

ITEM FOR PUBLIC WORKS SUBCOMMITTEE OF FINANCE COMMITTEE

HEAD 709 – WATERWORKS

Public Safety – Landslip prevention

61BL – Inspection of buried water mains affecting slopes – second five-year cycle inspection

Members are invited to recommend to Finance Committee the upgrading of **61BL** to Category A at an estimated cost of \$66.4 million in money-of-the-day prices.

PROBLEM

Leakage from water mains buried behind slopes may affect the stability of slopes and pose hazards to life and property. Regular inspection and maintenance of these water mains are required to prevent slope failure.

PROPOSAL

2. The Director of Water Supplies (DWS), with the support of the Secretary for Works, proposes to upgrade **61BL** to Category A at an estimated cost of \$66.4 million in money-of-the-day (MOD) prices for employing engineering consultants to carry out a second five-year cycle inspection and leakage detection of water mains¹ that may affect the safety of slope features registered in the Government Catalogue of Slopes and Retaining Walls² (New Catalogue).

/PROJECT

¹ Water mains mean public water mains maintained by Water Supplies Department (WSD). For the purpose of this paper, about 40 sections of drains maintained by WSD are also included.

² Geotechnical Engineering Office completed a Government Catalogue of Slopes and Retaining Walls at the end of 1998. It registered approximately 54 000 man-made slopes and retaining walls (collectively called slope features) in the territory.

PROJECT SCOPE AND NATURE

3. The scope of the project comprises the following tasks –
- (a) to identify all public water mains buried behind some 11 000 slope features which are registered in the New Catalogue but not included in the first cycle of inspection;
 - (b) to review the latest leakage detection technology and formulate strategy for the inspection and leakage detection programme;
 - (c) to undertake inspection and leakage detection works of those water mains identified in (a) above and to re-inspect some 4 600 sections of water mains³ already identified in the first cycle of inspection;
 - (d) to recommend cost-effective remedial measures where necessary for the inspected water mains together with an implementation programme; and
 - (e) to update WSD's computerized inventory system containing the database of the water mains together with inspection and leakage detection reports.

We plan to commence the proposed consultancy in November 2001 for completion by December 2006.

JUSTIFICATION

4. Water mains are susceptible to leakage. Such leakage is mainly due to deterioration of water mains following prolonged years of service. As all water mains are pressurized under normal service condition, leakage from them will become more severe with the passage of time. This may affect the stability of slopes nearby and pose hazards to life and property.

5. To prevent slope failures caused by leaking water mains buried in slopes, we promulgated the “Code of Practice on Inspection and Maintenance of Water Carrying Services Affecting Slopes” in 1996. The established practice is to carry out regular inspection and leakage detection of water mains buried behind slopes at five-year intervals.

/6.

³ A section of water main may span across more than one slope and include the associated branches between two predetermined points on the buried water main within the corresponding zone of influence.

6. In 1997, we commissioned consultants to carry out the first cycle of inspection under **53BL** "Inspection of buried water mains affecting slopes - consultants' fees". Based on the slope information available at that time from a survey being conducted for the preparation of the New Catalogue, the first cycle of inspection covered about 43 000 slopes.

7. The consultants engaged under **53BL** have identified 4 600 sections of water mains that are buried behind or in the vicinity of about 10 500 slopes and that might have impact on slope safety. We have completed the inspection of about 3 200 sections of water mains. About 13% of the inspected water mains had been found with minor leaks, which were treated as emergency cases and repaired immediately. We will complete the first cycle of inspection of the water mains and the necessary remedial works by end September 2002.

8. At the end of 1998, the Geotechnical Engineering Office completed the survey of all slope features in the territory and issued a New Catalogue which registers about 54 000 slope features. Since the New Catalogue includes 11 000 new slope features as compared with the 43 000 slopes covered in the first cycle of inspection under **53BL**, DWS needs to go through these "new" slope features and see if there are water mains buried behind them.

9. The buried water main sections that have been identified under **53BL** will soon need to be re-inspected. Accordingly, part of the new consultancy will be required to undertake inspection and leakage detection works on these water main sections, as well as those buried behind newly identified slope features.

10. The inspection and the leakage detection works require considerable resources over a specified period. Having examined ways and means of implementing such an inspection programme, DWS concludes that the substantial additional workload cannot be absorbed by existing staff in his Department who are fully stretched by the existing works programme. He therefore proposes to engage engineering consultants to carry out the inspection and the leakage detection works.

FINANCIAL IMPLICATIONS

11. We estimate the cost of the project to be \$66.4 million in MOD prices (see paragraph 12 below), made up as follows –

/(a)

| | \$ million | |
|--|-------------------|----------------------------|
| (a) Consultants' fees | 16.6 | |
| (i) identification of additional water mains | 1.1 | |
| (ii) formulation of inspection programme and preparation of drawings and tender documents | 0.9 | |
| (iii) inspection of water mains, preparation of reports with recommendations and updating of the computerized inventory system | 8.8 | |
| (iv) administration and site supervision of leakage detection works | 5.8 | |
| (b) Leakage detection works | 42.5 | |
| (c) Minor civil works associated with leakage detection works | 1.5 | |
| (d) Contingencies | 6.0 | |
| | <hr/> | |
| Sub-total | 66.6 | (in September 2000 prices) |
| (e) Provision for price adjustment | (0.2) | |
| | <hr/> | |
| Total | 66.4 | (in MOD prices) |
| | <hr/> | |

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

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

| Year | \$ million (Sept 2000) | Price adjustment factor | \$ million (MOD) |
|-------------|---------------------------|-------------------------------|---------------------|
| 2001 - 2002 | 0.6 | 0.98000 | 0.6 |
| 2002 - 2003 | 4.7 | 0.97976 | 4.6 |
| 2003 - 2004 | 16.5 | 0.98759 | 16.3 |
| 2004 - 2005 | 16.5 | 0.99549 | 16.4 |
| 2005 - 2006 | 16.5 | 1.00346 | 16.6 |
| 2006 - 2007 | 11.8 | 1.01149 | 11.9 |
| | 66.6 | | 66.4 |

13. We have derived the MOD estimates on the basis of the Government's latest forecasts of trend labour and construction prices for the period 2001 to 2007. We will award the proposed consultancy on a lump sum basis with provision for price adjustment as the consultancy period will exceed 12 months. We will also tender the leakage detection works under a lump sum contract with provision for price adjustment as the works period will exceed 21 months.

14. The project will not give rise to annually recurrent expenditure.

15. The project by itself would lead to an increase in water charges by 0.03% in real terms by 2006⁴.

PUBLIC CONSULTATION

16. As the proposed inspection and leakage detection of water mains will not involve any construction works, inconvenience and disturbance to the public will be minimal. We do not consider public consultation necessary.

/ENVIRONMENTAL

⁴ The increase in water charges is calculated on the assumption that the demand remains static during the period from 2000 to 2006 and the amount of Government subsidy to the waterworks operations is to be contained at the present level.

ENVIRONMENTAL IMPLICATIONS

17. The proposed inspection and leakage detection of water mains will not have any environmental impacts.

LAND ACQUISITION

18. The project does not require land acquisition.

BACKGROUND INFORMATION

19. It is Government's policy to monitor and repair buried services near all slope features registered in the New Catalogue.

20. On 12 July 1996, Finance Committee approved the upgrading of **53BL** "Inspection of buried water mains affecting slopes – consultants' fees" to Category A at an estimated cost of \$93.8 million in MOD prices for employing engineering consultants to carry out systematic identification of all buried water mains affecting slopes adjacent to housing estates and other developments, and to carry out inspection and detection of the identified water mains. We commenced the consultancy study, as the first five-year cycle of inspection, in January 1997 for completion in September 2002.

21. We included **61BL** in Category B in September 2000. We plan to commence the project in November 2001 for completion by December 2006. We will carry out repair works to the water mains under a maintenance programme whenever leakage is detected.

22. We estimate that the proposed works will create some 20 new jobs during the consultancy period. These will comprise five professional/technical staff and 15 labourers, totalling 930 man-months.

Works Bureau
May 2001

**61BL – Inspection of buried water mains affecting slopes –
second five-year cycle inspection**

Breakdown of estimates for consultants' fees

| | | Estimated man- months | Average MPS* salary point | Multiplier factor | Estimated fee (\$ million) | |
|---------------------------------------|---|-----------------------------|------------------------------------|----------------------|----------------------------------|-----|
| Consultants' staff costs | | | | | | |
| (a) Consultants' fees for | | | | | | |
| (i) | Review of the computerized inventory records developed in the first cycle and identification of additional water mains for inspection | Professional | 6 | 38 | 2.4 | 0.8 |
| | | Technical | 6 | 14 | 2.4 | 0.3 |
| (ii) | Development of leakage detection mechanism, formulation of inspection programme and preparation of drawings and tender documents | Professional | 4 | 38 | 2.4 | 0.6 |
| | | Technical | 6 | 14 | 2.4 | 0.3 |
| (iii) | Inspection of water mains, preparation of reports with recommendations and updating of the computerized inventory records | Professional | 48 | 38 | 2.4 | 6.6 |
| | | Technical | 48 | 14 | 2.4 | 2.2 |
| (iv) | Administration and site supervision of leakage detection works | Professional | 27 | 38 | 2.4 | 3.7 |
| | | Technical | 45 | 14 | 2.4 | 2.1 |
| Total consultants' staff costs | | | | | 16.6 | |

* 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 1.4.2000, MPS pt. 38 = \$57,525 per month and MPS pt. 14 = \$19,055 per month)

2. 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.

