5. Subject to the approval of the Finance Committee (FC), we plan to commence the proposed works in March 2011 for completion in December 2015.

JUSTIFICATION

6. Hong Kong's fresh water and salt water supplies are provided through a network of about 7 800 km of water mains. Most of these water mains are underground. A substantial portion of the water mains were laid more than 30 years ago. They are progressively approaching the end of their service life

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and have become increasingly difficult and costly to maintain. As a result of the ageing problem, there had been an increasing number of water main bursts and leakages causing inconvenience to the public and loss of precious water resources. To prevent further deterioration of the water supply network, we embarked on a territory-wide programme in 2000 for replacement and rehabilitation of some 3 000 km of aged water mains in stages.

7. After ten years of implementation, the R & R programme has achieved steady progress. With the R & R works completed to-date, coupled with the implementation of leakage control and pressure management measures, the annual number of bursts has reduced from the peak of about 2 500 in 2000-01 to 990 in 2009-10 as shown in Enclosure 2. For the eight-month period between April and November 2010, there were 452 bursts. The water main leakage rate has also reduced from 25% in 2001 to 21% in 2009. We anticipate that the water main leakage rate will further decrease to 15% upon completion of the R & R programme.

8. In order to maintain the momentum of the works in progress, we propose to commence works in March 2011 for stage 4 phase 1 of the R & R programme, as detailed in paragraph 3 above. We will seek the necessary funding approval for construction of the remaining works upon completion of their detailed design.

FINANCIAL IMPLICATIONS

9. We estimate the cost of the proposed works to be $6,262.4 million in MOD prices (please see paragraph 11 below), broken down as follows –

/(a) …..

			$ million	
(a)	Water main replacement by		2,880.0	
	(i) conventional method[1]	2,450.0		
	(ii) trenchless methods[2]	430.0		
(b)	Water main rehabilitation[3] by trenchless methods		1,355.0	
(c)	Environmental mitigation measures		40.0	
(d)	Consultants' fees for		51.0	
	(i) contract administration	8.0		
	(ii) management of resident site staff	43.0		
(e)	Remuneration of resident site staff		359.0	
(f)	Contingencies		460.0	
	Sub-total		5,145.0	(in September 2010 prices)
(g)	Provision for price adjustment		1,117.4	
	Total		6,262.4	(in MOD prices)

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1 Water main replacement by conventional method refers to laying of new water mains in trench. It involves opening up the road surface for the whole lengths of the pipelines being replaced. For budgetary purpose, we have based on site investigation outcome, assumed that around 86% of water mains under stage 4 phase 1 will be replaced by conventional method. The actual percentage may vary depending on site conditions.

2 Water main replacement by trenchless methods (sometimes referred to as 'minimum dig' or 'reduced dig' methods) refers to the use of pipe jacking, micro-tunnelling or boring techniques to construct underground pipelines without opening up the road surface for the whole lengths of the pipelines being replaced. Trenchless methods will be adopted as appropriate in water main replacement. For budgetary purpose, we have based on site investigation outcome, assumed that around 2% of water mains under stage 4 phase 1 will be replaced by trenchless methods. The actual percentage may vary depending on site conditions.

3 Water main rehabilitation refers to the launch of a new pipe from a 'launching pit' and pulling it inside the existing pipe route to a 'receiving pit'. Trenchless methods are adopted without opening up the road surface except at the pits. For budgetary purpose, we have based on site investigation outcome, assumed that around 12% of water mains under stage 4 phase 1 will be rehabilitated by trenchless methods. The actual percentage may vary depending on site conditions.

10. We engaged consultants to carry out detailed design of the proposed works. Due to insufficient in-house resources, we propose to continue to engage consultants to undertake contract administration and site supervision of the proposed works. A breakdown of the estimates for consultants' fees and resident site staff costs by man-months is at Enclosure 3.

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

Year	$ million (Sept 2010)	Price adjustment factor	$ million (MOD)
2011–12	270.0	1.04250	281.5
2012–13	700.0	1.09463	766.2
2013–14	1,050.0	1.14936	1,206.8
2014–15	1,050.0	1.20682	1,267.2
2015–16	1,050.0	1.27169	1,335.3
2016–17	615.0	1.34163	825.1
2017–18	410.0	1.41542	580.3
	5,145.0		6,262.4

12. We have derived the MOD estimates on the basis of the Government's latest set of assumptions on the trend rate of change in the prices of public sector building and construction output for the period from 2011 to 2018. We will deliver the works under re-measurement contracts because the quantities of works are subject to variation during construction to suit the actual underground conditions. The contracts will provide for price adjustments.

13. The proposed works will not give rise to additional recurrent expenditure. The project by itself would lead to an increase in production cost of water by 1.66% in real terms by 2017-18[4].

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[4] The increase in production cost of water is calculated at the present price level and on the assumption that the water demand remains static during the period from 2011 to 2018.

PUBLIC CONSULTATION

14. We consulted the concerned District Councils in mid-2010 on the proposed works and all the District Councils supported the project. A table showing results of the consultations is at Enclosure 4. We will implement adequate traffic and environmental mitigation measures under the works contracts to minimise inconvenience to the public. We will also closely monitor the implementation of these mitigation measures and the interfacing of works, and consult the relevant District Councils when necessary during the project period.

15. We circulated to the Legislative Council Panel on Development an information paper on the proposed works on 6 December 2010. Members raised no objection to the proposal.

ENVIRONMENTAL IMPLICATIONS

16. This is not a designated project under the Environmental Impact Assessment Ordinance (Cap. 499). The project does not have any long-term environmental impact. Short-term construction impacts will be mitigated through the implementation of standard pollution control measures, and also the measures recommended in the Preliminary Environmental Review Report for this project. We have included in paragraph 9(c) above a sum of $40.0 million (in September 2010 prices) in the project estimates for implementation of these mitigation measures and will incorporate these requirements into the works contracts for implementation.

17. We have considered the alignments of the proposed water mains in the planning and design stages to reduce the generation of construction waste where possible. In addition, we will require the contractors to reuse inert construction waste (e.g. excavated soil) on site or in other suitable construction sites as far as possible, in order to minimise the quantity of inert construction waste to be disposed at public fill reception facilities[5]. We will encourage the contractors to maximise the use of recycled or recyclable inert construction waste, as well as the use of non-timber formwork to further minimise the generation of construction waste.

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[5] Public fill reception facilities are specified in Schedule 4 of the Waste Disposal (Charges for Disposal of Construction Waste) Regulation. Disposal of inert construction waste in public filling reception facilities requires a licence issued by the Director of Civil Engineering and Development.

18. We will also require the contractors to submit for approval a plan setting out the waste management measures, which will include appropriate mitigation means to avoid, reduce, reuse and recycle inert construction waste. We will ensure that the day-to-day operations on site comply with the approved plan. We will require the contractors to separate the inert and non-inert portion of construction waste on site for disposal at appropriate facilities. We will control the disposal of inert construction waste and non-inert construction waste at public fill reception facilities and landfills respectively through a trip-ticket system.

19. We estimate that the project will generate in total about 712 000 tonnes of construction waste. Of these, we will reuse about 401 500 tonnes (56.4%) of inert construction waste on site and deliver 300 000 tonnes (42.1%) of inert construction waste to public fill reception facilities for subsequent reuse. We will dispose of the remaining 10 500 tonnes (1.5%) of non-inert construction waste at landfills. The total cost for accommodating construction waste at public fill reception facilities and landfill sites is estimated to be $9.4 million for this project (based on a unit cost of $27 per tonne for disposal at public fill reception facilities and $125 per tonne[6] at landfills)

HERITAGE IMPLICATIONS

20. The proposed works in Kowloon and on Hong Kong Island will not affect any heritage site, i.e. all declared monuments, proposed monuments, graded historic sites/buildings, sites of archaeological interest and Government historic sites identified by the Antiquities and Monuments Office (AMO). For the proposed works in the New Territories, some of the proposed alignments fall within sites of archaeological interest. Heritage Impact Assessment (HIA) has been conducted during the investigation phase. Given the nature of the proposed replacement and rehabilitation works, adverse impact on sites of archaeological interest is not anticipated. We will conduct archaeological watching brief during excavation as a precautionary measure according to the recommendation of the HIA report approved by AMO.

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[6] This 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 per m^3), nor the cost to provide new landfills (which is likely to be more expensive) when the existing ones are filled.

TRAFFIC IMPLICATIONS

21. We have carried out Traffic Impact Assessments (TIA) for the proposed works. The cumulative effects of traffic from projects at adjacent sites are also covered in the TIA. The TIA have concluded that the proposed works would not cause any significant traffic impact to the surrounding road network. We will implement temporary traffic arrangements to minimise the impact on traffic during construction and will display notice boards on site to explain the reason of temporary traffic arrangements and the expected completion dates of the individual sections of works. In addition, we will set up telephone hotlines for public enquiries or complaints. Furthermore, trenchless methods will be used whenever practicable for works along busy roads.

LAND ACQUISITION

22. The proposed works do not require any land acquisition.

BACKGROUND

23. The R & R programme is implemented in four stages. Stage 1 involves 600 km water mains and all the works were completed in early 2010. Stages 2 and 3 involve 750 km and 800 km water mains respectively, with 82% and 28% of the works completed as at November 2010. We expect to complete the works for Stages 2 and 3 by June 2011 and December 2013 respectively.

24. As regards the remaining stage 4 which involves replacement and rehabilitation of 850 km water mains in two phases, we upgraded **189WC** to Category B in January 2008. In July 2008, we upgraded part of **189WC** to Category A as **190WC** "Replacement and rehabilitation of water mains, stage 4 – investigation and detailed design" for engagement of consultants to carry out investigation and detailed design of the proposed works. As the design of the proposed works for stage 4 phase 1 as detailed in paragraph 3 above have been completed, the construction is ready to commence in March 2011, subject to FC's approval.

25. The R & R programme was originally planned for implementation in stages from 2000 to 2020. In response to the public aspiration for early completion of the project, we compressed the works programme in 2005 and advanced the target completion date of the entire project to 2015. Upon completion of stage 4 phase 1, 88.3% of the some 3 000 km aged water mains would have been replaced and rehabilitated. We will seek funding for the remaining 11.7% when the detailed design is finalised.

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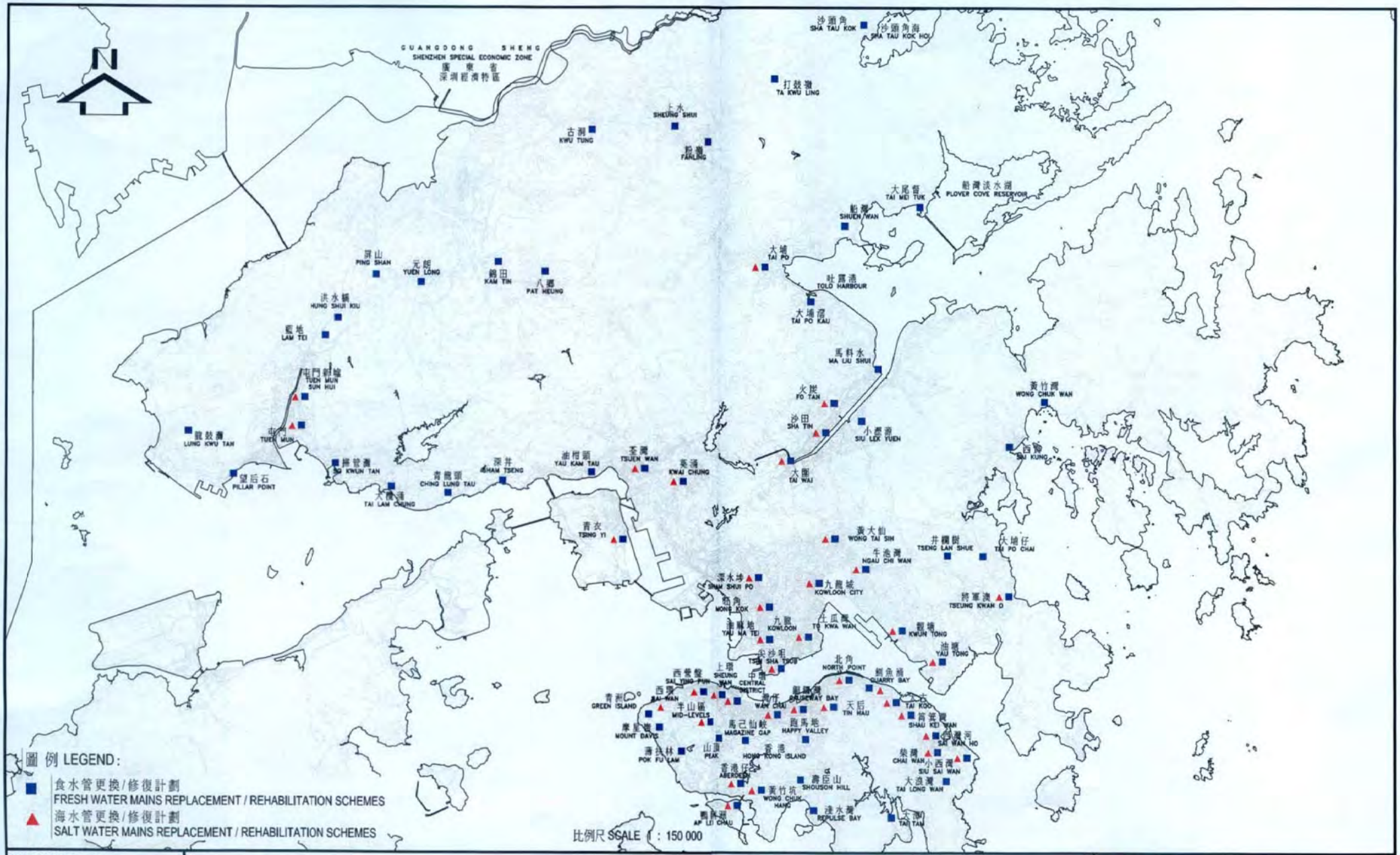
26. The proposed works will not involve any tree removal or planting proposals.

27. We estimate that the proposed works will create about 1 440 jobs (1 165 for labourers and another 275 for professional/technical staff) providing a total employment of 73 800 man-months.

Development Bureau
January 2011



核准 APPROVED

總工程師/工程管理 CE / PM

23 / 11 / 2010

（甲級工程）
（CAT 'A' Submission）

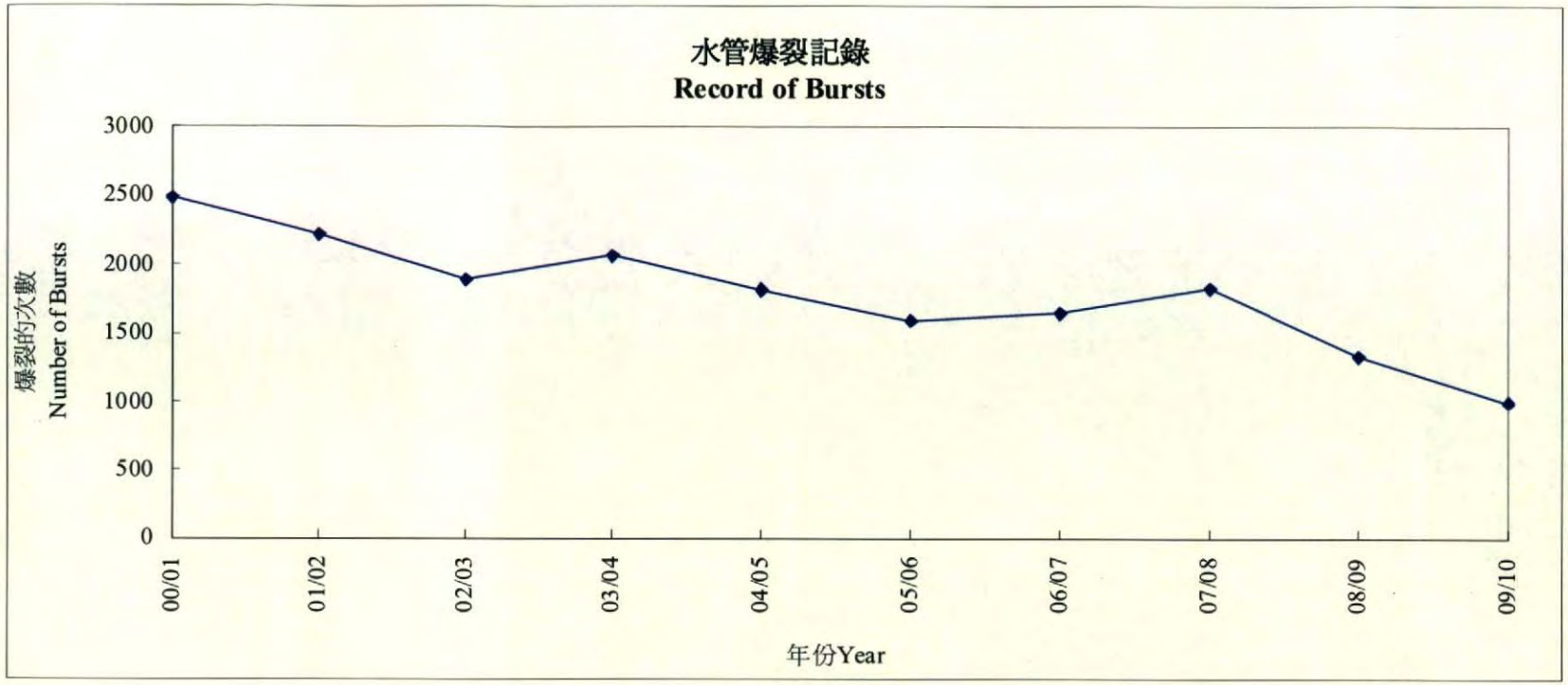
工務計劃項目第189WC號 ----- 更換及修復水管工程第4階段第一期
P.W.P. Item no. 189WC ----- Replacement and rehabilitation of water mains, stage 4 phase 1

水務署
WATER SUPPLIES DEPARTMENT

草圖編號 SKETCH NO. SK 62010 / 054

REF. 62010-054.DWG

附件1 ENCLOSURE 1


水管爆裂記錄
Record of Bursts
爆裂的次數
Number of Bursts
3000
2500
2000
1500
1000
500
0
00/01
01/02
02/03
03/04
04/05
05/06
06/07
07/08
08/09
09/10
年份Year

189WC – Replacement and rehabilitation of water mains, stage 4

Breakdown of the estimates for consultants' fees and resident site staff costs (in September 2010 prices) for stage 4 phase 1

			Estimated man-months	Average MPS* salary point	Multiplier (Note 1)	Estimated fee ($million)
(a)	Consultants' fees for contract administration (Note 2)		–	–	–	8.0
					Sub-total	8.0
(b)	Resident site staff costs (Note 3)	Professional	1 900	38	1.6	176.9
		Technical	7 054	14	1.6	225.1
					Sub-total	402.0
	Comprising –					
	(i) Consultants' fee for management of resident site staff					43.0
	(ii) Remuneration of resident site staff					359.0
					Total	410.0

*MPS = Master Pay Scale

Notes

1. A multiplier 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 now, MPS salary point 38 = $58,195 per month and MPS salary point 14 = $19,945 per month.)

2. The consultants' staff cost for contract administration is calculated in accordance with the existing consultancy agreement for the design and construction of the project. The construction phase of the assignment will only be executed subject to Finance Committee's approval to upgrade the proposed works to Category A.

3. The actual man-months and actual costs will only be known after completion of the construction works.

189WC – Replacement and rehabilitation of water mains, stage 4

Consultation with District Councils

District Council	Date of Meeting	Decision
Tai Po District Council Environment, Housing and Works Committee	14 July 2010	Supported
Yuen Long District Council Town Planning and Development Committee	14 July 2010	Supported
Tuen Mun District Council Environmental, Hygiene and District Development Committee	16 July 2010	Supported
North District Council District Minor Works and Environmental Improvement Committee	19 July 2010	Supported
Sai Kung District Council Traffic and Transport Committee	22 July 2010	Supported
Wong Tai Sin District Council Traffic and Transport Committee	27 July 2010	Supported
Sham Shui Po District Council Transport and Housing Affairs Committee	29 July 2010	Supported
Kwai Tsing District Council Traffic and Transport Committee	12 August 2010	Supported
Tsuen Wan District Council Environmental and Health Affairs Committee, and Traffic and Transport Committee	2 September 2010 and 6 September 2010	Supported

District Council	Date of Meeting	Decision
Wan Chai District Council Development, Planning and Transport Committee	2 September 2010	Supported
Sha Tin District Council Development and Housing Committee	9 September 2010	Supported
Yau Tsim Mong District Council Traffic and Transport Committee	9 September 2010	Supported
Eastern District Council Planning, Works and Housing Committee	16 September 2010	Supported
Kowloon City District Council Housing and Infrastructure Committee	16 September 2010	Supported
Southern District Council District Development and Environment Committee	27 September 2010	Supported
Kwun Tong District Council Traffic & Transport Committee	7 October 2010	Supported
Central and Western District Council Food, Environment, Hygiene and Works Committee	14 October 2010	Supported