

PROCUREMENT AND MAINTENANCE OF FIRE SERVICES EQUIPMENT

Executive Summary

1. The Fire Services Department (FSD) is responsible for fire-fighting and rescue on land and at sea, and providing emergency ambulance service for sick and injured persons under the Fire Services Ordinance (Cap. 95). Its fire services equipment (FSE), including communications systems, fire appliances and support vehicles, fire-fighting and rescue vessels and other fire services support equipment, is critical for delivering its core services and instrumental to the safe and efficient operations of frontline officers. In 2015-16, the FSD incurred \$482.7 million and \$127.1 million on the procurement and the maintenance of major FSE items respectively. The Audit Commission (Audit) has recently conducted a review to examine the FSD's work on the procurement and maintenance of FSE with a view to identifying areas for improvement.

Communications systems

2. *Two communications systems.* The FSD has adopted a sophisticated telecommunication and computer integrated mobilising system, known as the Third Generation Mobilising System (TGMS) to enhance the identification, location and mobilisation of fire-fighting and ambulance resources with a view to meeting the targets of graded response time. The FSD has also installed a radio communications system, namely the Digital Trunked Radio System (DTRS), to provide effective and efficient radio communications at incident scenes (para. 1.8).

TGMS

3. *Delay in commissioning of the TGMS.* In May 2000, the Finance Committee (FC) of the Legislative Council approved funding of \$718.6 million for the FSD to procure the TGMS for replacing the Second Generation Mobilising System (SGMS) in 2003. As of April 2016, \$708.2 million of the approved funding had been spent. In March 2001, a contract (Contract A) for the procurement, installation and maintenance of the TGMS was awarded to Contractor A. Owing to

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various reasons including slippage in building works and changes of user requirements, there were delays in completing certain milestones of Contract A. As the SGMS contractor indicated that it could no longer provide the maintenance services, the TGMS was commissioned in March 2005, i.e. 25 months before the completion of the System Acceptance Tests (SATs) in April 2007 (paras. 2.3 and 2.6 to 2.8), which had led to the following problems:

- (a) ***Targets of graded response time not met in the first year.*** Due to technical issues on the system side and teething problems for the frontline staff to adapt to the operation of the new system in the first year, the graded response times were only met in 89.2% of the fire calls and 89.6% of the emergency ambulance calls in 2005-06, i.e. below the target of 92.5% (para. 2.8(a)); and
- (b) ***Payment for live operation support of the TGMS before completion of the SATs.*** Contractor A had to support the live operation of the TGMS for 25 months before completion of the SATs, which was outside the scope of Contract A. The FSD had neither sought the approval for a contract variation nor agreed with Contractor A on whether and how the live operation support service fee should be paid before commencing the service. In the event, Contractor A was paid \$53.6 million for providing the live operation support services (para. 2.8(b)).

To prevent recurrence of similar problems, the FSD needs to take measures to tackle the root causes of contract delays and observe the laid-down requirements in procuring services outside the scope of a contract (para. 2.9).

4. ***Operational issues.*** The TGMS has a design serviceable life of 10 years and extendable to 15 years (para. 2.4). Audit examination has revealed the following operational issues after commissioning the TGMS in 2005:

- (a) ***Additional costs for monitoring the finalisation of outstanding contractual work.*** According to the funding paper of May 2000, an estimated \$13 million of the approved funding was for engaging the Government's trading funds to provide professional advice on the design, implementation and commissioning of the TGMS. Up to April 2016, \$81.2 million had been spent on engaging the trading fund services, of which \$35.9 million was for engaging the Electrical and Mechanical Services Trading Fund (EMSTF) in providing professional services for

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enhancing the TGMS and monitoring Contractor A's finalisation of outstanding contractual work from May 2007 onwards. Audit found that upon the completion of the SATs in April 2007, it had taken 4 years for the FSD and Contractor A to agree on the arrangements for handling the outstanding contractual work in March 2011. Afterwards, Contractor A spent some 4 years to complete all the outstanding contractual work in August 2015. In Audit's view, the FSD needs to take measures to ensure that outstanding contractual matters are dealt with expeditiously in similar projects in future to minimise professional service cost on contract management (para. 2.10); and

- (b) ***Delay in installation of TGMS equipment on new vehicles.*** Under Contract A, Contractor A was required to supply and install up to 763 sets of TGMS equipment on fire appliances, ambulances and vessels but there was no contract provision to cater for additional sets of TGMS equipment required by the FSD after September 2004 or for the relocation of TGMS equipment from the replaced vehicles to the new ones. As a result, the FSD had to procure such services from Contractor A for new vehicles. In two cases during the period October 2013 to January 2016, the FSD and the Government Logistics Department (GLD) took a long time to complete the procurement process, resulting in delays of about 7 months in installation of TGMS equipment on 25 new ambulances and 14 new fire appliances (para. 2.11).

5. ***Maintenance issues.*** According to Contract A, Contractor A was required to provide one-year warranty and a nine-year post-warranty maintenance service (para. 2.6). Audit has found the following areas for improvement:

- (a) ***Target maintenance response time and turnaround time not met.*** Contract A has set a target response time (i.e. time required for arrival on scene after a system incident is reported) and a target turnaround time (i.e. time required to rectify a breakdown after arrival on scene) for corrective maintenance of TGMS equipment. In 2015-16, for the maintenance of a sub-system of the TGMS: (i) the 2-hour response time target was not met in 423 (43%) of 985 cases; and (ii) the target of 6-hour turnaround time for critical faults was also not met in 248 (30%) of 814 cases (para. 2.12); and

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- (b) ***Lack of competitive bidding for extended maintenance services.*** While the TGMS has a design serviceable life of 10 years and extendable to 15 years, Contract A has only required a nine-year post-warranty maintenance service. When the FSD decided in February 2015 to extend the use of the TGMS for five years from April 2017 to April 2022, the maintenance service under Contract A had to be extended by means of a contract variation. The GLD's and the FSD's efforts to negotiate a reduced fee with Contractor A were not successful. In view of the significant cost of the extended maintenance services (\$58.5 million a year), the FSD needs to take measures in the future to acquire any extended maintenance services for procurement projects with an extendable design serviceable life through competitive bidding as far as practicable (para. 2.14).
6. ***Other enhancements for planning the next generation of the mobilising system.*** In 2014, the FSD commissioned a consultancy study to prepare for the replacement/upgrade of the TGMS (para. 2.16). The following enhancements need to be considered in planning for the next generation of the mobilising system:
- (a) ***Need to provide mobile phone location identification function.*** Over the years, the subscribed mobile phone numbers had increased by 104% from 8.2 million in 2004-05 to 16.7 million in 2015-16. The percentage of emergency calls from mobile phone users had also increased from 30% in 2001-02 to 44% in 2015-16. With the advancement in information and communications technology (e.g. location services in smartphones) in recent years, the FSD needs to explore the technical feasibility of providing mobile phone location identification function in the next generation of the mobilising system to facilitate speedy and accurate identification of incident addresses reported by mobile phone callers (para. 2.17); and
- (b) ***Need to set a target time for answering emergency calls.*** The FSD had not set any target time for answering emergency calls. Audit analysis revealed that: (a) of the 864,426 emergency calls which were responded to in 2015-16, the waiting times for 288,002 (33%) calls were 10 seconds or more; and (b) of the 288,002 calls, the waiting times of 8,747 (3%) calls were 60 seconds or more. As the time taken to answer emergency calls also affects the timeliness of despatch of emergency resources, the FSD needs to consider setting a target time for answering emergency calls in the design of the next generation of the mobilising system (para. 2.18).

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DTRS

7. In December 2012, the FSD engaged the EMSTF to provide post-warranty maintenance services for the DTRS under a Service Level Agreement (SLA) (para. 2.24).

8. ***Preventive maintenance.*** Under the SLA, the EMSTF was required to provide preventive maintenance on a half-yearly basis. For 2015-16, of 1,055 fire appliances, support vehicles, ambulances and vessels under preventive maintenance, the DTRS terminal equipment installed in 433 (41%) vehicles/vessels received only one round of preventive maintenance services and that installed in 312 (30%) vehicles/vessels missed all two rounds of preventive maintenance services (paras. 2.25 and 2.26).

9. ***Corrective maintenance.*** For 2015-16, the actual compliance level for the response time to corrective maintenance for DTRS infrastructure equipment was 78%, i.e. below the SLA requirement of 90% or above (para. 2.28).

Fire appliances and support vehicles

10. As at 1 May 2016, the FSD had a fleet of 434 fire appliances and 186 support vehicles. The FSD's Workshops and Transport Division is responsible for maintaining 415 fire appliances and 11 support vehicles while the EMSTF is responsible for maintaining the remaining 19 fire appliances and 175 support vehicles (para. 1.9).

11. ***Availability of fire appliances and support vehicles.*** The FSD has to ensure that its fire appliances and support vehicles are in an immediate state of readiness to respond to emergency calls at all times. For the fire appliances and support vehicles under the Workshops and Transport Division's maintenance, the FSD has set a target availability rate of 90%. Audit's examination revealed that the Division could not meet the target availability rate from 2013-14 to 2015-16. Since the Division had taken remedial measures to address the issue, the vehicle availability rate for August 2016 had increased to 89.5%, i.e. still slightly below the target of 90% (paras. 3.2 and 3.5 to 3.7).

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12. ***Termination of five fire-appliance procurement contracts.*** Between 2007 and 2009, the FSD obtained funding of \$175.9 million under the capital account of the General Revenue Account for procuring 37 fire appliances with target commissioning dates from May 2010 to January 2012. Between May 2008 and January 2010, the GLD on behalf of the FSD entered into five contracts with two contractors for procuring the 37 fire appliances at a total contract sum of \$136.4 million. However, all the five contracts were terminated by the Government between September 2011 and December 2012. Audit was concerned that this might render the cost and time spent on procuring the 37 fire appliances nugatory. In particular, the FSD paid a total of \$66 million under three of the five contracts but according to the Department of Justice, a counterclaim had been filed against the contractor to recover those costs, which is in the legal proceedings pending trial. Between January 2012 and March 2014, five new contracts were awarded to procure replacement fire appliances which were eventually put into operation between April 2014 and June 2016, some four years later than the original target commissioning dates from May 2010 to January 2012 (para. 3.11).

13. ***Scheduled maintenance.*** All the FSD's vehicles are subject to scheduled maintenance which is preventive in nature. The aim is to minimise the number of vehicle breakdowns during fire-fighting and rescue operations (para. 3.21). Audit has found the following areas for improvement:

- (a) ***Scheduled maintenance carried out by the FSD.*** From July 2015 to June 2016, 86 (20%) of the 426 FSD maintained vehicles had not undergone all stipulated rounds of scheduled maintenance. Besides, there were delays in carrying out 359 rounds of scheduled maintenance for 222 vehicles (35% of 1,022 rounds for the 426 vehicles) (para. 3.22); and
- (b) ***Scheduled maintenance carried out by the EMSTF.*** From April 2015 to March 2016, out of the 194 vehicles maintained by the EMSTF, 10 (5%) vehicles had missed all scheduled maintenance while another 23 (12%) vehicles each missed one round of the scheduled maintenance (para. 3.24).

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Fire-fighting and rescue vessels

14. As of July 2016, the FSD operated a fleet of 21 vessels to provide fire-fighting and rescue services within Hong Kong waters. Of the 21 vessels, 14 (67%) had exceeded their designed serviceable lives by 0.7 to 11 years (paras. 4.2 and 4.4).

15. *Delay in implementing the replacement projects for a fireboat and two speedboats.* In June 2012, the FC approved funding of \$85 million for the FSD to replace a fireboat (FB 7) which had been in service for over 20 years. In May 2013, the FSD also obtained funding of \$16 million for replacing two speedboats which had been in service since June 1999 and with maximum speed reduced by 25% from 40 to 30 knots. The FSD sought the assistance of the Marine Department (MD), i.e. the designated endorsement authority and agent for procurement of government vessels, in implementing the two replacement projects. However, the procurement progress had been slow, mainly due to the need to review the vessel procurement procedures and the shortage of experienced staff in the MD. The MD estimated that the two new speedboats would be delivered by July 2018, more than three years later than the target commissioning date of April 2015 and that the new FB 7 would be delivered by August 2019, more than four years later than the target commissioning date of December 2014. As a result of the delays, the total financial commitments of the FB 7 and speedboat replacement projects had increased by \$13.3 million (16%) to \$98.3 million and by \$16 million (100%) to \$32 million respectively (paras. 4.5, 4.8 to 4.10, 4.12 and 4.13).

16. *Need to take measures to ensure the timely implementation of the 10-year vessel replacement/procurement plan.* Apart from ongoing replacement projects for the FB 7 and the two speedboats, in 2015, the FSD had drawn up a 10-year procurement plan for replacing another 11 old vessels. The FSD had also planned to procure one new fireboat and one new fast rescue vessel for commissioning in 2018. Given that a total of 13 fire-fighting and rescue vessels are to be replaced/procured in the coming years, the FSD needs to ascertain from the MD whether it is able to cope with the FSD's 10-year vessel replacement/procurement plan in a timely manner (para. 4.14).

Other fire services support equipment

17. *Asset Management and Maintenance System (AMMS).* To improve the efficiency and effectiveness of the FSD's management of some 19,000 types of operating assets, in April 2012, the FC approved funding of \$49.8 million for the FSD to develop an integrated computer system, i.e. the AMMS. According to the funding paper of April 2012, the AMMS would provide major functions on inventory control, repair and maintenance management, and business intelligence analysis for enhancing the FSD's procurement and asset management work. However, up to July 2016 (over one year after the rollout of the AMMS in February 2015), some of these major functions could only be provided in the testing environment pending further fine-tuning before they could be put into actual use (paras. 5.2, 5.3 and 5.5).

18. *Fire-fighting protective suits.* In May 2010, the GLD on behalf of the FSD awarded a contract for the supply of 13,000 sets of fire-fighting protective suits at a cost of \$81 million which included an option of requiring the contractor (Contractor E) to provide a comprehensive managed care and maintenance services (CMCMS) of the suits. From October 2010 to March 2013, the FSD obtained the approvals from the Financial Services and the Treasury Bureau (FSTB)/GLD Tender Board for making three contract variations totalling \$50.1 million for Contractor E to provide the CMCMS from April 2011 to March 2017. In August 2016, after considering the FSTB's and the Security Bureau's advice on the tendering mode, the FSD adopted open tendering for the provision of the CMCMS for the fire-fighting protective suits from April 2017 to March 2022. The FSD needs to explore new service providers and bring in competitive tendering as far as possible for the procurement and maintenance of its other fire services support equipment in future (paras. 5.9, 5.11 and 5.12).

19. *Specialised fire services support equipment.* The Workshops and Transport Division is responsible for maintaining 56 types of electrical/mechanical specialised fire services support equipment (such as light portable pumps). Of the 1,647 rounds of preventive maintenance completed from June 2015 to May 2016, there were delays in carrying out 259 (15.7%) rounds of maintenance. The FSD needs to step up monitoring of the preventive maintenance for specialised equipment to ensure that it is carried out in a timely manner to prevent equipment failures before they occur or develop into major defects (paras. 5.15, 5.17 and 5.18).

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Audit recommendations

20. Audit recommendations are made in the respective sections of this Audit Report. Only the key ones are highlighted in this Executive Summary. Audit has *recommended* that the Director of Fire Services should:

Communications systems

- (a) seek prior approval from the appropriate authority when services outside the scope of a contract are required and take measures to negotiate the best or most favourable terms for the services (para. 2.19(a));
- (b) improve the preparation of user requirements to minimise subsequent changes after the award of contract and closely liaise with the works agents to sort out any unresolved issue of the installation site at the earliest opportunity in future procurement projects (para. 2.19(b));
- (c) take measures to ensure that any outstanding contractual matters are dealt with expeditiously in similar projects in future to minimise professional service cost on contract management (para. 2.19(c));
- (d) take measures to ensure that the procurement of additional TGMS equipment for installation on new emergency vehicles is carried out in a timely manner (para. 2.19(d));
- (e) require Contractor A to strengthen its maintenance services with a view to meeting the contract stipulated response time and turnaround time targets (para. 2.19(f));
- (f) for procurement projects with an extendable design serviceable life, take measures to acquire any extended maintenance services through competitive bidding as far as practicable (para. 2.19(h));
- (g) explore the technical feasibility of providing mobile phone location identification function in the next generation of the mobilising system (para. 2.19(j));

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- (h) **consider setting a target time for answering emergency calls in the design of the next generation of the mobilising system (para. 2.19(k));**
- (i) **closely monitor the compliance by the EMSTF with the service requirements stipulated in the SLA (para. 2.29(a));**

Fire appliances and support vehicles

- (j) **closely monitor the effectiveness of the Workshops and Transport Division's remedial measures in attaining the 90% target availability rate of the fire appliances and support vehicles (para. 3.9);**
- (k) **step up monitoring of the compliance with the scheduled maintenance requirements to ensure that the fire appliances and support vehicles receive proper maintenance in a timely manner (para. 3.27(a));**

Fire-fighting and rescue vessels

- (l) **closely monitor the progress of the replacement projects for FB 7 and the two speedboats to guard against further slippage (para. 4.15(b));**
- (m) **ascertain from the MD whether it is able to cope with the FSD's 10-year vessel replacement/procurement plan in a timely manner (para. 4.15(c));**

Other fire services support equipment

- (n) **expedite the fine-tuning of the outstanding functions in the AMMS and put them into use as soon as possible (para. 5.7(a));**
- (o) **explore new service providers and bring in competitive tendering as far as possible for the supply and maintenance of other fire services support equipment in future (para. 5.13); and**

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- (p) **step up monitoring of the preventive maintenance for specialised equipment to ensure that it is carried out in a timely manner (para. 5.19(a)).**

Response from the Government

- 21. The Government agrees with the audit recommendations.