

Executive Summary

Direct Investigation into Water Supplies Department's Maintenance of Government Water Mains and Risk Management

Foreword

Water is a very precious resource in Hong Kong. In recent years there have been frequent incidents of water main bursts (both fresh and salt water mains). Those incidents have not only caused inconvenience to the public, but also resulted in huge waste of fresh or salt water.

2. Moreover, while the leakage rate of water mains in Hong Kong has decreased from 25% in earlier years to the current 15.2%, it still falls significantly behind other cities (such as Singapore (5%) and Lisbon (8%)). In the past six years, the total consumption of fresh and salt water in Hong Kong amounted to 5.8 billion and 1.6 billion cubic metres respectively, averaging more than 960 million and 270 million cubic metres respectively per year. If the Water Supplies Department (“WSD”) can manage to reduce the leakage rate in Hong Kong to, for example, Singapore’s 5%, it would mean an annual reduction of fresh and salt water loss by 96 million and 27 million cubic metres respectively, equivalent to 38,429 (in terms of fresh water) and 10,883 (in terms of salt water) standard-size swimming pools. Based on the data of fresh water consumption per capita, the amount of fresh water loss saved mentioned above could meet the demand of some 2 million people in Hong Kong for a year. Using the average cost of Dongjiang water over the past three years (HK\$5.5 per cubic metre), the expenditure saved would amount to HK\$530 million.

Our Findings

3. In 2000, WSD launched the Replacement and Rehabilitation Programme of Water Mains (“Replacement Programme”) to replace 3,000 kilometres of water mains in 15 years in phases. The number of water main bursts incidents have significantly reduced from 2,500 in 2000 to 88 in 2017. WSD’s effort in this aspect is no doubt commendable. However, the Replacement Programme was substantially completed at the end of 2015, and would not be followed by other replacement programmes of such a massive scale. Instead, WSD will monitor water main leakages through the Water Intelligent Network (“WIN”). Yet, based on WSD’s latest estimates, WIN will not be fully established until 2023.

4. This direct investigation reveals inadequacies on the part of WSD in three aspects, namely, minimising water main bursts, follow-up actions on cases of water main bursts, and reducing leakages.

(I) Minimising Water Main Bursts

(A) Failure to Target Hot Spots of Water Main Bursts for Monitoring and Follow-up Actions

5. At certain locations, incidents of water main bursts occurred several times within a few years. Shortly after WSD's repair works, the water mains burst again and seriously affected the residents in the neighbourhood. However, WSD has not targeted such recurrent bursts for intensive monitoring and follow-up actions.

6. Water main bursts are mainly attributable to aged water mains or quality of the pipes (accounting for 46.07% of all water main bursts). Nevertheless, it was not until December 2016 (i.e. over one year after commencement of this direct investigation) that WSD listed those locations with recurrent bursts as "hot spots" and started analysing the reasons behind and monitoring the progress in implementing improvement measures. We consider that WSD should continue to closely monitor those "hot spots" and prioritise its follow-up actions. For those "hot spots" located within major water supply zones, or where occurrence of water main burst could cause serious disruption to traffic, WSD should give a higher priority in taking follow-up actions.

(B) Lack of Deterrent Penalty against Public Works Contractors for Damaging Water Mains

7. Between 2012 and 2017, WSD recovered compensation in 66 cases of damage to water mains caused by public works contractors. The total compensation amount was around \$2.07 million, or \$31,000 per case on average. We consider WSD's civil claims to be lacking in deterrent effect. It should remind all works departments concerned that for contractors who cause damage to water mains, such poor performance should be properly reflected under their existing evaluation systems for contractors. For those contractors who cause damage repeatedly, works departments should even consider rating their overall performance as poor, so as to limit their future opportunities of being awarded public works contracts.

(C) Ambiguous Assessment Criteria Regarding Risk of Damage of Water Mains

8. Using a risk-based approach, WSD's special inspection team selects road works projects into its inspection programmes. We have examined the relevant guidelines and found that WSD has not drawn up clear and objective criteria for assessing the risk of damage of water mains (e.g. whether the water mains concerned are prone to damage, the significance of the water mains). If the guidelines are unclear, inconsistencies may arise and some of the water mains that require inspection may be left out inadvertently.

(II) Following up on Cases of Main Bursts

(A) Lack of Performance Targets on Resumption of Salt Water Supply

9. While WSD has set performance targets on the time required for resuming fresh water supply, it has not done so for salt water main bursts. We noticed that the time required to resume salt water supply tended to last much longer than that for fresh water supply. In this light, we consider that WSD should study whether there is a need to set performance targets on the resumption of salt water supply and its feasibility. It should also examine the reasons behind the longer time required for resuming salt water supply, with a view to initiating and implementing improvement measures.

(B) Performance Targets Too Complicated

10. WSD's performance targets on handling cases of main bursts, and its performance in meeting those targets as presented on its website, are unclear and difficult to comprehend. For example, on the performance target of "maximum duration of supply interruption due to fresh water main burst", WSD's achievement rate of the target "85% cases within 8 hours" was 96.26%. The information looks baffling at first glance. What WSD actually meant was that only 81.82% (85% x 96.26%) of the cases could resume fresh water supply within 8 hours. We consider that Government departments should set and present clear performance targets for easy understanding to facilitate monitoring by the public.

(III) Reducing Leakages in Water Mains

(A) WSD Should Actively Examine and Introduce the Latest Leak Detection Technologies and Strengthen Water Pressure Management

11. In recent years, cities that excels in monitoring water supply facilities are using latest technologies in leak detection and water pressure management to minimise water main leakages. For example, Singapore adopts acoustic technology to proactively survey underground leaks. It also implements measures such as analysing leak data in preventing leaks in the water mains. We consider that WSD should keep abreast of the latest technologies and strive to double its efforts in the aspects of survey, leak detection technologies and water pressure management, so as to further reduce our leakage rate.

(B) WSD Should Set Performance Targets on Reducing Leakage Rate and Regularly Publish the Latest Leakage Rate to Facilitate Public Monitoring

12. WSD should set targets in further reducing the leakage rate of water mains (e.g. gradual reduction to 5% or even lower) and implement improvement measures for achieving the targets. Besides, WSD should publish regularly the latest leakage rate and its target leakage rate to facilitate public monitoring.

(C) No Comprehensive Measures Following the Replacement Programme to Ensure Stability of Water Supply Network

13. In 2015, WSD completed the Replacement Programme after replacing 3,000 kilometres of water mains. Thereafter, WSD will monitor water main leakages through WIN. However, based on WSD's latest estimates, WIN will not be fully established until 2023.

14. Water mains not covered in the Replacement Programme will further age and deteriorate. WSD should make reference to the successful experience of other cities in making ongoing assessment regarding risk of bursts and leakages and, where necessary, replace water mains with high risk or repeated bursts and leakages. Moreover, WSD should expedite the establishment of WIN and keep a close watch on its progress while implementing various measures to maintain the stability of our water supply network.

Recommendations

15. In light of the above, The Ombudsman makes ten improvement recommendations to WSD:

Minimising Water Main Bursts

- (1) to monitor closely the main burst "hot spots", prioritise its follow up works, and actively carry out improvement works;
- (2) to remind works departments of the need to reflect the poor performance of any contractors who have damaged water mains in their evaluation reports in order to exert a greater deterrent effect;
- (3) to revise the guidelines for inspection of road works and set out objective criteria for planning inspections;

Following up on Water Main Bursts

- (4) to examine the reasons for the longer time required for resuming salt water supply, and initiate and implement improvement measures;
- (5) to consider setting performance targets on the time required for resuming salt water supply after main bursts;
- (6) to review and simplify the performance targets for follow-up actions on cases of water main bursts;

Further Reducing Leakage Rate of Water Mains

- (7) by making reference to the successful experience of other cities, to further reduce the leakage rate of water mains in Hong Kong;
- (8) to set targets for reducing the leakage rate and publish regularly the latest leakage rate to facilitate public monitoring;
- (9) during the establishment of WIN, to implement measures to maintain the stability of water supply network; and
- (10) to expedite the full implementation of WIN.

**Office of The Ombudsman
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