

ITEM FOR FINANCE COMMITTEE

**CAPITAL WORKS RESERVE FUND
HEAD 710 - COMPUTERISATION
Water Supplies Department
New Subhead “Implementation of the Maintenance Works and
Laboratory Information Management Systems”**

Members are invited to approve a new commitment of \$40,253,000 under Head 710 for implementing the Maintenance Works and Laboratory Information Management Systems for the Water Supplies Department.

PROBLEM

The existing information systems and network infrastructure of the Water Supplies Department (WSD) cannot cope with WSD's business needs and increasing workload in respect of routine maintenance of waterwork facilities and quality control work for fresh water supply.

PROPOSAL

2. The Director of Water Supplies (DWS), on the advice of the Director of Information Technology Services (DITS) and with the support of the Secretary for Works, proposes to implement the Maintenance Works Management System (MWMS), the Laboratory Information Management System (LIMS) and the supporting data and network infrastructure as Stage 2 of the Information Systems Strategy (ISS) for WSD to better manage maintenance works of waterwork facilities and to further improve the quality and efficiency of laboratory work for the quality control work for fresh water supply.

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JUSTIFICATION

Problems with the existing operation

3. WSD's main objective is to provide a full supply of potable water and flushing water to meet the demands of the territory. WSD, therefore, has to carry out regular maintenance of waterwork facilities, and a full range of systematic testing of water samples to ensure reliability and quality of water supplies. However, the department's efforts to better manage maintenance works and to further improve the quality and efficiency of laboratory work have been constrained by a lack of advanced information management tools.

Management of Maintenance Works

4. WSD issues about 20 000 works orders (at a total value of about \$880 million) each year to contractors for the maintenance of waterwork facilities including plants, equipment and water mains. With the commissioning of new facilities, the number of works orders has been growing at an annual rate of 5%. WSD relies on the Works Order System (WOS), developed and maintained by the Treasury, for verification and payment of works carried out by the contractors. As WOS is essentially an accounting system, the department has to rely on paper records in planning and scheduling maintenance activities as well as keeping performance data of contractors. Maintenance records are located in different regions and offices. There are limitations in developing a comprehensive management information system to prioritize the preventive maintenance programme thereby optimizing the allocation of maintenance funds, and to enhance monitoring of the contractors' performance and quality of maintenance works.

Water Quality Control

5. There are 16 laboratories in WSD providing water quality testing and analysis services to 20 treatment works and other government departments. Each year, the department collects about 150 000 water samples from various sampling points and performs over one million tests for chemical, bacteriological and radiological analyses to ensure that the quality of treated water conforms to the World Health Organisation's (WHO) standards. With the limitations of stand-alone PCs and the existing PC-based laboratory information system which was developed in-house in 1990, the laboratories have to rely heavily on manual processes for compliance checking against water quality guidelines, collating individual testing results and compiling management reports on water quality. This has led to many problems such as duplicated data entries, data inconsistency, fragmentation of information, lengthy response time in processing enquiries and inefficient reporting of management information.

6. The WHO has announced that a new version of the “Guidelines for Drinking Water Quality” will be published in 2003. It is expected that the number of health-related parameters requiring testing will increase from 94 at present to about 120 in 2003. This will certainly increase the volume of water quality tests required. To improve efficiency in managing information on water quality and to comply with the new requirements, WSD needs an information management system for the laboratories using the latest Information Technology (IT).

Data and Network Infrastructure

7. To meet individual operational requirements, WSD has developed a number of stand-alone computer-based applications on a piece-meal basis over the years, such as the Pipe Leakage Inspection System, Slope Management System and Water Quality Complaint System. As a result, operational data is kept at different offices/units scattered throughout the department and not in a standard format that can be shared readily. This hinders a speedy response by these systems thereby affecting the services to the public. In addition, the existing office network in WSD is unable to support the required increase in the number of workstations from the existing 1 200 to 1 600 along with the implementation of MWMS and LIMS. Also, the existing office network only has limited capacity for transmitting spatial data such as engineering drawings and geographical information from the Drawing Office to users in WSD’s headquarters and five regional offices.

The Proposed MWMS and LIMS

8. To improve the above situation, DWS proposes to implement two computerised management information systems, namely MWMS and LIMS and a supporting data and network infrastructure. The proposed systems and infrastructure will have the following features -

- (a) the new systems will be developed on an open-platform to enable interface with Treasury's computer systems for payment purpose and other existing and future WSD computer systems;
- (b) MWMS will interface with LIMS through the supporting data and network infrastructure to form an integrated system comprising 350 existing and 400 new workstations;

/(c)

- (c) MWMS will facilitate works orders management, works progress management, and contractors' performance management;
- (d) LIMS will facilitate water sample analysis management and laboratory administration;
- (e) these two new systems can support the day-to-day operation of some 1 500 staff in five regional offices, 16 laboratories and the headquarters of WSD;
- (f) the capacity of the existing office network will be enhanced to cater for increased communications and allow efficient transmission of spatial data; and
- (g) the new systems and network will enable on-line service for the submission of job records by contractors through the Internet.

Encl. 1 A summary of the major functions of the proposed systems is at Enclosure 1.

Anticipated Benefits

Cost Savings

9. We expect the proposed systems will bring about total annual savings of \$19.5 million, comprising -

- (a) **realisable savings** of \$10,968,000 arising from reduced requirements for scheduled maintenance through better planning and scheduling of preventive maintenance works, and the deletion of five posts (comprising one Works Supervisor I, one Works Supervisor II and three Artisan posts), made possible upon streamlining of work. Through natural wastage, retraining and redeployment, no staff redundancy would arise; and
- (b) **notional savings** of \$8,548,000 being the cost of the fragmented savings in staff time in individual laboratories resulting from improved efficiency in operations, WOS' share of the operating costs of the computer systems at the Treasury, and the cost which

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would otherwise have to be incurred to enhance the existing computer networks for the transmission of spatial data across the department and for employment of additional staff of two Waterworks Chemists and one Assistant Clerical Officer to cope with the additional quality test requirements in compliance with the forthcoming revision in WHO's guidelines.

Encl. 2 A breakdown of the realisable and notional savings is at Enclosure 2.

Others Benefits

10. In addition, the proposed systems will also bring about the following improvements -

(a) ***Better information retrieval and data management***

The new systems will maintain records of maintenance works and water testing results to enable efficient retrieval by works and laboratory staff. Such information will also be shared among various WSD officers reducing the need for duplication of records. The availability of timely and good quality data will enhance WSD's operational efficiency by facilitating better management decision-making at corporate and regional levels.

(b) ***Reduced inconvenience caused by maintenance works to the public***

The new MWMS with comprehensive information on each maintenance job will facilitate close monitoring of the contractors' performance to ensure that works are delivered in accordance with the prescribed requirements including the time taken to complete the job. As a result, inconvenience to the public such as that caused by road opening or interruption of water supply will be reduced.

/(c)

(c) ***Better services to customers and business partners***

With the support of electronic service delivery provided by the integrated system, WSD will be able to receive job records submitted by contractors and exchange underground utility plans with utility undertakers electronically through the Internet. The availability of centralized corporate data will also enable frontline staff to handle a majority of enquiries and service requests, such as water suspension schedule and progress of maintenance works, direct.

(d) ***Enhanced quality assurance of water quality data***

The new LIMS will enable WSD laboratories to achieve a higher level of quality assurance of water quality data through capturing results directly from most water test instruments for further analysis, computation and collation, reducing the need for manual data transcription and data entry. It will also support more frequent dissemination of updated water quality test reports and statistics through the WSD's web site.

Cost and Benefit Analysis

Encl. 3

11. A detailed cost and benefit analysis for the project is at Enclosure 3. The analysis indicates that this project will break even in the year 2008-09 (i.e. three years after implementation). Thereafter, the annual savings of \$19,516,000 will exceed the annual cost of \$5,440,000 by \$14,076,000.

FINANCIAL IMPLICATIONS**Non-recurrent Cost**

12. The estimated total non-recurrent cost of the proposed MWMS and LIMS is \$40,253,000, made up as follows -

/(a)

	\$ '000
(a) Computer hardware, software and communication and network equipment	12,466
(b) System development and implementation services (including training and site preparation)	17,543
(c) Data conversion	2,725
(d) Contingency	3,274
(e) WSD contract staff	4,245
Total	40,253

13. As regards paragraph 12(a), the estimated cost of \$12,466,000 is for the acquisition of computer hardware, software, and networking equipment including servers, routers, hubs, database and system management tools.

14. As regards paragraph 12(b), the estimated cost of \$17,543,000 is for engaging external service providers in developing and implementing the proposed systems. The services will cover system set-up, application development, systems testing, training and site preparation including the installation of computer equipment, data ports, power points and cabling work.

15. As regards paragraph 12(c), the estimated cost of \$2,725,000 is for conversion of data in the existing systems into the new systems.

16. As regards paragraph 12(d), the estimated cost of \$3,274,000 represents a 10% contingency on the cost items set out in paragraph 12(a) to (c).

17. As regards paragraph 12(e), \$4,245,000 is to meet the cost of a project team comprising three staff, required for tender preparation and evaluation, supervising and working with the external service providers to ensure that the proposed systems conform to WSD's operational requirements, re-engineering the business process and training of end users.

Recurrent Cost

18. Upon full commissioning in 2005-06, the estimated annually recurrent cost for maintaining and supporting the proposed systems will be \$5,055,000 and then \$5,440,000 from 2006-07 onwards. A breakdown is provided as follows -

	\$ '000
(a) Computer hardware, software and communication and network equipment maintenance	2,118
(b) System support services	2,582
(c) Consumables	156
(d) WSD contract staff	584
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Total	5,440

19. As regards paragraph 18(a), the annual expenditure of \$2,118,000 is for the maintenance of hardware, software and communication network equipment, and the rental of communication lines.

20. As regards paragraph 18(b), the annual expenditure of \$2,582,000 is for hiring of services to provide on-going system support and maintenance.

21. As regards paragraph 18(c), the annual expenditure of \$156,000 is to provide consumables for the operation of the systems.

22. As regards paragraph 18(d), the annual expenditure of \$584,000 is to meet the cost of one IT staff for system administration and technical support to users.

Implementation Plan

23. We estimate that implementation of the proposed systems will be completed in phases from November 2003 to April 2005. A proposed implementation plan is as follows -

Activity	Period	
	Target start date	Target completion date
(a) Preparation of tender document	April 2002	October 2002
(b) Tendering for implementation service including provision of hardware and software	November 2002	April 2003
(c) Site preparation, installation of hardware, software and data conversion	May 2003	December 2004
(d) System development and testing	April 2003	January 2005
(e) System live run for		
(i) data infrastructure		November 2003
(ii) LIMS		March 2004
(iii) MWMS		April 2005

BACKGROUND INFORMATION

24. It is Government's policy to take full advantage of IT in order to improve the efficiency, quality of service and cost-effectiveness of government departments. To meet WSD's longer-term operational requirements, DWS, with the assistance of DITS and consultants, completed in March 1999 a departmental ISS Study aimed at developing a strategic plan for the implementation of IT systems in WSD over the following five years. The study concluded that the current IT situation in WSD is inadequate in supporting its business needs and therefore recommended an ISS with the following three major components for further development –

- (a) Customer service

To replace the outdated WOS with a new Customer Care and Billing System (CCBS) that will support the billing and collection processes, enable "one-stop shop" service to customers and offer on-line access to a range of WSD's services.

(b)

(b) Water supply and distribution operations

To develop an integrated IT system with geographical information needed to enhance support to WSD's water supply and distribution operations to ensure a reliable and quality water supply and to achieve efficient assets management.

(c) Management information for finance and administration

To provide an integrated management information system for the internal management of financial and administrative matters of WSD.

25. Of the three components, the ISS study has accorded priority to the development and implementation of the proposed CCBS. On 9 March 2001, Members approved a commitment of \$253,100,000 for the CCBS as Stage 1 of the ISS for WSD.

26. We have just completed a feasibility study for the implementation of Stage 2 of the ISS, viz. MWMS, LIMS and the supporting data and network infrastructure which form parts of the Water Supply and Distribution Operations Programme.

27. We informed the Legislative Council Panel on Planning, Lands and Works of the proposed implementation of the Maintenance Works and Laboratory Information Management Systems by circulation on 26 February 2002. Members had no objection to the proposal.

Major Functions of the Proposed Maintenance Works Management and Laboratory Information Management Systems

Maintenance Works Management System (MWMS)

The major functions of MWMS include -

- (a) capture and process work requests for maintenance works;
- (b) schedule and manage works orders and pre-determine the programme and standards for the maintenance works;
- (c) schedule staff resource for site supervision and maintain site inspection records, progress reports and audit results of maintenance works;
- (d) maintain history of maintenance works;
- (e) process job records submitted by contractors for measurement and payment;
- (f) interface with the Ledger Accounting and Financial Information System and the Payment of Creditors System of the Treasury to enable financial control and to arrange payment to contractors for each works order;
- (g) provide on-line facilities for data entry and enquiry, and submission of job records by contractors; and
- (h) generate management information and regular reports on contractors' performance.

Laboratory Information Management System (LIMS)

The major functions of LIMS include -

- (a) schedule and manage sample collection, sample analysis and quality assurance activities;
- (b) develop reference data to facilitate evaluation of test results;
- (c) maintain history of the test results;
- (d) maintain inventory information on equipment and consumables for the water treatment process;
- (e) provide on-line facilities for data entry and enquiry; and
- (f) generate management information and regular reports and statistics on water quality.

Enclosure 2 to FCR(2002-03)4

**Annual Savings (from 2007-08 onwards)
expected from the proposed Maintenance Works Management and
Laboratory Information Management Systems**

Realisable Savings

	\$ '000
1. Staff savings	1,292
2. Reduced requirements for scheduled maintenance	9,222
3. Direct maintenance cost for Works Order System and existing computer networks	444
4. Reduction in the use of paper	10

Sub-total 10,968

Notional Savings

5. Improvement of staff efficiency	434
6. Works Order System's share of the operating costs of the Treasury systems	4,368
7. Savings resulting from avoidance of the need to enhance the existing computer networks and provision of additional staff to cope with the additional water quality test requirements.	3,746

Sub-total 8,548

Total Annual Savings 19,516

**Cost and Benefit Analysis of the Maintenance Works and Laboratory Information Management Systems
(at 2001 price level)**

	2002-03 \$ '000	2003-04 \$ '000	2004-05 \$ '000	2005-06 \$ '000	2006-07 \$ '000	2007-08 \$ '000	2008-09 \$ '000	2009-10 \$ '000	2010-11 \$ '000
Cost									
Non-recurrent Expenditure	1,415	20,273	15,761	2,804	0	0	0	0	0
Recurrent Expenditure	0	1,078	2,739	5,055	5,440	5,440	5,440	5,440	5,440
Total Cost	1,415	21,351	18,500	7,859	5,440	5,440	5,440	5,440	5,440
Savings									
Realisable Savings	0	0	400	2,954	8,968	10,968	10,968	10,968	10,968
Notional Savings	0	359	7,456	8,548	8,548	8,548	8,548	8,548	8,548
Total Savings	0	359	7,856	11,502	17,516	19,516	19,516	19,516	19,516
Net Savings	(1,415)	(20,992)	(10,644)	3,643	12,076	14,076	14,076	14,076	14,076
Net Cumulative Savings	(1,415)	(22,407)	(33,051)	(29,408)	(17,332)	(3,256)	10,820	24,896	38,972