For information

Legislative Council Panel on Development

Follow-up Action to Meeting on 17 April 2012

9345WF – Planning and investigation study of desalination plant at Tseung Kwan O

Further to the meeting of Panel on Development held on 17 April 2012, we provide below the requested information on measures in place for promoting water conservation and water saving, as well as enhancement in water leakage control and prevention of water mains bursts, including the latest progress of the Replacement and Rehabilitation Programme of water mains in the ensuing paragraphs.

Measures in place for promoting water conservation and water saving

2. We have been promoting water conservation as a key element of the Total Water Management strategy, which we promulgated in 2008. The strategy put emphasis on containing growth of water demand through implementation of various water conservation and water saving measures.

Public Education Campaigns

3. We consider there is possible scope for reduction in water consumption and this could be achieved through public education campaigns and the use of water saving devices. In addition to enhancing our on-going water conservation publicity and public education activities, we also target education at the younger generation to encourage them to appreciate the need for water conservation. Since 2009, we have launched the water conservation campaigns entitled "Water Conservation Starts from Home" and school water audit for primary school students. We have also distributed an information kit and a school water audit handbook to all primary schools, and organised annually the "Water Conservation Ambassador Selection Scheme" for primary school students. We published and distributed a set of booklets as a teaching kit for liberal studies of the secondary school curriculum and have been conducting talks and roving exhibitions at schools throughout the school year.

4. In 2010-11 we organised a competition calling for creative water saving ideas from the property management sector, catering services and students of tertiary education institutes. In 2011-12 we changed the target

contestants to households and secondary school students. Furthermore, we will start to set up a dedicated team in WSD to oversee the formulation and implementation of water conservation measures, including –

(a) extension of the "Water Efficiency Labelling Scheme";
(b) implementation of new promotion campaigns in the community to strengthen public education; and
(c) promotion of water conservation to the relevant industries.

5. As a further step to strengthen public education on water conservation, we are planning to establish a water conservation education centre. The centre will exhibit relevant information on water resources, water supply infrastructures and the protection and effective uses of water resources.

Promoting Use of Water Saving Devices

6. We have established a technical standard for water saving devices and have been implementing the voluntary "Water Efficiency Labelling Scheme" (WELS) progressively for various plumbing fixtures and appliances to facilitate the public to select appropriate water saving devices. The WELS on showers for bathing, water taps and washing machines have been implemented since September 2009, September 2010 and March 2011 respectively. We have just launched the WELS on urinal equipment in March 2012. At present, the products registered under the WELS comprise 178 models of showers for bathing, 102 models of water taps and 56 models of washing machines.

7. To promote water conservation in the Government, we have commissioned a consultancy study to review the water consumption practice in Government facilities and develop water saving guidelines for these facilities without compromising the level of services to the public. Moreover, since 2009, we have launched a programme for retrofitting Government buildings and schools with water saving devices.

Measures in place for enhancement in water leakage control and prevention of water mains bursts

8. To enhance leak detection as a preventive measure to reduce main burst, we have migrated from the traditional waste detection based leak

detection[1] to the proactive burst prevention based leak detection[2] with the advancement of technology.

9. Firstly, GSM noise loggers with wireless data transmission capability have been installed at selected critical pipe sections for continuous monitoring of the flow condition and providing prompt for attending to possible leakage.

10. Secondly, to keep pace with the advancement in technologies, we have continued to explore new leak detection technologies to strengthen our ability in leak detection.

11. We completed a pilot scheme on the new "Sahara" technology in February 2011 for detecting leaks on in-service pressurized water mains. The technology makes use of tethered instrument comprising a CCTV camera and an acoustic sensor for insertion via an access point into a water main not less than 300 mm in diameter to inspect its internal conditions or detect leakage points. The technology has been proved to be very effective in locating leakage points, but the cost is very high.

12. We have also arranged a site trial of the "Smartball" technology in December 2011. It is another new technology for detecting leaks on in-service pressurized water mains. The technology makes uses of an aluminum alloy core containing an acoustic sensor, which is then inserted into and travel along water main not less than 300mm in diameter to detect anomalous acoustic activity associated with leaks. The trial has been successful in detecting leakage points. Although it is cheaper than the "Sahara" technology, its cost is still on the high side. We will continue searching for comparable alternatives worldwide in a bid to drive down the cost through competitive tendering should these technologies be adopted as regular tools for leak detection.

13. Thirdly, leak detection by Leak Noise Correlator has achieved good improvement as specialist contractors/suppliers keep on refining the algorithm of the equipment to filter off background and traffic noise and improving the accuracy on leak detection. We have conducted site trials of a new Leak Noise Correlator, AquaScan TM which has been proved to perform more effectively on leak detection for non-metal pipe and large diameter pipe. We have

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[1] Waste detection based leak detection is the detection of water loss in a selected water supply zone with follow up search for leakage spots within the supply zone.

[2] Proactive burst prevention based leak detection is the direct checking of water mains for locating leakage points on the water mains. Critical water main sections are often closely monitored under such an approach. The more advanced technology also includes an appraisal of the general condition of the water mains inspected.

procured the equipment to strength our ability in leak detection. The advanced leakage control, monitoring and detection works are illustrated in **Annex 1**.

14. We have been trying out a new performance-based leak detection contract to incentivise specialist leak detection contractors to detect leaks and the initial results are promising.

15. Pipe leakage is closely correlated to the water pressure in the pipe. Pressure management is a proven means to reduce leakage and hence water main bursts. We have therefore been implementing pressure management schemes in suitable locations over the whole territory in earnest.

Latest progress of the Replacement and Rehabilitation Programme of water mains

16. We have made good progress in the staged implementation of the 15-year Water Mains Replacement and Rehabilitation (R&R) Programme which aims at replacing/rehabilitating 3000 kilometres of old watermains. Works under stages 1 and 2 have been completed while works under stage 3 and 4 are actively under way. Up to the end of March 2012, a total of 1,770 km of pipes have been replaced/rehabilitated.

17. With the R & R works completed to-date, coupled with the implementation of leakage control and pressure management measures, the annual number of bursts has reduced from the peak of about 2,500 in 2000-01 to about 320 in 2011-12 as shown in **Annex 2**. The water main leakage rate has also been reduced from 25% in 2001 to 19% in 2011. We anticipate that the water main leakage rate will further decrease to 15% upon completion of the R & R programme by the end of 2015.

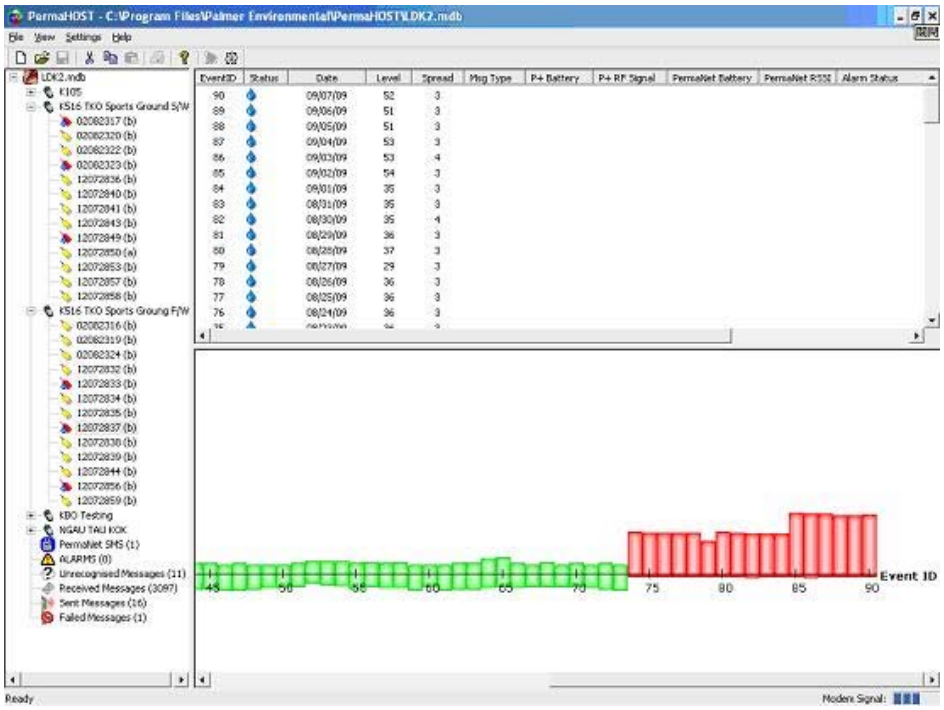
Development Bureau
Water Supplies Department
May 2012

Advanced Leakage Control, Monitoring and Detection Works

I. Locating leak with Noise Loggers

Typical Equipment

Typical Set-up



Illustrative Result

Note:

The bar above the horizontal axis represents the main noise level. The bar below the horizontal axis represents the spread of the noise level distribution. A high main noise level and narrow noise spread indicates a possible leak and is highlighted in red. A low main noise level and wide noise spread indicates “no leak” and is highlighted in green.

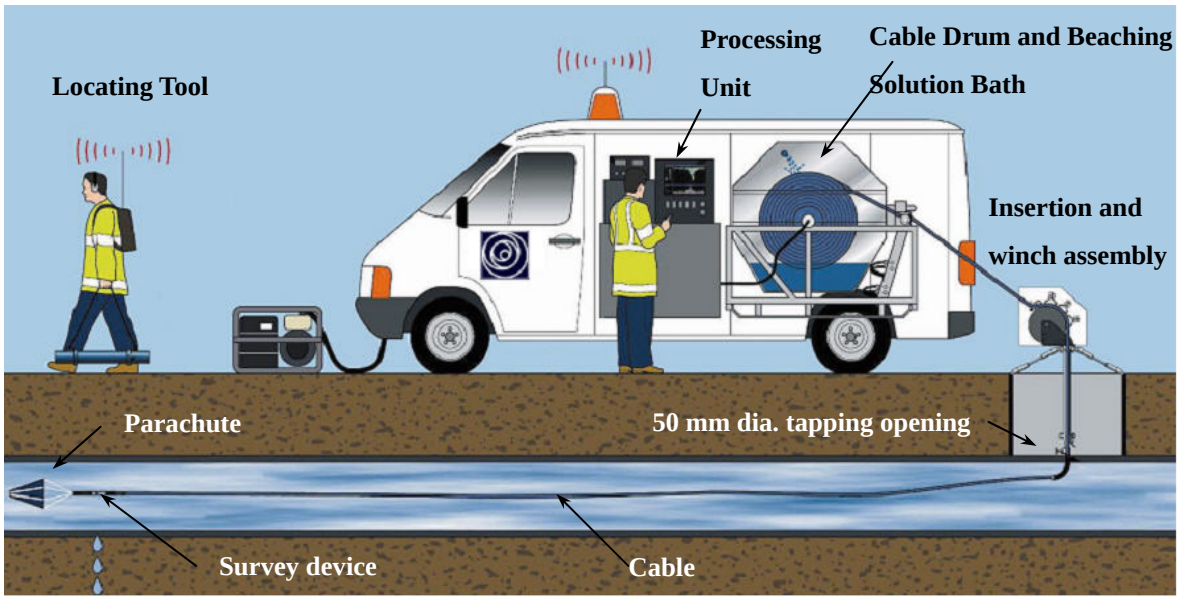
II. New Technologies for Condition Assessment of Water Mains

A. Sahara

The new technology is a non-destructive, condition assessment tool that is used to inspect the interior and detect leaks in large diameter (300 mm dia. and above) pressurised water mains without interruption of service.

The system will be able to operate in an in-service pressurised water main by insertion of a cable with the survey device (a CCTV camera or acoustic sensor) through any tapping opening that is at least 50 mm in diameter. Under the flow of water, the parachute at the front end of the cable will carry the survey device and cable through the section of water main to be surveyed, providing real-time inspection of the internal conditions of the water main and detection of any leak in the water main. The position of defect or leak can then be marked on the ground surface, facilitating subsequent repairs.

Since the cable is connected to the control equipment on the ground surface and can be controlled to permit halting of the survey device at any position, it not only transmits the survey signal in real time, but also increases substantially the sensitivity, accuracy and effectiveness of detecting defects or leaks.

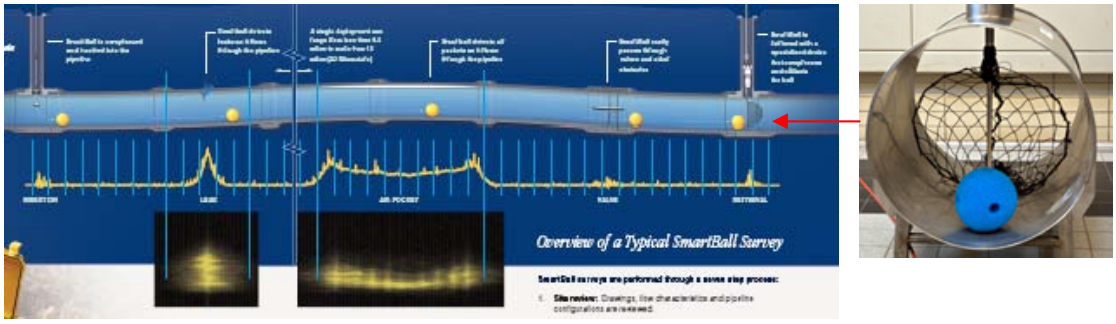


Typical Set-up of the System

B. Smartball

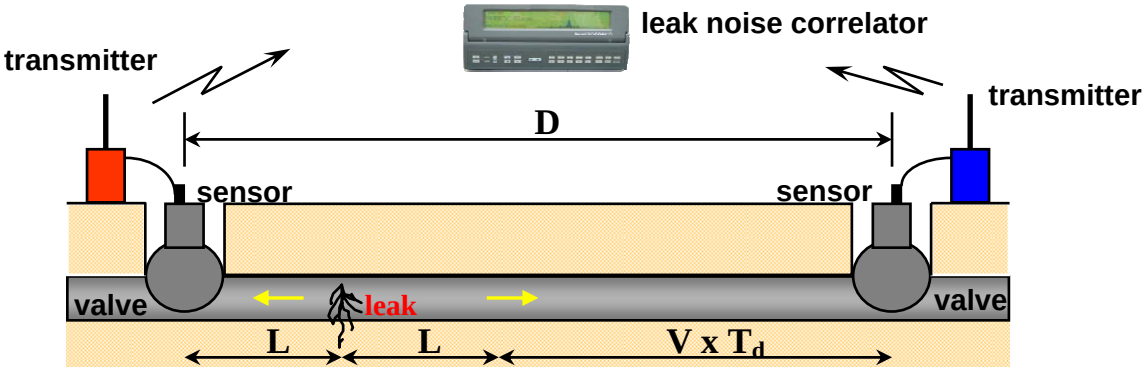
Smartball is another new technology which is also a non-destructive, condition assessment tool that is used to detect leaks in pressurised water mains (300 mm dia. and above) without interruption of service.

It is a free-swimming foam ball with an instrument-filled (including an acoustic sensor, tri-axial accelerometer, tri-axial magnetometer, GPS synchronised ultrasonic transmitter, and temperature sensor) aluminum alloy core capable of detecting and locating very small leaks and gas pocket in pipelines. The system will be able to operate in an in-service pressurised water main by insertion of the above foam ball through any tapping opening that is at least 100 mm in diameter. The ball travels with the water flow, collecting information about leaks along the section of water main to be surveyed. The acoustic sensor can clearly discern the acoustic activity associated with leaks. This data is recorded and post-processed to report the presence and location of leaks. It calculates the locations of leaks by detecting acoustic pulses emitted by the ball at receivers attached to pipe appurtenances.



Overview of a Typical Smartball Survey

III. Pinpointing Leak with Leak Noise Correlator



Pinpoint Leak Location in a Pipe

Note:

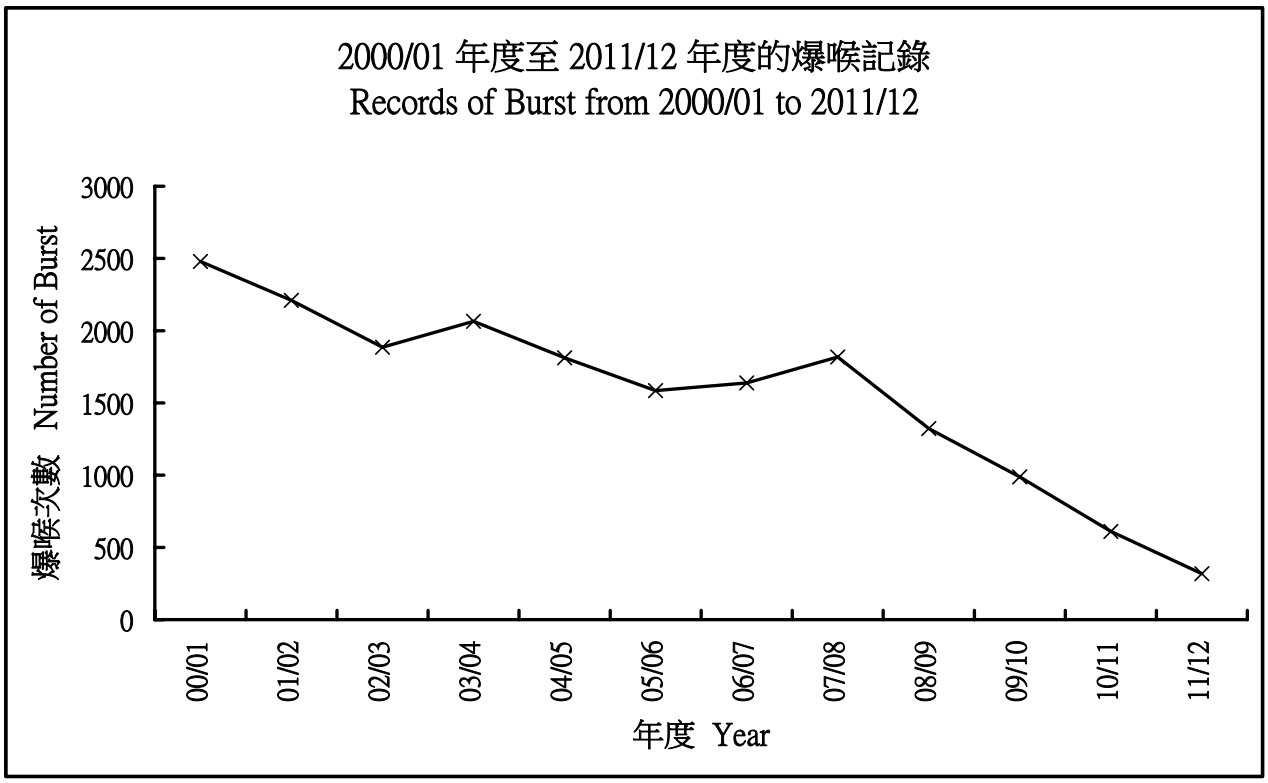
(1) A leak noise correlator is used to pinpoint the location of a leak along a section of water main of any size without interruption of service. Two sensors are deployed on the valves on either side of the suspected leak location. Before carrying out the pinpointing by using leak noise corrector, the distance between the two sensors (D), pipe diameter and the pipe material are required to be input to the leak noise corrector.

(2) When there is a leak, the leak noise will propagate along the water main and reach the two sensors with a time difference T_d, and then to the correlator via the transmitters. A correlation peak will be shown on the display screen of the correlator, indicating a possible leak.

(3) The leak position is calculated by the correlator using the formula $L = (D – V \times T_d) / 2$, where T_d is the time difference and V is the sound velocity along the water main based on the input data.

Taking Measurement

附件 **2** **Annex 2**


2000/01 年度至 2011/12 年度的爆喉記錄
Records of Burst from 2000/01 to 2011/12
爆喉次數 Number of Burst
3000
2500
2000
1500
1000
500
0
00/01
01/02
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04/05
05/06
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