

A. Introduction

The Audit Commission ("Audit") conducted a value for money audit on the actions taken by the Water Supplies Department ("WSD") to minimise water losses from unauthorised water consumption and inaccurate metering with focus on the following areas:

- enforcement action against unlawful water taking;
- inspection of unauthorised water consumption;
- management of water meter accuracy; and
- performance reporting.

2. **Mr MA Lee-tak, Director of Water Supplies**, made an opening statement at the Committee's public hearing on 1 December 2011. The full text of his statement is in *Appendix 16*.

3. In gist, the **Director of Water Supplies** said in his opening statement that:

- the quantity of water loss from unauthorised water consumption (i.e. 17.30 million cubic metres ("Mm³") which represented 2% of the total fresh water supply in 2010) was only a notional estimate. The adoption of a notional estimate with regard to local conditions was in line with the international best practice. As literature review revealed that figures of 0.5% to 4.3% had been used in the region, the WSD adopted 2%, a figure close to the average of the range, for the case of Hong Kong for estimation purpose, in view of Hong Kong's state of development;
- according to the accuracy limits of water meter of $\pm 2\%$ and $\pm 3\%$ as specified respectively in the meter procurement contracts and the Waterworks Regulations, the quantity of water loss from inaccurate metering amounted to 2% of the total fresh water supply in 2010 as mentioned in the Director of Audit's Report ("Audit Report") should be regarded as performance within the allowable limits, rather than a loss of government revenue;

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- in the past years, the WSD had focused on increasing the percentage of the meter fleet with service year within the optimum service life. The WSD would now shift its focus to replacing meters with high service years or high recorded consumption left in the previous rounds due to different complications; and
- in view of the difficulties encountered during replacement of aged water meters, the WSD was considering the viability of applying for warrants from the Magistracy for entry into the premises to effect works, including the clearance of obstruction to access, and repair to plumbing and building fabrics for meter replacement, with costs incurred to be recovered from the parties concerned.

4. The Committee noted the Director of Water Supplies' remark that a figure in the range of 0.5% to 4.3% had been applied to estimate the notional quantity of water loss from unauthorised water consumption in the region. The Committee asked whether the situation of unauthorised water consumption in Hong Kong was serious, considering that the notional quantity of apparent water losses in Hong Kong, which referred to water consumed by users but not metered or charged, amounted to 4% of the total fresh water supply in 2010 as mentioned in the Audit Report. The **Director of Water Supplies** clarified that 4% was actually comprised of 2% for water loss from unauthorised water consumption and 2% for inaccurate metering, and such figures were estimates only.

B. Enforcement action against unlawful water taking

Apparent water losses

5. According to paragraph 1.7 of the Audit Report, the notional quantity of water losses from unauthorised water consumption and inaccurate metering totalled 34.94 Mm³ in 2010, representing 4% of the total fresh water supply in the year and involving estimated notional water charges forgone of some \$160 million (\$79.2 million and \$80.8 million were attributed to unauthorised water consumption and inaccurate metering respectively). The Committee also noted from paragraph 2.9 of the Audit Report that from 2008 to 2010, the number of unlawful water taking convictions had increased by 52% from 60 to 91. Since unlawful water taking would result in loss of water and government revenue, the Committee asked what actions the WSD had taken to address the problem of unlawful water taking.

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6. The **Director Water Supplies** said at the public hearing and in his letter of 19 December 2011 (in *Appendix 17*) that:

- the WSD had been adopting a two-prong approach in dealing with unlawful water taking, i.e. by detection and prosecution and by promotion and education against unauthorised uses. The WSD would strengthen work on these two areas by exploring new detection techniques and enhancing collaboration with concerned authorities and other sectors of the community, with a view to widening the detection webs for unlawful water taking activities;
- the WSD had started to adopt a risk-based approach in detecting possible unauthorised water consumption since 2011, through comparison of flow data registered by flow meters of individual district meter areas with aggregated meter consumption figures of individual consumers in the corresponding areas. When there were discrepancies between those two sets of figures, indicating abnormalities in water consumption, the WSD would take follow-up actions, including investigation and on-site inspection. It would also institute prosecution if unauthorised water use was identified; and
- the WSD would explore the feasibility of using data mining techniques to evaluate changes of individual consumers' water usage as an aid towards identifying suspected unauthorised water use.

Unlawful water taking at markets

7. The Committee noted from paragraph 2.16 of the Audit Report that the number of unlawful water taking convictions at the Food and Environmental Hygiene Department ("FEHD")'s markets had increased from 4 in 2008 to 18 in 2010, representing an increase of 350%. Moreover, there were repeated offences committed by the same stall operator. Notwithstanding this, the WSD had not informed the FEHD of the situation nor similar offences committed by other stall operators at the FEHD's markets. As a result, the FEHD could not take necessary follow-up action, such as issuing warning letters to the offenders.

8. The Committee further noted that under the existing market-stall tenancy agreement, the FEHD could issue a warning letter to a tenant for non-compliance with the legal provisions relating to the use of a market stall and could terminate a tenancy agreement after the issue of three warning letters to a tenant within a period

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of six months. It appeared to the Committee that if the WSD had informed the FEHD, the FEHD could have taken effective enforcement actions against those tenants who unlawfully took water at the FEHD's markets and such actions could have great deterrent effect. The Committee questioned whether the WSD had tried its best to deter and prevent unlawful water taking activities at the FEHD's markets and what the WSD had done to address the problem.

9. The **Director of Water Supplies** replied that the WSD had liaised with the FEHD to strengthen the measures for prevention of unlawful water taking activities at public markets. The FEHD also accepted Audit's recommendations and would collaborate with the WSD in taking enforcement actions against such activities.

Unlawful water taking at construction sites

10. The Committee referred to paragraphs 2.32 and 2.36 of the Audit Report, which reported that there were nine conviction cases of unlawful water taking at government works sites from 2008 to 2010. In these cases, the site workers who were employees of the contractors, instead of the contractors, were prosecuted. The WSD had not notified the responsible government departments of the cases on the grounds of privacy as the defendants in those cases were employees of the contractors, who were individual persons.

11. Against the above background, the Committee asked:

- why the WSD could not institute prosecution against both the contractors and the site workers concerned, although it was obvious that the site workers had taken water unlawfully for use at their employers' construction sites;
- why in cases of residential developments' taking water unlawfully for flushing, the Owners' Corporations ("OC") concerned would be prosecuted, but government works contractors would not be charged even though their employees took water unlawfully for use at their sites; and
- whether the WSD agreed that the current practice would create an opportunity for contractors to evade the legal liability for unlawful taking of water, and whether the WSD would review its existing approach in dealing with similar cases to plug the loophole.

12. The **Director of Water Supplies** and **Mr Bobby NG, Assistant Director/Development of the WSD** responded that:

- in order to institute a prosecution, the WSD needed to identify the person taking water unlawfully and if he/she admitted committing the offence, he/she would be the one to be prosecuted; and
- to deter unlawful water taking activities at works sites, the WSD would review the existing contractor administration procedures with the Development Bureau ("DB") and provide more information, such as conviction cases of unlawful water taking at works sites and the contractors who had records of taking water unlawfully, to the related government departments so that they could help monitor whether there were any unlawful water taking activities at their works sites. If there were such activities, the departments could provide more evidence to the WSD for prosecution.

13. The **Director of Water Supplies** supplemented in his letter of 19 December 2011 that the WSD would solicit the DB's assistance to highlight in the contractor administration procedures that any unauthorised water uses at the contractors' works sites would be reflected in their performance reports. The WSD would also seek legal advice on how the contractor's responsibility for unlawful taking of water at works sites by employees of the contractors could be more effectively pursued based on the evidence collected.

14. The Committee referred to Case 3 in paragraph 2.32(b) of the Audit Report, in which a government works contractor commenced landslip preventive works in June 2008 but only applied for temporary water supply in November 2008, i.e. 132 days after commencement of the works. Upon receipt of the application, the WSD requested the contractor to provide additional information for the application. During this period, the contractor continued taking water unlawfully at the works site. In February 2009, i.e. 91 days after the contractor's first submission of application, the WSD received a revised application from the contractor and approved the application. According to the Project Administration Handbook for Civil Engineering Works ("the Handbook"), a contractor should submit an application for temporary water supply before the award of a contract to ensure water was supplied shortly after commencement of works.

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15. The Committee questioned:

- why the WSD officers concerned had not taken the initiative to follow up the contractor's application for temporary water supply after requesting the contractor to provide additional information or promptly processed the contractor's revised application, and whether their slow response had resulted in prolonged unlawful water taking at the works site;
- whether the omission was due to the bureaucratic mindset of the WSD officers concerned which resulted in their failure to respond to a situation requiring timely actions, or the low priority accorded by the WSD to reducing water loss from unauthorised water consumption; and
- why the WSD had not solicited the assistance of other government departments to help ensure compliance with the requirements of the Handbook, such as by reminding their contractors to apply for temporary water supply before commencement of works.

16. The **Director of Water Supplies** stated that:

- the WSD officers concerned were not bureaucratic. Nevertheless, the WSD would remind its staff to take more initiative to follow up applications for temporary water supply from contractors before commencement of works, especially when the applications were late or additional information was required; and
- the WSD had already liaised with other government departments and would regularly remind them of the need to comply with the requirements of the Handbook, i.e. to apply for temporary water supply before commencement of works.

Unlawful water taking for flushing at residential developments

17. The Committee noted from Case 1 in paragraph 2.24(a) of the Audit Report that when the WSD investigated a complaint about unlawful water taking in Development A, the responsible WSD officers needed to wait some time before they were granted the right of access by the estate management office of Development A. Subsequently, the WSD officers gained instant access to Development A after obtaining a search warrant.

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18. It appeared to the Committee that WSD officers often encountered difficulties in gaining prompt access to premises for conducting investigations of unlawful water taking activities. To ascertain the extent of the problem, the Committee enquired:

- about the number of cases in which the WSD had taken enforcement actions with a warrant and the circumstances of such cases from 2008 to 2010;
- how long it normally took for the WSD to obtain a warrant from the Magistracy for entering premises to conduct investigations, collect evidence or terminate unauthorised connections; and
- whether the obtaining of warrants would prolong the WSD's investigation and prosecution work.

19. The **Director of Water Supplies** and **Mr CHIN Chu-sum, Assistant Director/Customer Services of the WSD** responded that:

- to facilitate inspection and prosecution work, the WSD sometimes had to obtain a warrant from the Magistracy for entry to premises, if they failed to obtain such consent of the estate management offices concerned; and
- to successfully obtain a warrant from the Magistracy, WSD officers needed to produce proof to court that they had made the best attempt to obtain consent of the estate management offices concerned for entry to the premises but in vain. It would normally take one week for them to prepare such information and obtain a warrant from the Magistracy.

20. In his letter of 19 December 2011, the **Director of Water Supplies** stated that from 2008 to 2010, there were six cases in which the WSD required warrants to take enforcement actions against unlawful water taking activities. Five of the cases were related to suspected unlawful taking of fresh water for flushing and one case concerned suspected unlawful taking of fresh water for use in a restaurant.

21. The Committee further asked, besides prosecution, what other measures the WSD would carry out to prevent unlawful water taking activities, including those which would enable users to have water supply through proper channels and sources.

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22. The **Director of Water Supplies** replied at the public hearing and in his letter of 19 December 2011 that the WSD would consider extending the network of sea water supply to areas without such supply and assisting estate management offices of residential developments to properly maintain their flushing systems through the expansion of the "Quality Water Recognition Scheme for Buildings" to flushing systems, with a view to reducing the risk of system breakdowns and hence the occurrences of unlawful tapping of fresh water for flushing.

23. Turning to Case 2 in paragraph 2.24(b) of the Audit Report, the Committee noted that the OC of Development B admitted taking fresh water unlawfully for flushing at two blocks for about 28 months in January 2008. In March 2008, the WSD requested the OC to remove the unauthorised connections and issued a summon to the OC, which was later convicted of the offences with fines of \$5,000 and a water charge of \$69,622. In May 2008, the WSD refused the OC's request for extending the removal time of unauthorised connections, the OC then submitted an application to the WSD for temporary water supply for flushing. In June 2008, the WSD requested the OC to revise the application and finally approved the application in September 2008. Between June and October 2008, the OC continued taking water unlawfully and the WSD issued another summon to the OC, which was convicted of the offences with fines of \$10,000 and a water charge of \$7,871. Up to November 2011, unlawful water taking continued in Development B notwithstanding that the OC had twice been convicted of the offences.

24. The Committee queried why unlawful water taking activities still continued in Development B despite the WSD's repeated enforcement actions. It asked:

- about the actions that the WSD would take to put such activities to an end and whether the WSD had sought the Department of Justice ("DoJ")'s advice on the need to apply for a review against the sentence imposed on this case; and
- whether the WSD considered that the level of penalties imposed on offenders convicted of unlawful water taking was too lenient to deter such activities, and whether the WSD would consult the DoJ on the need to review such penalties.

25. The **Director of Water Supplies** and **Assistant Director/Development** explained that:

- since Development B took water from its fire services installation for flushing, the WSD, after discussing with the Fire Services Department,

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decided not to terminate the water supply to Development B for the sake of fire precaution. Instead, the WSD would institute another prosecution and was considering applying for a warrant from the Magistracy for entering the building to remove the unauthorised connections; and

- it was the DoJ's decision as to whether it should apply for a review against the sentence imposed on a case and the WSD would act on its advice. To enhance the deterrence against unlawful water taking activities, the WSD would first adopt measures to strengthen its prosecution work, including providing more information on the offenders to the court, so as to ensure that offenders would be given appropriate sentences. The WSD would periodically review the effectiveness of such measures and then consider reviewing the level of penalties, if the need arose.

26. As unlawful water taking still continued in Development B, the Committee requested the WSD to provide a progress report on Case 2 in two months' time after the public hearing.

27. In his letter of 20 January 2012 (in *Appendix 18*), the **Director of Water Supplies** informed the Committee that the WSD instituted the third prosecution and the OC of Development B was convicted of the offences. The OC was fined \$33,000 and was required to settle a water charge of \$51,781. The OC had removed the unauthorised connection and its application for temporary water supply for flushing had been approved by the WSD. The permanent flushing supply system of Development B was expected to commence by end February 2012.

C. Inspection of unauthorised water consumption

Responsibilities and manpower of the Prosecution Unit ("PU")

28. The WSD's PU is responsible for conducting inspections and investigations of suspected unauthorised water consumption cases, carrying out surprise inspections of suspected premises and buildings, and instituting prosecution against unlawful water taking under the Waterworks Ordinance (Cap. 102) and the Waterworks Regulations. It currently has an establishment of 13 staff in four different ranks, including one Chief Technical Officer, three Waterworks Inspectors, three Assistant Waterworks Inspectors and six Customer Services Inspectors.

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29. According to Table 4 in paragraph 3.3 of the Audit Report, from 2008 to 2010, the PU conducted 2,411 inspections of suspected unauthorised water consumption cases. The Committee asked:

- about the duties and responsibilities of each of the four ranks of staff of the PU; and
- whether the manpower of the PU was sufficient for handling its workload and whether the existing division of work among the PU staff could facilitate inspection and prosecution work.

30. The **Director of Water Supplies** and the **Assistant Director/Development** replied at the public hearing and in the letter of 19 December 2011 that:

- the PU was headed by a Superintendent (at the rank of Chief Technical Officer) and comprised of three prosecution teams, each headed by a Prosecution Officer (at the rank of Waterworks Inspector), who was assisted by an Assistant Prosecution Officer (at the rank of Assistant Waterworks Inspector) and two Customer Services Inspectors. The major responsibilities of the prosecution team were to conduct investigations, collect evidence, prepare reports, institute prosecution and attend court as prosecutor or witness;
- the main duties of each of the four ranks of staff were:
 - (a) *Superintendent*: to supervise the activities of the PU, examine cases reported to be in contravention of the Waterworks Ordinance and the Waterworks Regulations, take prosecution actions against offenders, perform as prosecutor in court, recommend revision of the related legislations if required and arrange staff training;
 - (b) *Prosecution Officer*: to supervise prosecution team, prepare case work connected with investigation and prosecution, prepare evidence and court statements, and perform as prosecutor in court;
 - (c) *Assistant Prosecution Officer*: to conduct on-site investigations, investigate complaints of irregularities lodged by the public and other agencies, collect evidence, prepare reports on such investigations, present evidence in court and act as government witness; and

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(d) *Customer Services Inspector*: to conduct inspections, attend complaints of breaches of the Waterworks Ordinance and the Waterworks Regulations, and assist Prosecution Officers and Assistant Prosecution Officers in legal proceedings; and

- the major duties of the Superintendent were to institute prosecution and act as prosecutor or witness at court. Such work amounted to one-third of his workload. As for the other staff, they were mainly responsible for conducting investigations and inspections, which were often carried out by more than one staff from the team. To efficiently carry out these duties, the WSD had already deployed appropriate resources to the PU.

31. The Committee further asked about the number of investigations and inspections which were conducted by two PU staff together. The **Director of Water Supplies** explained in his letter of 20 December 2011 (in *Appendix 19*) that:

- since collection of evidence during investigation required simultaneous actions at different locations, for example, operating valves at ground floor and taps within the premises to ascertain that water was drawn through the illegal connection to the premises, and thus at least two and very often three staff would be deployed for the investigation; and
- from 2008 to 2010, all the inspections of suspected unauthorised water consumption cases were conducted with at least two staff.

32. Noting that all the inspections of suspected unauthorised water consumption cases had to be conducted by at least two PU staff together, the Committee queried why the WSD only allocated 13 staff to the PU and asked if the WSD would review the PU's manpower strength. The Committee also questioned:

- whether the WSD had accorded a low priority to minimising water losses from unauthorised water consumption and inaccurate metering, and hence it only deployed a team of 13 staff to handle such work; and
- whether legal and prosecution training were provided to the Superintendent and other staff of the PU to ensure that they had the necessary legal skills and expertise required for carrying out their inspection and prosecution duties effectively.

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33. The **Director of Water Supplies** and the **Assistant Director/Development** responded that:

- the WSD would first adopt other measures and make use of data mining techniques to strengthen inspection and prosecution work. If the workload of the PU further increased, the WSD would review the manpower of the PU again;
- the WSD did not neglect its duties of minimising water losses from unauthorised water consumption and inaccurate metering. However, in view of the substantial amount of water losses due to water mains leakage and bursts (the notional quantity of such losses amounted to some 20% of the total fresh water supply in 2010), the WSD had to allocate more resources and manpower support to the replacement of water mains; and
- all the PU staff, including new recruits, had to undergo a one-week legal and prosecution training conducted by the Customs and Excise Department.

Staff training and assistance from government departments

34. Regarding the staff training provided to WSD officers, the Committee noted from paragraph 3.5 of the Audit Report that the PU only provided five training courses relating to unlawful water taking and prosecution to WSD officers from January 2004 to July 2011, including two half-day seminars in 2004, two sessions as part of the induction training for new recruits in 2008 and 2010 respectively and one half-day talk in 2011.

35. The Audit Report also stated that some WSD officers did not comply with the WSD's guidelines to conduct inspections when they discovered contraventions to the Waterworks Ordinance or the Waterworks Regulations, such as collecting evidence as far as possible and identifying the person committed the offence at the first instance, resulting in insufficient evidence for prosecution of the offence. Case 4 and Case 5 of the Audit Report were examples.

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36. In view of the above, the Committee asked:

- why only a few training courses were organised by the PU in the past seven years and whether it was due to the PU's insufficient manpower; and
- whether WSD officers had the necessary knowledge for handling suspected unlawful water taking cases.

37. The **Director of Water Supplies** said at the public hearing and in his letter of 19 December 2011 that:

- the PU would arrange the uploading of training materials, including conviction cases, onto the WSD intranet for web-based training on handling suspected unlawful water taking cases to WSD officers. The WSD would also review the staff training needs and modes in December 2012 for further enhancement as necessary; and
- the WSD would also improve staff training and conduct regular training courses on handling suspected unlawful water taking cases for WSD officers, so as to enhance the quality of work. Moreover, the WSD would provide such training to officers of other target government departments to help detect such activities.

38. Paragraph 3.7 of the Audit Report stated that the number of referral cases by government departments of unauthorised use of water at construction sites was significantly reduced from 23 in 2008 to 4 in 2010, representing a reduction of 83%. The Committee asked if the WSD was aware of the situation and if government departments realised the need to report such cases to the WSD for follow-up action.

39. The **Director of Water Supplies** explained that each department would have its own considerations and work priorities. Nevertheless, the WSD would proactively seek assistance from other government departments for reporting suspected unlawful water taking cases to the WSD for follow-up action.

Investigations of suspected cases

40. According to paragraph 3.21 of the Audit Report, the responsible investigation officer of the PU should report the findings to the Superintendent of the PU after conducting an investigation on a suspected case of unauthorised water consumption. If termination of unauthorised connections, i.e. remedial action, was required, the Superintendent would refer the case to the responsible district officers of the Customer Services Branch ("CS Branch") for remedial action. In some cases, both the PU and the CS Branch took a long time to complete the actions and the examples were as follows:

- from October to December 2010, in 13 out of 43 cases requiring termination of unauthorised connections, the investigation officers of the PU took 11 to 25 working days after the last inspections to report the findings to the Superintendent of the PU; and
- from October to December 2010, in 13 out of 43 cases, the district officers of the CS Branch took more than 10 working days to complete the remedial action.

41. The Committee enquired why:

- the responsible investigation officers of the PU took such a long time to report the findings to the Superintendent; and
- the CS Branch also took such a long time to complete the remedial action, and whether it was because the CS Branch lacked manpower support or the district officers concerned did not work seriously.

42. The **Assistant Director/Development** and the **Assistant Director/Customer Services** explained that:

- the PU sometimes needed a longer time to collect evidence and prepare reports so as to increase the chance of successful prosecution. In order to closely monitor the work progress, the PU had been using a computerised record system to record details of the investigation on all suspected cases and the progress of follow-up action; and
- as the CS Branch was required to inform the offenders before terminating the unauthorised connections, sometimes it might need more

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time to get in touch with the offenders. In cases where the offenders lived in villages or rural areas, the WSD might even need to seek help from the Home Affairs Department in order to contact the offenders.

43. The Committee further enquired:

- about the current establishment of the CS Branch; and
- whether the WSD would set time pledges for completing the different steps involved in handling cases of termination of unauthorised connections, with a view to avoiding delay by the PU and the CS Branch in handling such cases.

44. The **Director of Water Supplies** stated in his letter of 19 December 2011 that:

- the CS Branch currently had an establishment of 250 staff providing non-accounts-related services to the community, including handling cases of termination of unauthorised connections (which amounted to around 0.1% of the workload), installation and replacement of water meters, attending complaints from customers on water supplies, disconnecting and reconnecting water supplies, and providing emergency temporary water supplies etc; and
- the WSD had determined that upon completion of an investigation by the PU and if termination of unauthorised connection was required, the PU should notify the CS Branch within three working days from the date of completion of investigation for the latter's follow-up actions. The WSD would also set time limits for the following work:
 - (a) issuing notices (i.e. Form K) to offenders requiring them to engage licensed plumbers to carry out rectification work to terminate unauthorised connections;
 - (b) conducting inspection after the period allowed for rectification as stated in Form K so as to confirm if the work required had been complied with;
 - (c) issuing disconnection notice (i.e. Form J) if the unauthorised connections had not been terminated;

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- (d) conducting inspection after the period allowed for rectification as stated in Form J and terminating unauthorised connections as necessary; and
- (e) applying for warrants from the Magistracy for entry to premises if offenders obstructed the WSD staff from making inspections or terminating unauthorised connections.

D. Management of water meter accuracy

Water meter replacement programmes

45. According to the Audit Report, the WSD completed a review of the accuracy of large water meters in May 1997 and the results revealed that the optimal service life of 25-millimetres ("mm") to 100-mm meters would be 7 years and that of 150-mm to 300-mm meters would be 4 years. However, ever since the last review in 1997, the WSD had not conducted any reviews of the replacement strategy for large water meters (i.e. 25-mm to 300-mm). Since the water charge revenue of large water meters accounted for 34% of the total water charge revenue in 2010-2011, the Committee asked if the WSD would consider adopting a risk-based strategy for determining the priority for meter replacement.

46. The Committee also noted from paragraph 4.32 of the Audit Report that the water authority of Singapore replaced meters for large-consumption customers every year. The water authority of Macao had developed new analysis models to locate problematic water meters. After adopting these models, it was estimated that the efficiency of meter replacement had increased by 20% as compared with the previous replacement scheme which was based on the manufacturing dates and meter readings. The Committee asked whether the WSD would consider adopting such overseas practices when drawing up its meter replacement plans.

47. The **Director of Water Supplies** said at the public hearing and in his letter of 20 December 2011 that:

- the WSD would adopt a risk-based strategy to determine the priority for water meter replacement. For instance, the WSD would determine the meter replacement cycles based on water consumption and water charge revenue involved, instead of optimal service life;

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- the WSD would periodically review the optimal replacement cycles of meters based on statistical test data. In addition, it would conduct review to develop cumulative flow volume-driven replacement criteria for meter replacement to further improve the overall accuracy of water meters. The WSD would also make use of data mining techniques to identify those meters reaching the set cumulative flow volume from the meter fleet for replacement; and
- the WSD would conduct periodic reviews of meter replacement strategies, taking into account new methodologies available as well as good practices overseas.

Replacement of large water meters

48. As stated in paragraphs 4.14 and 4.20 of the Audit Report, as of July 2011, 6% of the 15-mm meters, 31% of the 25-mm to 100-mm meters, and 30% of the 150-mm to 300-mm meters had exceeded their optimal service lives of 12 years, 7 years and 4 years respectively. It appeared to the Committee that these figures reflected that the WSD had focused its efforts on replacing small water meters (i.e. 15-mm). In view of the high percentage of large water meters long overdue for replacement and the substantial amount of water charge revenue related to such meters, the Committee asked if the WSD would speed up the replacement of large water meters.

49. The **Director of Water Supplies** said at the public hearing and in his letter of 19 December 2011 that:

- the WSD would now focus on replacing the water meters long overdue for replacement. However, replacement of large water meters was not an easy task and the WSD staff often encountered difficulties when replacing these meters. As these meters were usually located at buildings' main distribution pipe and plumbing systems, the WSD needed to stop the water supply before replacement. Moreover, the replacement work would occasionally be held up because of the need to sort out issues, such as clearance of blocked access, arranging a suitable time slot for water stoppage for meter replacement, and awaiting customers to repair dilapidated plumbing and carry out building renovation works within their premises; and

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- to solve the above problems, the WSD would obtain warrants from the Magistracy for entering premises to effect the works to facilitate the meter replacement.

50. The Committee further asked if the WSD had set a timetable for replacing the large water meters which had exceeded their optimal service lives. The **Director of Water Supplies** replied in his letter of 19 December 2011 that the WSD would acquire resources for replacing large water meters according to the following schedule:

Age (Year)	Number of meters in service as at July 2011 (Quantity)	Target date of replacement
25-mm to 100-mm meters (optimal service life of 7 years)		
Over 20	3	All by end 2011
11 to 20	3,196	80% by end 2012; remaining 20% by end June 2013
8 to 10	7,382	50% by end 2012; remaining 50% by end 2013
150-mm to 300-mm meters (optimal service life of 4 years)		
11 to 16	10	All by end March 2012
5 to 10	37	30 pieces by end 2012; 7 pieces by end June 2013

Replacement of water meters for government establishments

51. According to paragraph 4.25 of the Audit Report, as of July 2011, there were 9% of the water meters installed in government establishments which had exceeded their optimal service lives and 10 of them were 150-mm to 200-mm meters.

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The Committee queried why even government departments did not observe the rule of replacing aged water meters.

52. The **Director of Water Supplies** explained that since fresh water supply to government establishments was free of charge, the WSD had not allocated a lot of resources to replace these meters in the past. However, as the replacement work of chargeable water meters was almost completed, the WSD could now allocate more resources to replace the aged meters at government establishments.

53. In response to the Committee's question, the **Director of Water Supplies** supplemented in his letter of 19 December 2011 that the 10 aged 150-mm to 200-mm meters were located at the following government establishments:

Establishments	Quantity of meters
Water Supplies Department	5
People's Liberation Army Forces	2
Drainage Services Department	2
Fire Services Department	1

E. Performance reporting

54. According to paragraph 5.9 of the Audit Report, in 2010-2011, water charge revenue relating to large water meters (i.e. 25-mm to 300-mm) amounted to \$872 million, accounting for 34% of the total water charge revenue of \$2.56 billion. Despite of the substantial amount of water charge revenue involved, the WSD did not select large water meters for carrying out meter accuracy tests. The Committee enquired about the reasons for not conducting such tests for large water meters.

55. The **Director of Water Supplies** and **Mr WONG Man-ching, Chief Electrical and Mechanical Engineer/Maintenance of the WSD**, said that the total number of large water meters was small as compared with the total number of water meters. However, the WSD would select certain number of small and large water meters for meter accuracy tests every month. Moreover, the WSD often

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encountered difficulties when carrying out such tests for large water meters, which might involve stoppage of water supply. Thus, the WSD considered that the most effective way for improving large water meter accuracy was to implement regular meter replacement programmes.

F. Conclusions and recommendations

56. The Committee:

Overall comments

- expresses astonishment that:
 - (a) in 2010, unauthorised water consumption and inaccurate metering led to a total water loss of 34.94 million cubic metres, representing 4% of the total fresh water supply in the year and involving estimated notional water charges forgone of some \$160 million (\$79.2 million and \$80.8 million were attributed to unauthorised water consumption and inaccurate metering respectively); and
 - (b) the Water Supplies Department ("WSD") has simply followed established practices and procedures when taking enforcement actions against unlawful water taking. It lacks the initiative to improve the strategies for addressing the unlawful water taking problem or identify ways to resolve the problems encountered in enforcement work. For instance, the WSD only started to adopt a risk-based strategy for detecting possible unauthorised water consumptions in 2011 but not earlier, and the WSD has not proactively explored ways to overcome the difficulties in promptly gaining access to premises for conducting investigations of unlawful water taking;
- notes that the WSD has focused on reducing water losses due to water mains leakage and bursts and has not accorded a high priority to minimising water losses from unauthorised water consumption and inaccurate metering, but does not accept such an approach and considers that the Director of Water Supplies should give an equally high priority to minimising water losses from unauthorised water consumption and inaccurate metering;

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- acknowledges that the WSD will explore the possibility of using data mining techniques to evaluate changes of individual consumers' water usage and, if possible, compare them with those of similar types of consumers as an aid towards identifying suspected unauthorised uses;
- recommends that the Director of Water Supplies should:
 - (a) accord a sufficiently high priority to tackling the problem of unlawful water taking and inaccurate metering so as to minimise the loss of water and government revenue; and
 - (b) in addition to detection of unauthorised water consumption, study whether a risk-based strategy can be adopted to detect other irregularities and facilitate the WSD's work;

Enforcement action against unlawful water taking

- expresses serious concern and finds it unacceptable that:
 - (a) there was a significant increase in the number of unlawful water taking convictions from 60 in 2008 to 91 in 2010, representing an increase of 52%;
 - (b) the WSD has failed to take the initiative to seek the assistance of other government departments in preventing and deterring unlawful water taking activities, as illustrated by the following:
 - (i) some cases of unlawful water taking took place at the Food and Environmental Hygiene Department ("FEHD")'s markets, and the number of such cases increased from 4 in 2008 to 18 in 2010. However, the WSD did not inform the FEHD of unlawful water taking offences at public markets for the latter to take follow-up action;
 - (ii) from 2008 to 2010, nine cases of convicted unlawful water taking took place at government works sites. However, the WSD did not notify the responsible government departments of such cases at their works sites. In these cases, only the site workers who were employees of the contractors, but not the contractors, were prosecuted, and this would allow the

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contractors to evade the legal liability for taking water unlawfully for use at their sites; and

- (iii) in Case 3 in the Director of Audit's Report ("Audit Report"), a government works contractor only applied for temporary water supply 132 days after commencement of works and the WSD approved the application 91 days later, contrary to the requirement of the Project Administration Handbook for Civil Engineering Works that such an application should have been made before the award of the works contract;
 - (c) for Case 3 in the Audit Report, the WSD's failure to closely monitor the situation (i.e. to follow up the application for temporary water supply after requesting the contractor to provide additional information and to promptly process the contractor's revised application) might have resulted in prolonged unlawful water taking at the works site and reflects that the mindset of the WSD officers concerned was too bureaucratic that they failed to respond to a situation requiring timely actions, e.g. applications for temporary water supply for works sites before commencement of works;
 - (d) from 2008 to 2010, there were 48 convictions of unlawful water taking for flushing, some of which were attributed to breakdowns of flushing systems in residential developments and hence the estate management offices concerned tapped water unlawfully to maintain water supply for flushing pending repair of the systems; and
 - (e) in Case 2 in the Audit Report, unlawful water taking continued in Development B notwithstanding that the Owners' Corporation ("OC") of the development had been convicted of the offences;
- acknowledges that:
- (a) the Director of Water Supplies has accepted the Audit Commission ("Audit")'s recommendations in paragraphs 2.12, 2.19, 2.29 and 2.38 of the Audit Report;
 - (b) the WSD now adopts a two-prong approach in dealing with unauthorised water losses, i.e. by detection and prosecution and by promotion and education against unauthorised uses. The WSD

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will strengthen work on these two areas by exploring new detection techniques and enhancing collaboration with concerned authorities and other sectors of the community;

- (c) to deter unauthorised water uses at government works sites, the WSD will solicit the Development Bureau's assistance to highlight in the contractor administration procedures that any unauthorised water uses at the contractors' works sites will be reflected in their performance reports. The WSD will also seek legal advice on how the contractor's responsibility for taking water unlawfully at works sites by employees of the contractors can be more effectively pursued based on the evidence collected;
 - (d) for Case 2 in the Audit Report, the WSD instituted the third prosecution and the OC of Development B was convicted of the offences. The OC was fined \$33,000 and was required to settle a water charge of \$51,781. The OC has removed the unauthorised connection and its application for temporary water supply for flushing has been approved by the WSD. The permanent flushing supply system of Development B is expected to commence by end February 2012; and
 - (e) regarding unlawful water taking activities at the FEHD's markets, the Director of Food and Environmental Hygiene has accepted Audit's recommendations in paragraph 2.20 of the Audit Report;
- recommends that Director of Water Supplies should:
- (a) proactively seek the assistance of various government departments in preventing and deterring unlawful water taking, including providing the responsible government departments with information of convictions of unlawful water taking at their works sites;
 - (b) remind WSD officers of the need to take appropriate timely actions according to the circumstances of different situations. For example, they should promptly follow up and process applications for temporary water supply at works sites before commencement of works;
 - (c) in consultation with the Department of Justice, consider the need for reviewing the level of penalties imposed on offenders convicted

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of unlawful water taking, with a view to enhancing the deterrence against such activities; and

- (d) adopt effective measures to enable users to have water supply through various proper channels and sources, so as to prevent unlawful water taking activities. These measures should include extending the network of sea water supply to areas without such supply, and proactively assisting estate management offices of residential developments to properly maintain their flushing systems, with a view to reducing the risk of system breakdowns and hence the occurrences of unlawful tapping of fresh water for flushing;

Inspection of unauthorised water consumption

- expresses dissatisfaction and finds it unacceptable that:
 - (a) the WSD has not allocated sufficient manpower to its Prosecution Unit ("PU") which only has an establishment of 13 staff and is responsible for conducting inspections and investigations of suspected unauthorised water consumption cases and instituting prosecution under the Waterworks Ordinance (Cap. 102) and the Waterworks Regulations. Moreover, the four ranks of staff in the PU, i.e. Chief Technical Officer, Waterworks Inspector, Assistant Waterworks Inspector and Customer Services Inspector, may not possess the necessary legal skills and expertise required for carrying out their prosecution work effectively;
 - (b) the PU only provided five training courses relating to unlawful taking of water and prosecution to WSD officers from January 2004 to July 2011 (including two half-day seminars, two sessions as part of the induction training for new recruits and one half-day talk), which may not be sufficient to equip its staff with the necessary knowledge for handling suspected unlawful water taking cases;
 - (c) some WSD officers did not comply with the WSD's guidelines to collect evidence when they discovered contraventions to the Waterworks Ordinance or the Waterworks Regulations, such as collecting evidence as far as possible and identifying the person who has committed the offence at the first instance, resulting in

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insufficient evidence for prosecution of the offence. Cases 4 and 5 in the Audit Report are examples;

- (d) there were too few surprise inspections of suspected unauthorised water consumption cases in comparison with the estimated unauthorised water consumption cases;
 - (e) the WSD did not document its risk-based strategy on selecting buildings and premises for conducting surprise inspections; and
 - (f) there was a significant reduction in the number of referral cases by government departments of unauthorised use of water at construction sites, from 23 in 2008 to 4 in 2010, representing a reduction of 83%;
- expresses serious concern that:
- (a) investigation officers of the PU sometimes took an unduly long time to submit investigation reports. From October to December 2010, in 13 out of 43 cases requiring termination of unauthorised connections, the investigation officers took 11 to 25 working days after the last inspections to report the findings to the Superintendent of the Unit; and
 - (b) district officers of the Customer Services Branch ("CS Branch") sometimes took a long time to complete the remedial action of terminating unauthorised water consumption. From October to December 2010, in 13 out of 43 cases, the district officers took more than 10 working days to complete the remedial action;
- acknowledges that:
- (a) the Director of Water Supplies has accepted Audit's recommendations in paragraphs 3.11, 3.19 and 3.29 of the Audit Report;
 - (b) the PU will arrange the uploading of training materials, including conviction cases, onto the WSD intranet for web-based training to improve training on handling suspected unlawful water taking cases for WSD officers. The WSD will review the training needs and modes in December 2012 for further enhancement as necessary; and

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- (c) the WSD has determined that upon completion of an investigation by the PU and if termination of unauthorised connection is required, the PU should notify the CS Branch within three working days from the date of completion of investigation for the latter's follow-up actions. The WSD will also set the time limits within which termination of unauthorised connections must be carried out;
- urges the Director of Water Supplies to:
 - (a) review the existing strategies for detecting and investigating suspected unauthorised water consumption cases and conducting surprise inspections, including allocation of resources and frequency of surprise inspections;
 - (b) immediately conduct a serious review of the PU, including its manpower strength, division of work and work procedures, and the legal skills and expertise of its staff with a view to enhancing the Unit's overall efficiency and the effectiveness of its prosecution work;
 - (c) regularly assess the training needs of WSD officers in handling suspected unlawful water taking cases and make improvement to staff training; and
 - (d) expeditiously set time limits within which termination of unauthorised connections must be carried out;

Management of water meter accuracy

- expresses dissatisfaction and disappointment that:
 - (a) the WSD has not conducted a review of the meter replacement strategy for large water meters (i.e. 25-millimetres ("mm") to 300-mm) since the last review in 1997. Neither has it adopted a risk-based strategy for determining the priority for meter replacement;
 - (b) the WSD has focused on replacing 15-mm water meters which are mainly used by domestic customers, but not the large water meters which are mainly used by non-domestic customers, despite that a high percentage of water charge revenue is related to large water meters;

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- (c) as of July 2011, 9% of the meters installed in government establishments had exceeded their optimal service lives; and
 - (d) as of July 2011, 6% of the 15-mm meters, 31% of the 25-mm to 100-mm meters, and 30% of the 150-mm to 300-mm meters had exceeded their optimal service lives of 12 years, 7 years and 4 years respectively;
- acknowledges that:
- (a) the Director of Water Supplies has accepted Audit's recommendations in paragraphs 4.18, 4.22, 4.28 and 4.34 of the Audit Report; and
 - (b) the WSD will periodically review the optimal replacement cycles of meters based on statistical test data. It will also conduct review to develop cumulative flow volume-driven replacement criteria for timely meter replacement to further improve the overall accuracy of the meters, and make use of data mining techniques to identify those meters reaching the set cumulative flow volume from the meter fleet for replacement;
- recommends that the Director of Water Supplies should:
- (a) adopt a risk-based approach in determining the priority for meter replacement, such as replacing the large water meters long overdue for replacement first, in view of the large amount of water charge revenue involved; and
 - (b) explore the appropriateness and feasibility of requiring non-domestic customers with large water meters to bear the cost of replacing the meters;

Performance reporting

- notes that, relating to enforcement actions, the WSD only included in its Controlling Officer's Reports performance indicators on the number of prosecutions and the total amount of fines imposed;

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- is surprised that:
 - (a) the WSD did not publicise its annual targets on meter accuracy in its Annual Reports and performance pledge booklets; and
 - (b) the WSD did not select large water meters for carrying out meter accuracy tests despite the fact that the water charge revenue of such meters accounted for 34% of the total water charge revenue in 2010-2011;
- acknowledges that the Director of Water Supplies has accepted Audit's recommendations in paragraph 5.10 of the Audit Report;
- urges the Director of Water Supplies to consider carrying out accuracy tests of large water meters periodically in view of their substantial water charge revenue; and

Follow-up action

- wishes to be kept informed of the progress made in implementing the various recommendations made by the Committee and Audit.