

## **ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE**

### **HEAD 709 – WATERWORKS**

#### **Water Supplies – Combined fresh/salt water supply**

#### **174WC – Replacement and rehabilitation of water mains, stage 1 phase 2**

Members are invited to recommend to Finance Committee the upgrading of the remainder of **174WC** to Category A at an estimated cost of \$1,267.1 million in money-of-the-day prices for implementation of the remaining works in stage 1 phase 2 of the territory-wide water mains replacement and rehabilitation programme.

### **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.

### **PROPOSAL**

2. The Director of Water Supplies, with the support of the Secretary for the Environment, Transport and Works, proposes to upgrade **174WC** to Category A at an estimated cost of \$1,267.1 million in money-of-the-day (MOD) prices for implementation of the remaining works in stage 1 phase 2 of the territory-wide water mains replacement and rehabilitation programme.

**/PROJECT .....**

**PROJECT SCOPE AND NATURE**

3. The full scope of works under **174WC** comprises approximately 210 kilometres (km) of fresh water mains and 40 km of salt water mains. The remaining works under **174WC** that we now propose to upgrade to Category A comprise the replacement and rehabilitation of, mainly in Kowloon, –

- (a) about 203 km of fresh water mains ranging from 20 millimetres (mm) to 1 000 mm including associated service pipes and connections; and
- (b) about 36 km of salt water mains ranging from 25 mm to 600 mm including associated service pipes and connections.

\_\_\_\_\_ 4. The locations of the proposed works are at Enclosure 1. Details of  
\_\_\_\_\_ typical water mains replacement and rehabilitation works proposed are at  
Enclosure 2.

5. We plan to commence the proposed works in August 2006 for completion in March 2010.

**JUSTIFICATION**

6. Hong Kong's fresh water and salt water supplies are provided through a network of about 7 400 km of water mains. Most of these water mains are underground. About 45% of the water mains were laid more than 30 years ago. They are approaching the end of their service life and have become increasingly difficult and costly to maintain.

7. With more water mains approaching the end of their service life, we are experiencing an increasing number of main bursts causing inconvenience to the public. As the previous way of carrying out small scale replacement works on a local basis was no longer effective, we engaged consultants in February 1996 to carry out an Underground Asset Management Study to develop a comprehensive and cost-effective management plan for the water supply network. The Study recommended the replacement and rehabilitation of some 3 000 km of aged water mains in stages to prevent further deterioration of the water supply network.

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8. The whole replacement and rehabilitation programme was originally scheduled for completion by 2020. To bring about early improvement to the supply system and minimise inconvenience to the public due to frequent main bursts, we have advanced the completion of the whole replacement and rehabilitation programme to 2015. We will continue to review the programme taking account of prevailing constraints and the residual service life of the water mains to be replaced with a view to completing the works within a shorter time frame before 2015.

9. To meet the compressed project programme, we need to start the proposed works as set out in paragraph 3 above in August 2006. Due to insufficient in-house staffing resources, we plan to engage consultants to supervise part of the proposed works.

10. Where beneficial and practicable, rehabilitation<sup>1</sup> by trenchless methods rather than traditional replacement methods will be adopted, as the former techniques generally require less excavation and reduce environmental impacts and disturbance to traffic.

## FINANCIAL IMPLICATIONS

11. We estimate the cost of the proposed works to be \$1,267.1 million in MOD prices (see paragraph 12 below), made up as follows –

	<b>\$ million</b>
(a) Water mains replacement by	627.7
(i) conventional method	542.8
(ii) trenchless methods <sup>2</sup>	84.9
(b) Water mains rehabilitation by trenchless methods	347.6
	/(c) .....

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<sup>1</sup> Rehabilitation methods are generally classified as trenchless methods (sometimes referred to as 'minimum dig' or 'reduced dig' methods). In these techniques, a new pipe is launched from a 'launching pit' and travels along the existing pipe route to a 'receiving pit' without opening up the road surface for the whole length of the pipe.

<sup>2</sup> Water main replacement by trenchless 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 length of the pipelines. We will adopt trenchless methods for mainlaying works in areas with serious traffic and environmental problems.

	<b>\$ million</b>	
(c) Environmental mitigation measures	8.5	
(d) Consultants' fees for	112.7	
(i) contract administration	2.8	
(ii) site supervision	109.9	
(e) Contingencies	109.7	
Sub-total	1,206.2	(in September 2005 prices)
(f) Provision for price adjustment	60.9	
Total	1,267.1	(in MOD prices)

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

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

<b>Year</b>	<b>\$ million (Sept 2005)</b>	<b>Price adjustment factor</b>	<b>\$ million (MOD)</b>
2006 – 2007	68.0	1.01500	69.0
2007 – 2008	236.9	1.03023	244.1
2008 – 2009	368.7	1.04568	385.5
2009 – 2010	354.3	1.06136	376.0
2010 – 2011	163.7	1.07728	176.4
2011 – 2012	14.6	1.10152	16.1
	1,206.2		1,267.1

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13. We have derived the MOD estimate on the basis of the Government's latest forecast of trend rate of change in the prices of public sector building and construction output for the period from 2006 to 2012. We will implement the mainlaying works under six 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 adjustment as the contract periods will exceed 21 months.

14. The proposed works will not give rise to additional recurrent expenditure.

15. The project by itself would lead to an increase in production cost of water by 0.04% in real terms by 2012<sup>3</sup>.

## **PUBLIC CONSULTATION**

16. We consulted the ten District Councils concerned between August 2005 and January 2006. A table summarising the consultations is at Enclosure 4. All of them supported the proposed works. In response to some District Councils' concerns about traffic and environmental impacts arising from the proposed works, we will incorporate adequate mitigation measures in the relevant works contracts. We will monitor implementation of these measures and the interfacing of works where practicable, and keep the relevant District Councils informed of progress during the construction period.

17. We consulted the Legislative Council Panel on Planning, Lands and Works on 8 January 2001 regarding the stage 1 phase 2 works, and in May 2005 by circulation of an information paper regarding the part-upgrading of **174WC** to Category A as **185WC**. Members supported the proposals on both occasions. On 28 February 2006, we consulted the Panel again on the proposed remaining works under **174WC**. Members had no objection to the proposal.

## **ENVIRONMENTAL IMPLICATIONS**

18. This is not a designated project under the Environmental Impact Assessment Ordinance (Cap. 499). We have completed a Preliminary Environmental Review which concluded that the proposed works would not have any

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<sup>3</sup> 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 2006 to 2012.

long term adverse environmental impact. We will control short term impacts caused by the construction works through implementation of standard pollution control measures. We have included \$8.5 million (in September 2005 prices) in the project estimate for implementation of the environmental mitigation measures.

19. We have considered the alignments of the proposed water mains in the planning and design stages to reduce the generation of construction and demolition (C&D) materials where possible. In addition, we will require the contractors to reuse inert C&D materials (e.g. reuse of excavated soil as filling material) on site or in other suitable construction sites as far as possible, in order to minimise the disposal of C&D materials to public fill reception facilities<sup>4</sup>. We will encourage the contractors to maximise the use of recycled or recyclable C&D materials, as well as the use of non-timber formwork to further minimise the generation of construction waste.

20. We will also require the contractors to submit waste management plans (WMP) for approval. The WMP will include appropriate mitigation measures to avoid, reduce, reuse and recycle C&D materials. We will ensure that the day-to-day operations on site comply with the approved WMP. We will control the disposal of public fill and C&D waste to public fill reception facilities and landfills respectively through a trip-ticket system. We will require the contractors to separate public fill from C&D waste for disposal at appropriate facilities. We will record the disposal, reuse and recycling of C&D materials for monitoring purposes.

21. We estimate that the project will generate about 245 000 tonnes of C&D materials. Of these, we will reuse about 102 000 tonnes (41.6%) on site, deliver 138 000 tonnes (56.3%) to public fill reception facilities for subsequent reuse and dispose of 5 000 tonnes (2.1%) at landfills. The total cost for accommodating C&D materials at public fill reception facilities and landfill sites is estimated to be \$4.35 million for this project (based on an unit cost of \$27/tonne for disposal at public fill reception facilities and \$125/tonne<sup>5</sup> at landfills).

**/TRAFFIC .....**

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<sup>4</sup> Public fill reception facilities are specified in Schedule 4 respectively of the Waste Disposal (Charges for Disposal of Construction Waste) Regulation. Disposal of public fill in a public fill reception facilities requires a licence issued by the Director of Civil Engineering and Development.

<sup>5</sup> 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/m<sup>3</sup>), nor the cost to provide new landfills (which is likely to be more expensive) when the existing ones are filled.

## TRAFFIC IMPACTS

22. We have carried out traffic impact assessments which concluded that the proposed works would not cause any unacceptable traffic impact. We will implement temporary traffic arrangements to minimise impacts on traffic during construction and use trenchless methods wherever practicable for rehabilitation of water mains along busy roads. We will also establish traffic management liaison groups comprising representatives from relevant Government departments to examine the temporary traffic arrangements before implementation.

## LAND ACQUISITION

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

## BACKGROUND INFORMATION

24. We upgraded **174WC** to Category B in September 2000.

25. In March 2001, we upgraded part of **174WC** to Category A as **178WC** for engagement of consultants to carry out site investigations, traffic impact assessment and environmental review. The consultancy completed in 2003.

26. In June 2005, we upgraded part of **174WC** to Category A as **185WC** “Replacement and rehabilitation of water mains, stage 1 phase 2 works in Sha Tin and Tai Wai” for replacement and rehabilitation of about 7 km of fresh water mains and 4 km of salt water mains in Sha Tin and Tai Wai. The works commenced in September 2005 for completion by end 2007.

27. We have substantially completed the detailed design of the proposed remaining works under **174WC** and plan to start construction in August 2006 for completion in March 2010.

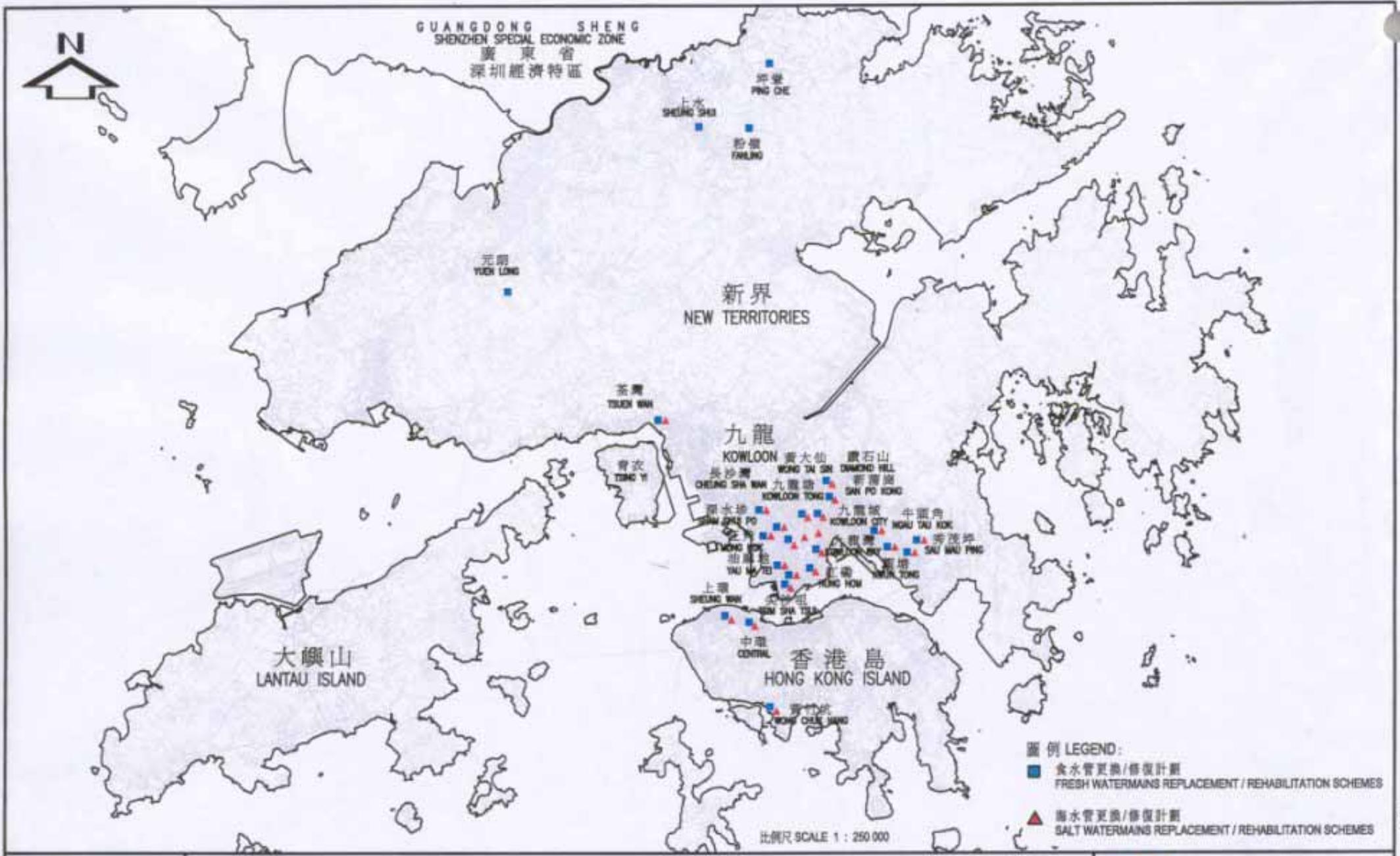
28. The stage 1 works includes replacement and rehabilitation of the most critical water mains. The stage 1 phase 1 works under **90WC** “Replacement and rehabilitation of water mains, stage 1 phase 1” commenced in December 2000 and will be completed by end of 2008. We will continue planning and design of the remaining stages 2 to 4 of the water mains replacement and rehabilitation programme with a view to completing the works before 2015.

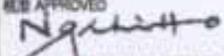
29. The proposed works will not involve any tree removal or planting proposal.

30. We estimate that the proposed works will create about 450 jobs (370 for labourers and another 80 for professional/technical staff) providing a total employment of 17 000 man-months.

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Environment, Transport and Works Bureau  
March 2006



核准 APPROVED  
  
 總工程師/工程管理部 CE/PM  
 13/2/2006

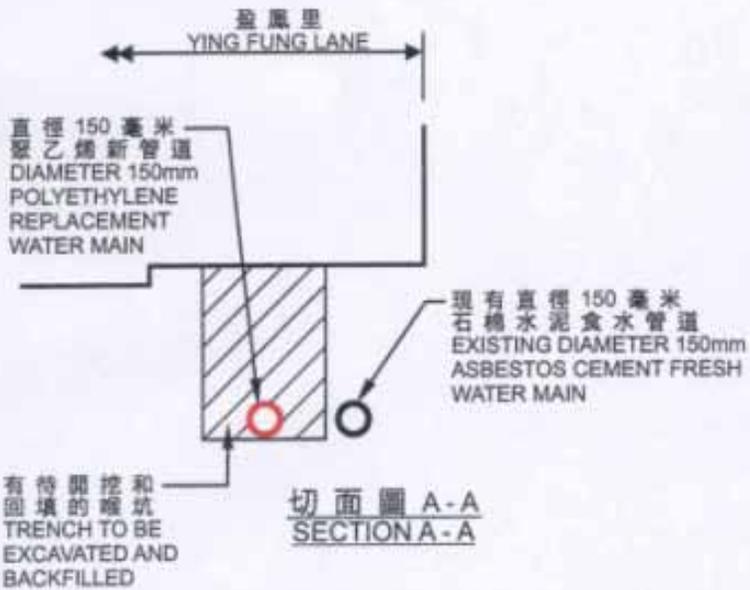
(甲級工程)  
 (CAT 'A' Submission)  
 工務計劃項目174WC——更換及修復水管工程第1階段第2期  
 P.W.P. NO. 174WC — REPLACEMENT AND REHABILITATION OF WATER MAINS, STAGE 1 PHASE 2

 水務署  
 WATER SUPPLIES DEPT.  
 草圖編號 SKETCH NO. SK 62005 / 172 / 001

附件一 ENCLOSURE 1



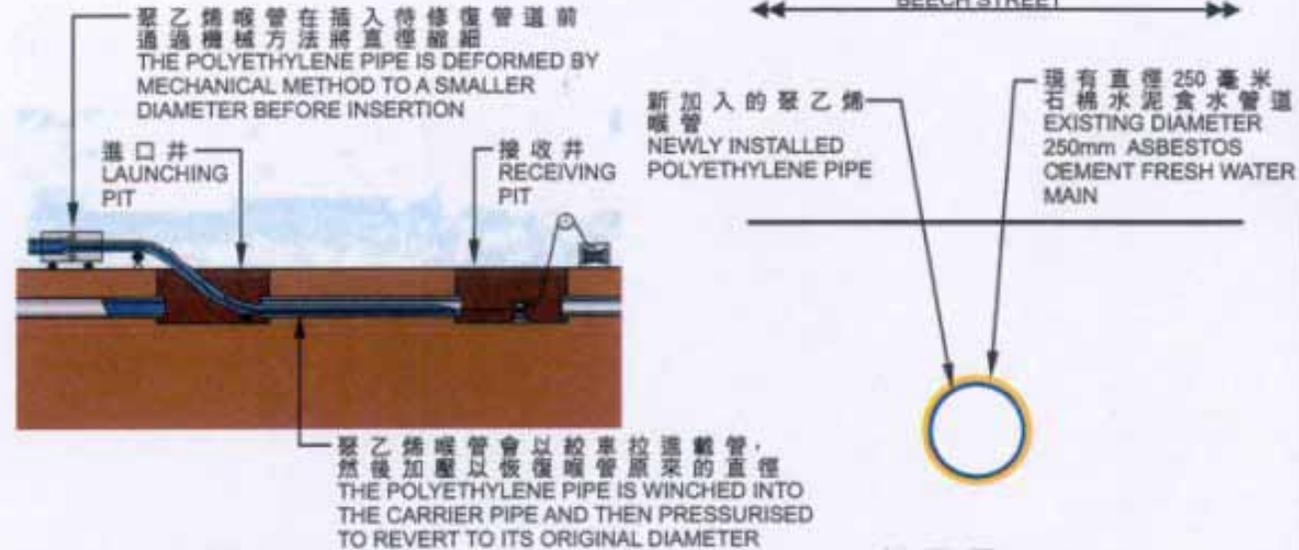
**地盤平面圖 - 更換水管**  
**SITE PLAN - WATER MAIN REPLACEMENT**  
 比例尺 SCALE 1:2000



**切面圖 A-A**  
**SECTION A-A**



**地盤平面圖 - 修復水管**  
**SITE PLAN - WATER MAIN REHABILITATION**  
 比例尺 SCALE 1:2000



**切面圖 B-B**  
**SECTION B-B**

**修復水管圖解**  
**WATER MAIN REHABILITATED**  
**ILLUSTRATION**

APPROVED  
 [Signature]  
 總工程師/工程管理部 CE/PM  
 13/21 2006

工務計劃項目174WC — 更換及修復水管工程第1階段第2期  
 更換及修復水管範例  
 P.W.P. No. 174WC — Replacement and rehabilitation of water mains, stage 1 phase 2  
 Typical water main replacement and rehabilitation details

水務署  
 WATER SUPPLIES DEPT.  
 草圖編號 SK 62005 / 172 / 002

附件二 ENCLOSURE 2

## Enclosure 3 to PWSC(2006-07)1

### 174WC – Replacement and rehabilitation of water mains, stage 1 phase 2

#### Breakdown of estimates for consultants' fees:

<b>Consultants' staff costs</b>	<b>Estimated man-months</b>	<b>Average MPS* salary point</b>	<b>Multiplier (Note 1)</b>	<b>Estimated fee (\$million)</b>	
(a) consultants' fees for works in the construction stage (Note 2)				2.8	
(b) site supervision by resident site staff employed by the consultants (Note 3)	Professional  Technical	468  2 405	38  14	1.6  1.6	40.6  69.3
<b>Total consultants' staff cost</b>				<b>112.7</b>	

\*MPS = Master Pay Scale

#### Notes

1. A multiplier of 1.6 is applied to the average MPS point to estimate the cost of resident site staff supplied by the consultants. (As at 1.10.2005, MPS Pt. 38 = \$54,255 per month and MPS Pt. 14 = \$18,010 per month).
2. The consultants' fees for works in the construction stage are the actual tendered prices provisionally included in the Consultancy Agreement Nos. CE 21/2004 (WS) and CE 22/2004 (WS) for the design and construction of the project. The construction phase of the assignments will only be executed subject to Finance Committee's approval to upgrade the proposed works to Category A.
3. We will only know the actual man-months and actual cost after completion of the construction works.

**174WC – Replacement and rehabilitation of water mains, stage 1 phase 2**

**Consultations with District Councils**

<b>District Council</b>	<b>Date of Meeting</b>	<b>Decision</b>
Central and Western District Council	24 November 2005 and 19 January 2006	Supported
Kowloon City District Council Traffic and Transport Committee	29 September 2005	Supported
Kwun Tong District Council Traffic and Transport Committee	1 September 2005	Supported
North District Council District Development and Environmental Improvement Committee	26 September 2005	Supported
Sham Shui Po District Council Traffic Committee	27 October 2005	Supported
Southern District Council Planning, Works and Housing Committee	24 October 2005	Supported
Tsuen Wan District Council Environmental and Health Affairs Committee	1 September 2005 and 3 November 2005	Supported
Tsuen Wan District Council Traffic and Transport Committee	4 November 2005	Supported
Wong Tai Sin District Council	13 September 2005	Supported
Yau Tsim Mong District Council	25 August 2005	Supported
Yuen Long District Council Town Planning and Development Committee	14 September 2005	Supported