

MANAGEMENT OF THE PUBLIC LIGHTING SYSTEM

Executive Summary

1. The Lighting Division of the Highways Department (HyD) with an establishment of 98 staff is responsible for the design standards, operation and maintenance, and the majority of design and construction of the public lighting system. As at April 2015, the public lighting system comprised 145,823 road lights (e.g. installed along public roads and carriageways), 79,225 special lights (e.g. installed at footbridges and subways) and 10,820 traffic bollards. The annual electricity charge was \$140 million. The HyD had awarded three contracts with a total contract value of \$693 million for the management, installation, operation and maintenance of road lights and traffic bollards (MOM contracts), each for a term of four years. For the provision of comprehensive maintenance for special lighting installations, the HyD has entered into a Service Level Agreement (SLA) with the Electrical and Mechanical Services Trading Fund (EMSTF) of the Electrical and Mechanical Services Department. In 2014-15, the HyD paid SLA charges totalling \$49 million to the EMSTF.

Operation and maintenance of road lighting

2. *Need to improve the scope and approach used in monitoring contractors' performance and road lighting availability.* To ensure a high service level of road lighting, the contractors of the MOM contracts are required to maintain the monthly availability of the road lighting system in the designated contract areas at not lower than 99.5%. Besides the contractors' daily check on the road lighting system, the HyD carries out night inspections to monitor independently the road lighting availability and the contractors' performance. According to the HyD, the stipulated lighting availability of 99.5% had been met in the three MOM contracts in 2014. However, the Audit Commission (Audit) found that the HyD's 51 inspection routes only covered 93,391 (64%) of the total 145,823 road lighting points. There is a risk that any outage or substandard performance of the contractors in relation to the uninspected lighting points may not be detected.

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Moreover, Audit's sample check revealed that the HyD's laid-down requirement for all 51 designated inspection routes to be covered at least once a month was not always followed. In June 2015, 4 out of 27 routes in one region were not inspected but another 17 routes were inspected twice. In 2008, the HyD put into trial use a remote control system to monitor road light operation. While the HyD's review of 2009 showed that the system was effective in reducing complaints, electricity consumption and monitoring manpower, the review of 2014 found it not cost-effective to further extend its use. In light of recent development (such as new technological advances), the HyD needs to re-examine the cost-effectiveness of extending the use of the system (paras. 2.2 to 2.7, 2.9 and 2.11 to 2.13).

3. *Need to ensure compliance with time limits for responding to fault calls.*
From June 2014 to May 2015, 12,249 fault calls concerning road lighting, gantry sign and roadside directional sign lighting, and traffic bollards were received. The MOM contracts have specified time limits for responding to fault calls, including rectifying urgent faults within 3 hours for minor repairs and within 12 hours for all other urgent fault cases. The contractors reported that they met the fault rectification time limits for 98.8% of the calls. However, there is no definition of minor repairs in the contracts. Audit's sample check revealed that a contractor mainly used the within 3-hour fault rectification time limit for measuring compliance while the other two contractors always used the within 12-hour time limit. In addition, a contractor measured its response time to fault calls based on the time of its acknowledgement of a fault call instead of the time a fault call was received as laid down in the contract. As a result, non-compliance for 576 cases had not been reported from June 2014 to May 2015 (paras. 2.16, 2.18 and 2.19).

4. *Need to ensure compliance with stipulated maintenance frequencies.*
The contractors are paid a monthly lump-sum fee to carry out scheduled maintenance works according to the frequencies stipulated in the MOM contracts (e.g. annual inspection of lighting equipment). However, as at April 2015, 14 types of scheduled maintenance works had not been carried out in accordance with the stipulated maintenance frequencies. In particular, some works had been outstanding for more than four years but payments for the works had already been made as part of the monthly lump-sum fees (paras. 2.27, 2.30 and 2.32).

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Operation and maintenance of special lighting

5. *Need to reflect SLA requirements in general special lighting subcontract.* The EMSTF has subcontracted the maintenance of 74% special lighting installations (including 62% relating to footbridge and subway lighting under a general special lighting subcontract). However, the 99.5% monthly equipment availability requirement stipulated in the SLA had not been incorporated in the general special lighting subcontract to ensure its enforceability on the subcontractor. Moreover, the subcontract had not always reflected the revised requirements of a new SLA, such as the 98.5% compliance level for fault call attendance requirement of the 2013 SLA and the reduced patrol frequency of the 2015 SLA (paras. 3.2, 3.5, 3.11 and 3.15).

6. *Need to closely monitor achievement of target equipment availability.* Before June 2015, the EMSTF calculated the monthly equipment availability of the special lighting system based on the number of faulty lights under complaint, which might not fully reflect the overall lighting operation. In response to Audit's enquiry, the EMSTF has since June 2015 used the number of faulty lights found during regular patrols for calculating the equipment availability. Based on the revised methodology, the monthly equipment availability figures for 2014-15 were below the SLA requirement of 99.5%, ranging from 98.7% to 99.4% (paras. 3.6 to 3.8).

7. *Need to improve regular patrol service.* According to the SLA, the regular patrol service on special lighting points should cover those listed in the SLA and subsequent additions during the agreement period. However, a total of 22 footbridges/subways/walkways (involving 1,887 special lighting points) were found by Audit to have been omitted from the patrol service. Moreover, in the absence of a laid-down time limit on rectifying faults identified during regular patrols, there were cases of delay. For example, as at June 2015, 325 general special lights had been repeatedly reported to be faulty, and the rectification works of some of these lights had been outstanding for more than two years. Delays in rectifying faulty lights could increase safety risks to pedestrians and other road users (paras. 3.9, 3.17 and 3.18).

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8. *Need to carry out scheduled maintenance works according to stipulated frequencies.* Under the SLA, the EMSTF has to arrange periodic cleaning of lanterns and group replacement of lamps, ranging from once every six months to once every 36 months. During the period from April 2013 to March 2015, some of these maintenance works were not carried out in accordance with the stipulated frequencies (paras. 3.19 and 3.20).

Installation of public lights

9. *Need to monitor long outstanding installation works for road lights.* Lighting installation works are mainly carried out under the Public Lighting Programme (PLP) approved by an inter-departmental Public Lighting Vetting Committee (PLVC) annually. The HyD had not compiled any ageing analysis to monitor the progress of road light installation works. As at March 2015, of the 1,534 approved road lights pending installation, 71 (5%) had been outstanding for more than three years and another 649 (42%) lights for one to three years. In September 2015, the HyD informed Audit that actions had been taken in respect of the 71 road lights. The HyD still needs to expedite action on the 649 outstanding lights (paras. 4.2 to 4.5).

10. *Need to expedite action on installation of village lights.* Having regard to the manpower resources and available funding, the HyD sets an annual quota for the number of village lights to be installed under the PLP. The Home Affairs Department (HAD) is responsible for coordinating village lighting applications and carrying out liaison work. During 2005-06 to 2015-16, the annual quotas of village lighting installation varying from 400 to 2,000 were insufficient to meet the village lighting applications. As at June 2015, the backlog of waitlisted village lights for inclusion in the PLP was 2,693. From 2005-06 to 2015-16, the PLVC approved the installation of 9,075 village lights, of which 1,461 approved village lights were pending installation as at October 2015. In particular, 553 (38%) had been outstanding for more than three years. Audit examination revealed that there were cases of delays in arranging site meetings and taking follow-up actions by the HAD and the HyD (paras. 4.8 to 4.11 and 4.13 to 4.16).

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Implementation of energy saving measures

11. Over the years, the HyD has made efforts to reduce energy consumption of the public lighting system, e.g. using high pressure sodium lamps to attain an energy saving of about 30%. From 2010-11 to 2014-15, while the number of public lights increased by 6% from 223,300 to 235,600, the electricity consumption decreased by 3% from 136.3 million kilowatt-hours (kWh) to 132.6 million kWh. In January 2015, the Government set a new target of achieving a 5% saving in electricity consumption for government buildings. To support the Government's energy saving initiative, the HyD needs to step up its efforts to implement energy saving measures for the public lighting system (paras. 5.2 and 5.4).

12. *Need to expedite action on installing electronic ballasts.* Non-dimmable electronic ballasts can be used to replace electromagnetic ballasts to reduce energy loss. In August 2008, the HyD issued an instruction requiring the replacement of failed electromagnetic ballasts on non-high-speed roads by non-dimmable electronic ballasts. However, Audit examination of 3,841 ballasts installed/replaced between 2009-10 and 2014-15 revealed that only 792 (21%) had complied with the laid-down requirement (paras. 5.5 and 5.6).

13. *Need to review the pace of adopting energy saving devices.* It is the HyD's practice to adopt energy saving devices (such as non-illuminated retro-reflective traffic bollards and T5 fluorescent tubes) for new installations and replacing failed or damaged devices. While this practice can avoid unnecessary disposal of existing devices, it takes a longer time to realise the benefits of the energy saving devices. For example, while the use of T5 fluorescent tubes to replace T8 fluorescent tubes could achieve an energy saving of 20% to 30%, only 18% of the T8 fluorescent tubes were replaced after a lapse of five years. The HyD needs to consider conducting a review of the cost-effectiveness of speeding up the use of energy saving devices in the public lighting system (paras. 5.9 and 5.10).

Audit recommendations

14. **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 Highways should:**

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Operation and maintenance of road lighting

- (a) set adequate inspection routes for the night inspections of the MOM contract areas with a view to covering all the lighting points as far as possible (para. 2.14(a)(i));
- (b) review the cost-effectiveness of extending the use of the system for remote control of road light operation (para. 2.14(b));
- (c) clearly define the two time limits for completing different types of repair works for urgent faults (para. 2.25(a));
- (d) address the inadequacies in monitoring the contractors' performance in attending to fault calls (para. 2.25(e));
- (e) step up monitoring of the contractors' scheduled maintenance works and follow up outstanding maintenance works with contractors concerned for completed contracts (para. 2.37(a) and (c));

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- (f) step up monitoring of the progress of road light installation works and expedite action on the outstanding road lights (para. 4.6);
- (g) take measures to meet the demand for village lighting in good time (para. 4.18(a));
- (h) in collaboration with the Director of Home Affairs, step up monitoring of the progress of the approved village lighting installation works (para. 4.18(c));

Implementation of energy saving measures

- (i) take measures to ensure that the requirement on replacing electromagnetic ballasts by non-dimmable electronic ones is complied with (para. 5.11(a)); and

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- (j) consider conducting a review of the cost-effectiveness of speeding up the use of energy saving devices (para. 5.11(c)).

15. Audit has also *recommended* that the Director of Electrical and Mechanical Services should:

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- (a) incorporate the target equipment availability requirement and fault attendance service standard of the SLA in the general special lighting subcontract (para. 3.21(a));
- (b) closely monitor the achievement of the target equipment availability requirement (para. 3.21(b)(i));
- (c) incorporate the omitted footbridges/subways/walkways in the SLA/subcontract for providing the regular patrol service and speed up rectification of faulty lights found during regular patrols (para. 3.21(b)(ii) and 3.21(e));
- (d) tighten control to ensure that any revised service requirements of a new SLA are promptly reflected in the subcontracts (para. 3.21(b)(iii)); and
- (e) tighten control to ensure that scheduled maintenance works are carried out in accordance with the stipulated frequencies (para. 3.21(f)).

Response from the Government

16. The Government agrees with the audit recommendations.