

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 1 (part 2) - works in Yuen Long, Fanling, Kowloon City, Wong Tai Sin and Sham Shui Po", to Category A at an estimated cost of \$117.5 million in money-of-the-day prices; and
- (b) the retention of the remainder of **90WC** in Category B.

PROBLEM

Ageing fresh and salt water mains throughout the territory are prone to frequent bursts and leaks. We need to replace and rehabilitate water mains 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.

/PROPOSAL

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 \$117.5 million in money-of-the-day (MOD) prices for the replacement and rehabilitation of aged water mains, stage 1 phase 1 (part 2) works in Yuen Long, Fanling, Kowloon City, Wong Tai Sin and Sham Shui Po.

PROJECT SCOPE AND NATURE

3. The original scope of **90WC** comprised the replacement and rehabilitation of approximately 250 kilometres (km) of fresh water mains and 100 km of salt water mains. The Finance Committee has previously approved the upgrading of parts of **90WC** to Category A (see paragraph 23 to 25 below). The remaining scope of works under **90WC** comprises the replacement and rehabilitation of approximately 232.3 km of fresh water mains and 98.3 km of salt water mains throughout the territory to be implemented in two sub-phases as follows –

- (a) phase 1A (final part) comprising the replacement and rehabilitation of approximately 14.3 km of fresh water mains; and
- (b) phase 1B comprising the replacement and rehabilitation of approximately 218 km of fresh water mains and 98.3 km of salt water mains.

4. The part of **90WC** we now propose to upgrade to Category A comprises –

- (a) phase 1A (final part) –

i.e. the replacement and rehabilitation of about 14.3 km of fresh water mains ranging from 80 millimetres (mm) to 300 mm in diameter and the associated service connections in Yuen Long and Fanling.

We plan to commence construction in early 2002 for completion by the end of 2005. The site plans showing the proposed works are at Enclosure 1; and

/(b)

- (b) part of phase 1B –works in Kowloon City, Wong Tai Sin and Sham Shui Po, comprising –
- (i) the replacement of about 1.4 km of fresh water mains and 1.0 km of salt water mains ranging from 150 mm to 600 mm in diameter and the associated service connections in To Kwa Wan and Ma Tau Kok in the Kowloon City District;
 - (ii) the replacement of about 1.4 km of fresh water mains and 0.8 km of salt water mains ranging from 150 mm to 200 mm in diameter and the associated service connections in the Diamond Hill areas in the Wong Tai Sin District; and
 - (iii) the replacement of about 2.1 km of fresh water mains and 1.7 km of salt water mains ranging from 100 mm to 700 mm in diameter and the associated service connections in the Sham Shui Po and Cheung Sha Wan areas.

We plan to start the replacement works in early 2002 for completion in mid 2005. We will carry out the works in Kowloon City and Wong Tai Sin in conjunction with the mainlaying works under **85WC**¹ "Water supply to South East Kowloon Development, stage 1 - works" and incorporate the works into the contracts for **85WC**. For the works in Sham Shui Po and Cheung Sha Wan, we will carry out these in conjunction with the drainage improvement works under **99CD**² "West Kowloon drainage improvement, stage 2 phase 1 works" and the proposed road work project³ "Pedestrian environment improvement phase 1 scheme – Sham Shui Po". The site plans showing the proposed works are at Enclosure 2.

/5.

¹ A related paper, PWSC(2001-02)67, for the upgrading of **85WC** under **Head 709** to Category A entitled "Water supply to South East Kowloon development, stage 1 - works" is submitted for Members' consideration at this meeting.

² In June 1999, Finance Committee approved the upgrading of part of **59CD** under **Head 704** 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.

³ The proposed road work project is initiated by Transport Department and will be implemented by Highways Department with funds from the block allocation under **Head 706** of the Capital Works Reserve Fund.

5. The remaining works of **90WC** to be retained in Category B include the replacement and rehabilitation of approximately 213.1 km of fresh water mains and 94.8 km of salt water mains under phase 1B.

JUSTIFICATION

6. Hong Kong's fresh and salt water supplies are provided through a network of 5 700 km of water mains. Most of these water mains are underground. About 45% of the water mains were laid some 30 years ago as part of the development of urban areas and new towns. They are approaching the end of their service life and have become increasingly difficult and costly to maintain.

7. In view of the considerable length of water mains approaching the end of their service life in the foreseeable future, we engaged consultants in February 1996 to carry out an Underground Asset Management Study (the Study) to develop a comprehensive and cost-effective management plan for the water supplies network. We completed the Study at the end of 1997. Taking into account the capital cost of the replacement and rehabilitation works, savings in maintenance costs, the loss of water and the social implications of leakage and main bursts, the Study recommended the replacement and rehabilitation of some 3 000 km of ageing water mains in stages over 20 years to prevent further deterioration of the water supply network. We estimate that the number of pipe failures per year will be reduced from the 2000 level of 24 700 (1 900 bursts and 22 800 leaks) to 15 000 (1 000 bursts and 14 000 leaks) upon the completion of the recommended 20-year programme. Over the same period, the loss of fresh water will be reduced from 220 million to 180 million cubic metres per year. This represents an improvement in the leakage rate of the water mains from the current level of 25% to 15% in 20 years' time. Otherwise, the water supply system would continue to deteriorate and we believe that the number of pipe failures per year would increase to 40 000 with annual loss of 630 million cubic metres of fresh water in the same period.

8. We have substantially completed the detailed design for the remaining works under phase 1A and therefore propose to proceed with the construction as described in paragraph 4(a) above.

9. To avoid repetitive road opening and traffic disruption, we also propose to implement part of the works under phase 1B as described in paragraph 4(b) above and to carry out these works in conjunction with drainage improvement works, road works and other mainlaying works in the vicinity.

/FINANCIAL

FINANCIAL IMPLICATIONS

10. We estimate the capital cost of the proposed works to be \$117.5 million in MOD prices (see paragraph 11 below), made up as follows –

| | \$ million | |
|-------------------------------------------------------------|-------------------|----------------------------|
| (a) phase 1A (final part) | | |
| (i) Water main replacement by | 36.4 | |
| (A) traditional mainlaying method | 35.9 | |
| (B) trenchless construction method | 0.5 | |
| (ii) Water main rehabilitation | 1.1 | |
| (ii) Environmental mitigation measures | 0.4 | |
| | <hr/> | |
| Sub-total for (a) | 37.9 | |
| | <hr/> | |
| (b) phase 1B (part) | | |
| (i) Water main replacement by traditional mainlaying method | 58.5 | |
| (ii) Environmental mitigation measures | 0.8 | |
| (iii) Consultants' fees for | 8.8 | |
| (A) contract administration | 1.4 | |
| (B) site supervision | 7.4 | |
| | <hr/> | |
| Sub-total for (b) | 68.1 | |
| | <hr/> | |
| (c) Contingencies | 10.5 | |
| | <hr/> | |
| Sub-total | 116.5 | (in September 2001 prices) |

/(d)

| | |
|------------------------------------|------------------------------|
| | \$ million |
| (d) Provision for price adjustment | <u>1.0</u> |
| Total | <u>117.5</u> (in MOD prices) |

Owing to insufficient in-house staff resources, DWS proposes to engage consultants to carry out the construction supervision of the works in Kowloon City, Wong Tai Sin and Sham Shui Po. A breakdown of the estimates for the consultants' fees by man-months is at Enclosure 3.

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

| Year | \$ million (Sept 2001) | Price adjustment factor | \$ million (MOD) |
|-------------|---------------------------|-------------------------------|---------------------|
| 2002 – 2003 | 18.7 | 0.99700 | 18.6 |
| 2003 – 2004 | 39.0 | 1.00398 | 39.2 |
| 2004 – 2005 | 39.5 | 1.01101 | 39.9 |
| 2005 – 2006 | 11.2 | 1.01808 | 11.4 |
| 2006 – 2007 | 6.5 | 1.02521 | 6.7 |
| 2007 – 2008 | 1.6 | 1.03239 | 1.7 |
| | <u>116.5</u> | | <u>117.5</u> |

12. We have derived the MOD estimate on the basis of the Government's latest forecast of trend labour and construction prices for the period 2002 to 2008. We will implement the mainlaying works under remeasurement contracts because the quantities involved may vary with the actual ground conditions. To obtain more information about underground utilities in particular, we have carried out a comprehensive review of utility record drawings. In addition, we have conducted extensive utility surveys comprising investigation pits/trenches to identify possible conflict with existing utilities so as to determine the most practical alignment of the replacement and rehabilitation water mains during the planning and design stage. We will also require contractors to carry out trial pits/trenches to confirm the actual alignment of existing utilities prior to the commencement of the works. The /contracts

contracts will provide for price adjustments as the contract periods will exceed 21 months.

13. The savings in recurrent expenditure arising from this project is about \$2.68 million per annum.

14. The notional decrease in water charges to be brought about by this project is 0.02%.

PUBLIC CONSULTATION

15. On 13 May 1999, we consulted the Legislative Council Panel on Planning, Lands and Works on **90WC**. Members had no adverse comments on the project.

16. We consulted the Town Planning and Development Committee of the Yuen Long District Council on 23 May 2001 and the District Development and Environmental Improvement Committee of the North District Council on 18 September 2001 regarding the remaining works in Yuen Long and Fanling under phase 1A. Both committees supported the proposed works.

17. We consulted the Traffic and Transport Committee of the Kowloon City District Council on 23 August 2001 and the Traffic and Transport Committee of the Wong Tai Sin District Council on 11 September 2001 regarding the works in Kowloon City and Wong Tai Sin. Both committees supported the proposed works in principle. In view of the committee members' concern about the traffic and environmental impacts arising from the proposed waterworks and other utility works in the area, we will reduce these impacts as far as practicable through the implementation of adequate environmental and traffic mitigation measures under the relevant works contracts. We will monitor the implementation of these measures and the interfacing of works where practicable and will fully brief the relevant District Councils during the project period.

18. We consulted the Traffic Committee of the Sham Shui Po District Council on 27 September 2001 regarding the works in Sham Shui Po and Cheung Sha Wan. The committee supported the proposed works in principle but the committee members have expressed concern about the temporary relocation of on-street hawkers to make way for the proposed works. We will co-ordinate with relevant departments towards a suitable arrangement to deal with the issue properly before commencement of works and will keep the committee members fully apprised of the progress.

/ENVIRONMENTAL

ENVIRONMENTAL IMPLICATIONS

19. DWS completed a Preliminary Environmental Review (PER) for 90WC in December 1997. The PER 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 during construction through the implementation of mitigation measures⁴ in the relevant contracts and have included \$1.2 million (in September 2001 prices) in the project estimate for implementing these mitigation measures.

20. At the planning and design stages, we have given due consideration to designing the levels and alignments for the proposed water mains with a view to minimizing the generation of construction and demolition (C&D) materials. We will require the contractors to submit waste management plans (WMPs) for approval. The WMPs 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 WMPs. We will control the disposal of public fill and C&D waste to designated public filling facilities and landfills respectively through a trip-ticket system and will record the disposal, reuse and recycling of C&D materials for monitoring purposes. We will require the contractors to separate public fill from C&D waste for disposal at appropriate facilities. We estimate that about 20 400 cubic metres (m³) of C&D materials will be generated by the project. Of these, about 13 412 m³ (65.7%) will be reused on site, 6 680 m³ (32.7%) will be reused as fill in public filling areas⁵ and 308 m³ (1.6%) will be disposed of at landfills. The notional cost of accommodating C&D waste at landfill sites is estimated to be \$38,500 for this project (based on a notional unit cost⁶ of \$125/m³).

/LAND

⁴ The standard pollution control measures include wheel washing facilities, desilting traps, the use of silenced plant and other procedures as recommended in the Environmental Protection Department's Recommended Pollution Control Clauses.

⁵ A public filling area is a designated part of a development project that accepts public fill for reclamation purposes. Disposal of public fill in a public filling area requires a licence issued by the Director of Civil Engineering.

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/m³), nor the cost to provide new landfills (which are likely to be more expensive) when the existing ones are filled. The notional cost estimate is for reference only and does not form part of this project estimate.

LAND ACQUISITION

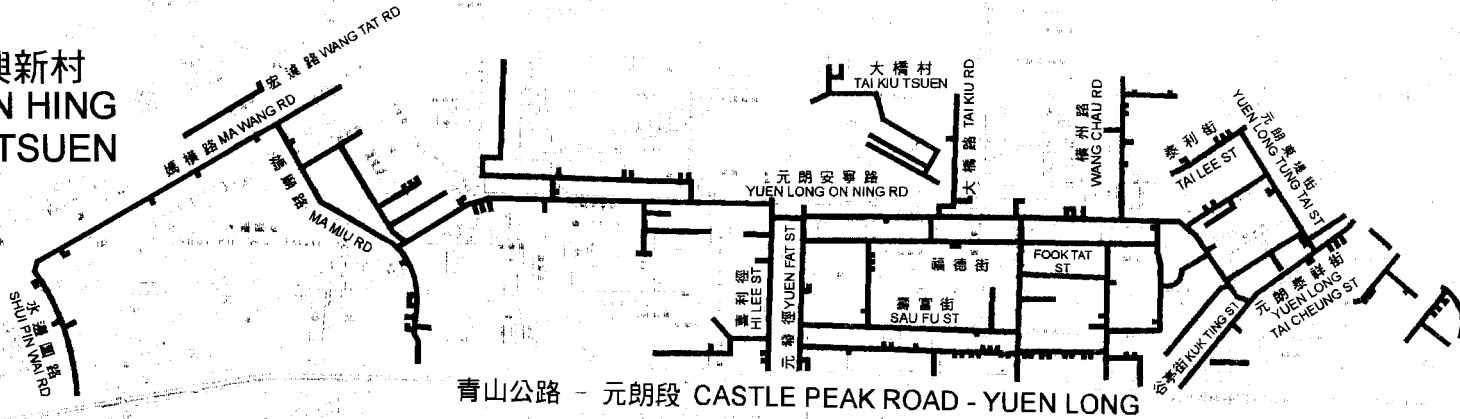
21. The proposed works do not require land acquisition.

BACKGROUND INFORMATION

22. We upgraded **90WC** to Category B in October 1998.
23. In November 1999, the Finance Committee approved the upgrading of part of **90WC** to Category A as **95WC** entitled "Replacement and rehabilitation of water mains, stage 1 phase 1B – investigation" at an estimated cost of \$66.3 million in MOD prices for engaging consultants to carry out preliminary investigations and impact assessments for stage 1 phase 1B works. The consultants have substantially completed the investigations and impact assessments.
24. In November 2000, the Finance Committee approved the upgrading of part of **90WC** to Category A as **175WC** entitled "Replacement and rehabilitation of water mains, stage 1 phase 1 (part 1) works in Sheung Shui, Tai Po, Sha Tin and Mong Kok" at an estimated cost of \$115.3 million in MOD prices. Works commenced in stages in December 2000 for completion by the end of 2005.
25. In March 2001, the Finance Committee approved the upgrading of part of **90WC** as **177WC** entitled "Replacement and rehabilitation of water mains, stage 1 phase 1B – detailed design and advance works" at an estimated cost of \$69.8 million in MOD prices for engaging consultants to carry out detailed design for stage 1 phase 1B works and advance works in North Point. We will complete the detailed design of the remaining works in phase 1B by January 2003 with a view to commencing construction in 2003 for substantial completion in 2006.
26. Subject to approval by the Finance Committee to upgrade this project to Category A, the estimated value of the remaining parts in **90WC**, excluding this project, is about \$2.22 billion in September 2001 prices.
27. We estimate that the project will create some 50 jobs comprising 10 professional/technical staff and 40 labourers, totalling 1 645 man-months.



振興新村
CHUN HING
SAN TSUEN



元朗舊墟
YUEN LONG
KAU HUI

青山公路 - 元朗段 CASTLE PEAK ROAD - YUEN LONG

圖例 LEGEND :

—— 擬提升為甲級的水管敷設工程
PROPOSED MAINLAYING WORKS TO BE
UPGRADED TO CATEGORY 'A'

比例尺 SCALE 1 : 7 500

核准 APPROVED

Csd
總工程師/設計 CE / Des

工務計劃90WC — 更換及修復水管工程第1階段第1期 (第2部份) 元朗, 粉嶺, 九龍城, 黃大仙及深水埗區工程
(元朗區工程)

P.W.P. NO.90WC — REPLACEMENT AND REHABILITATION OF WATER MAINS, STAGE 1 PHASE 1 (PART 2) WORKS
IN YUEN LONG, FANLING, KOWLOON CITY, WONG TAI SIN AND SHAM SHUI PO
(WORKS IN YUEN LONG)

(甲級工程)
(CAT 'A' Submission)

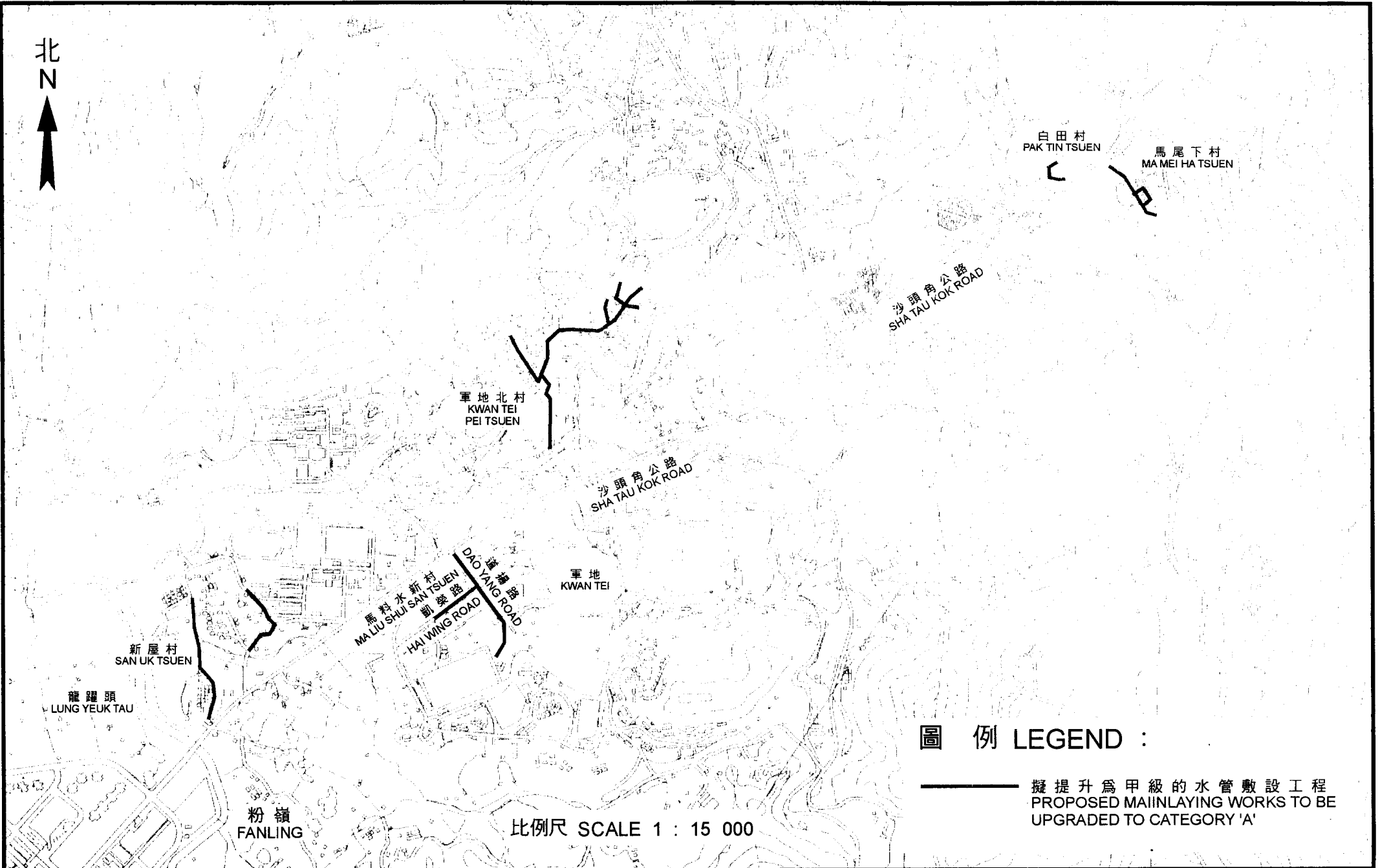


水務署
WATER SUPPLIES DEPT.

草圖編號
SKETCH NO.

SK 62001 / 064

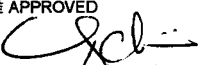
22 / 01 / 2001



圖例 LEGEND :

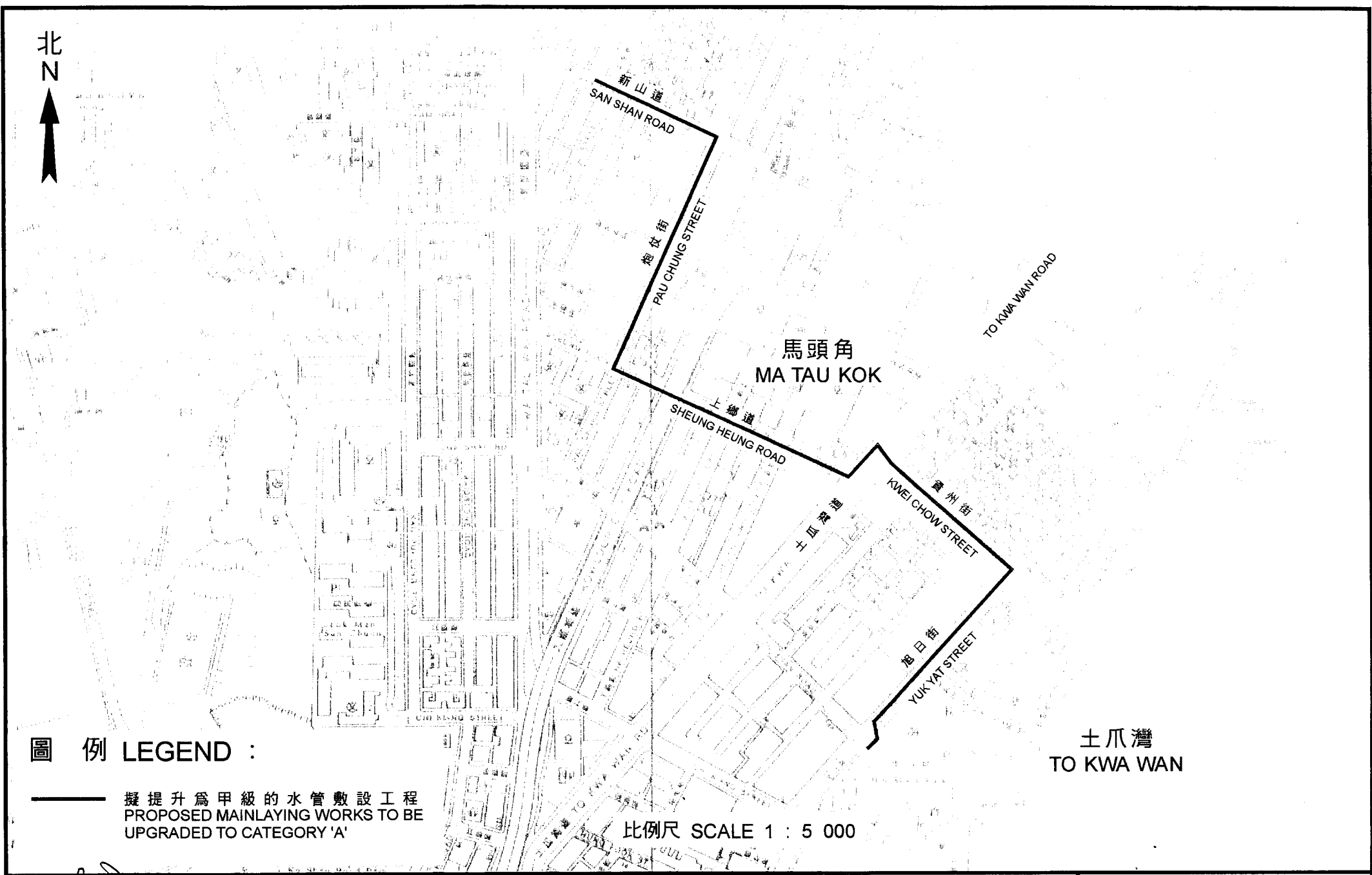
—— 擬提升為甲級的水管敷設工程
PROPOSED MAINLAYING WORKS TO BE
UPGRADED TO CATEGORY 'A'

比例尺 SCALE 1 : 15 000

核准 APPROVED

總工程師/設計 CE / Des
22/10 / 2001

工務計劃90WC — 更換及修復水管工程第1階段第1期 (第2部份) 元朗, 粉嶺, 九龍城, 黃大仙及深水埗區工程
(粉嶺區工程)
P.W.P. NO.90WC — REPLACEMENT AND REHABILITATION OF WATER MAINS, STAGE 1 PHASE 1 (PART 2) WORKS
IN YUEN LONG, FANLING, KOWLOON CITY, WONG TAI SIN AND SHAM SHUI PO
(WORKS IN FANLING)
(甲級工程)
(CAT 'A' Submission)

 水務署
WATER SUPPLIES DEPT.
草圖編號 SK 62001 / 083
SKETCH NO.



圖例 LEGEND :

—— 擬提升為甲級的水管敷設工程
PROPOSED MAINLAYING WORKS TO BE
UPGRADED TO CATEGORY 'A'

比例尺 SCALE 1 : 5 000

核准 APPROVED

總工程師/工程管理 CE/PM

22 / 10 / 2001

工務計劃90WC — 更換及修復水管工程第1階段第1期 (第2部份) 元朗, 粉嶺, 九龍城, 黃大仙及深水埗區工程
(九龍城區工程)

P.W.P. NO.90WC — REPLACEMENT AND REHABILITATION OF WATER MAINS, STAGE 1 PHASE 1 (PART 2) WORKS
IN YUEN LONG, FANLING, KOWLOON CITY, WONG TAI SIN AND SHAM SHUI PO
(WORKS IN KOWLOON CITY)

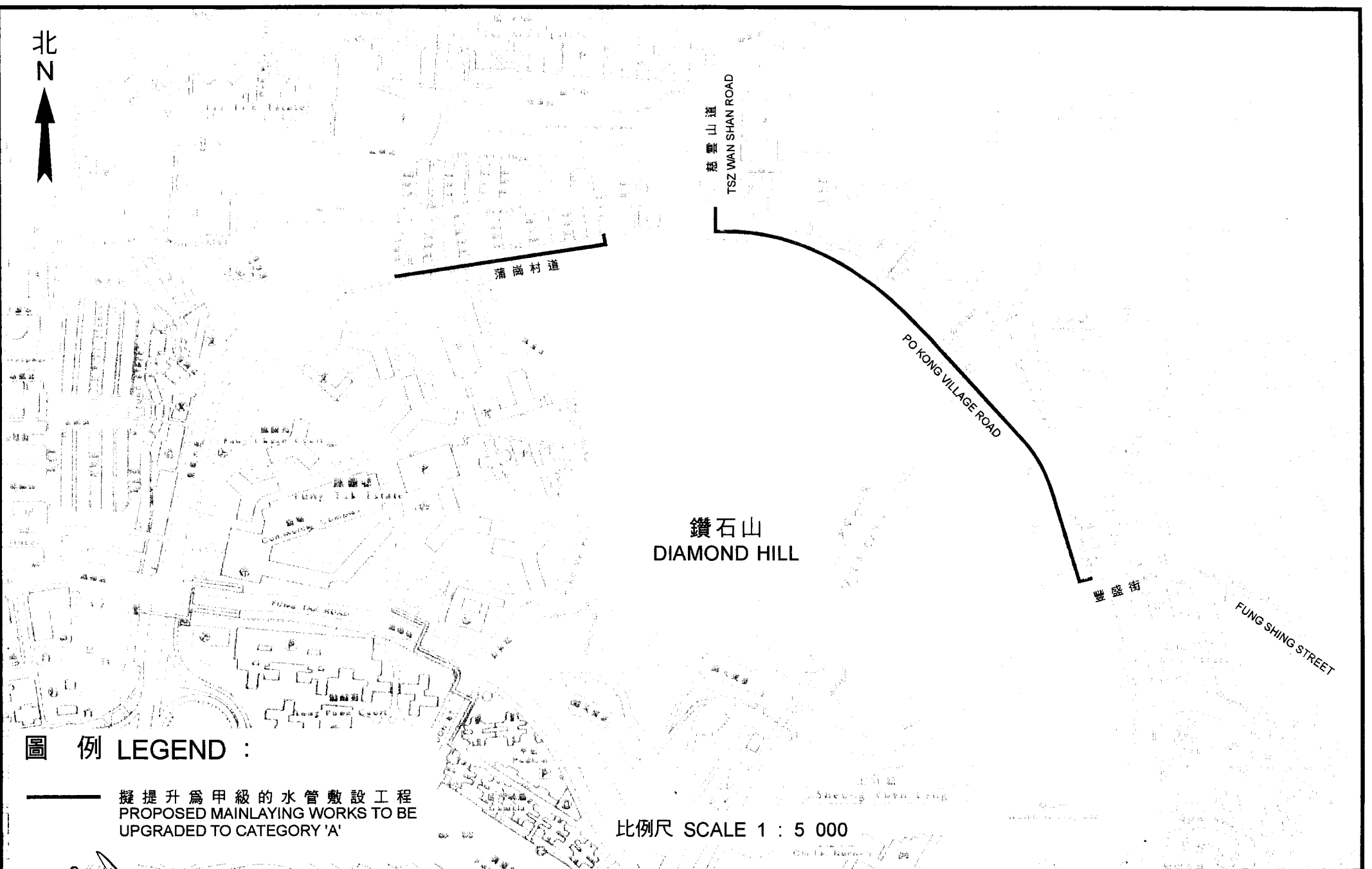
(甲級工程)
(CAT 'A' Submission)



水務署
WATER SUPPLIES DEPT.

草圖編號 SK 62001 / 085 / 001
SKETCH NO.

北
N



蒲崗村道

鑽石山道
TSZ WAN SHAN ROAD

PO KONG VILLAGE ROAD

鳳聲街


FUNG SHING STREET

鑽石山
DIAMOND HILL

圖例 LEGEND :

—— 擬提升為甲級的水管敷設工程
PROPOSED MAINLAYING WORKS TO BE
UPGRADED TO CATEGORY 'A'

比例尺 SCALE 1 : 5 000

核准 APPROVED

總工程師/工程經理 (E/PM)
22 / 10 / 2001

工務計劃90WC — 更換及修復水管工程第1階段第1期(第2部份)元朗,粉嶺,九龍城,黃大仙及深水埗區工程
(黃大仙區工程)
P.W.P. NO.90WC — REPLACEMENT AND REHABILITATION OF WATER MAINS, STAGE 1 PHASE 1 (PART 2) WORKS
IN YUEN LONG, FANLING, KOWLOON CITY, WONG TAI SIN AND SHAM SHUI PO
(WORKS IN WONG TAI SIN)
(甲級工程)
(CAT 'A' Submission)

 水務署
WATER SUPPLIES DEPT.
草圖編號 SKETCH NO. SK 62001 / 085 / 002

北
N



荔枝角
LAI CHI KOK

長沙灣
CHEUNG SHA WAN

深水埗
SHAM SHUI PO

發祥街
FAT TSEUNG STREET

長沙灣路
CHEUNG SHA WAN ROAD

荔枝角路
LAI CHI KOK ROAD

西九龍走廊
WEST KOWLOON CORRIDOR

欽州街西
YEN CHOW STREET WEST

聯業街
APLIU STREET

桂林街
KWEI LIN STREET

北河街
PEI HO STREET

南園街
NAM CHEONG STREET

醫局街
YEE KUK STREET

海墘街
HAI TAN STREET

白楊街
POPLAR STREET

界限街
BOUNDARY ROAD

圖例 LEGEND :

—— 擬提升為甲級的水管敷設工程
(與渠務署協同部份)
PROPOSED MAINLAYING WORKS TO BE
UPGRADED TO CATEGORY 'A'
(IN CONJUNCTION WITH DRAINAGE
SERVICES DEPARTMENT)

—— 擬提升為甲級的水管敷設工程
(與運輸署協同部份)
PROPOSED MAINLAYING WORKS TO BE
UPGRADED TO CATEGORY 'A'
(IN CONJUNCTION WITH TRANSPORT
DEPARTMENT)

比例尺 SCALE 1 : 10 000

核准 APPROVED

總工程師/工程管理 CE / PM
22 / 10 / 2001

工務計劃90WC — 更換及修復水管工程第1階段第1期(第2部份)元朗,粉嶺,九龍城,黃大仙及深水埗區工程
(深水埗區工程)
P.W.P. NO.90WC — REPLACEMENT AND REHABILITATION OF WATER MAINS, STAGE 1 PHASE 1 (PART 2) WORKS
IN YUEN LONG, FANLING, KOWLOON CITY, WONG TAI SIN AND SHAM SHUI PO
(WORKS IN SHAM SHUI PO)
(甲級工程)
(CAT 'A' Submission)

水務署
WATER SUPPLIES DEPT.
草圖編號 SKETCH NO. SK 62001 / 085 / 003

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

Breakdown of the estimates for the consultants' fees

| Consultants' staff costs | | | Estimated man- months | Average MPS* salary point | Multiplier | Estimated fee (\$million) |
|---------------------------------------|------------------------------------------------------------------|--------------|--------------------------------------|----------------------------------------------|-------------------|------------------------------------------|
| (i) | Contract administration | Professional | 8 | 38 | 2.4 | 1.2 |
| | | Technical | 5 | 14 | 2.4 | 0.2 |
| (ii) | Site supervision by resident site staff of the consultants | Professional | 17 | 38 | 1.7 | 1.7 |
| | | Technical | 172 | 14 | 1.7 | 5.7 |
| Total consultants' staff costs | | | | | | <hr/> 8.8 <hr/> |

*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 above figures are based on estimates prepared by the Director of Water Supplies. We will only know the actual man-months and actual fees when construction works are completed.

