

# LCQ20: Prevention of water mains bursts

Following is a question by the Hon Yang Wing-kit and a written reply by the Secretary for Development, Ms Bernadette Linn, in the Legislative Council today (January 10):

Question:

It is learnt that incidents of water mains burst occur from time to time in Hong Kong, causing serious traffic impact and inconvenience to passers-by, and many members of the public are worried about the hidden dangers of water mains bursts. In this connection, will the Government inform this Council:

(1) of the number of water mains burst incidents in each of the 18 districts in Hong Kong in each of the past three years, and the following information in relation to such incidents: (i) the locations, (ii) the causes of the incidents, (iii) the year in which the relevant water mains were installed, (iv) the burst record of the water mains prior to the incidents, (v) the year in which the water mains were last replaced or repaired, and (vi) whether the water mains have been included in the District Metering Areas (DMAs) of the Water Intelligent Network (WIN);

(2) of the current coverage of DMAs of WIN and the progress of the works, and whether it has assessed the effectiveness of WIN in monitoring water mains bursts; if so, of the details; if not, the reasons for that;

(3) of the list and timetable of works projects included in the Risk-based Improvement Programme of Water Mains, with a breakdown by District Council district and project progress (i.e. (i) those for which replacement or rehabilitation works have been completed, (ii) those for which the relevant improvement works have commenced, and (iii) those under planning);

(4) of the follow-up situation of the "main burst hot spots" (i.e. locations with repeated water main bursts) in each of the 18 districts in Hong Kong in each of the past three years, and the longest, shortest and average time taken to complete the improvement works at such main burst hot spots; and

(5) as it is learnt that the Drainage Services Department has introduced a remotely operated pipeline inspection robot to assist in the investigation of the condition of underground drains, whether the authorities have used pipeline inspection robots to investigate the condition of water mains, and introduced other latest leak detection technologies to strengthen water pressure management; if so, of the details; if not, the reasons for that?

Reply:

President,

The Water Supplies Department (WSD) has all along been committed to providing the public with reliable, sufficient and quality water supply. Through continuous improvement in asset management and making good use of technology, the WSD strives to ensure the effective operation of the water supply networks.

From 2000 to 2015, the WSD carried out a territory-wide replacement and rehabilitation of water mains programme to replace and rehabilitate about 3,000-kilometre long aged water mains (including fresh and salt water mains), thereby raising the healthiness of the water supply networks.

Since 2015, the WSD has implemented multi-pronged measures, including adopting a "risk-based asset management programme for water mains" by introducing factors such as age of use, materials, past records of bursts or leaks, surrounding environment and consequence resulting from bursts or leaks, for assessing the risk of water mains so as to replace or rehabilitate specific sections of water mains with higher risk progressively with a view to continuously maintaining the healthiness of the water supply networks and reducing the risks of water main bursts or leaks.

Besides, the WSD is establishing approximately 2 400 Water Intelligent Network (WIN) district metering areas (DMAs) within the fresh water distribution networks in the territory. In addition to monitoring leakage in the networks to timely carry out maintenance works for damaged mains, the risks of main bursts or leaks can be reduced by detecting and adjusting water pressure through the pressure management devices installed in the WIN.

The WSD has also established a "main burst hotspot" mechanism. If more than one main burst (with diameter of 150 millimetres or above) occurs within a 400-metre long road section in two years, the WSD will designate the location as a "main burst hotspot" and arrange for expedited replacement or rehabilitation of the concerned water main so as to reduce the risk of recurrent main bursts.

The above measures can effectively manage the condition of water supply networks and facilitate targeted measures (such as replacement, rehabilitation, pressure reduction) for high-risk water mains so as to reduce the risks of main bursts or leaks. In fact, the situation of main bursts and leakage has been continuously improved in recent years.

Through the abovementioned multi-pronged measures and with efforts over the years, the number of annual main burst cases has been greatly reduced from around 2 500 in 2000 to 30 cases in 2023 (as of November 30). In the same period, the leakage rate of fresh water mains has also dropped from over 25 per cent to around 14 per cent.

The replies to various parts of the Hon Yang's question are as follows:

(1) In the past three years, the WSD recorded a total of 95 main burst incidents, and their distribution is tabulated in Annex 1. Most of the water

mains involved were aged ones laid in the 1990s or earlier without any previous burst records. The remaining main burst incidents were mainly caused by accidents during excavation works. At present, the concerned water mains have been included in the monitoring scope of the "risk-based asset management programme for water mains" and/or the WIN.

(2) By end-2023, the WSD has established around 1 960 DMAs (out of around 2 400 DMAs) covering all districts across Hong Kong. Their distribution is tabulated in Annex 2. The remaining DMAs are expected to be completed in around 2025.

(3) As of 2023, a total of approximately 490km long water mains has been included in the "risk-based asset management programme for water mains". Amongst them, approximately 185km long water mains have been replaced or rehabilitated while the improvement works for the rest are underway or will be progressively carried out. The relevant figures by district are tabulated in Annex 3.

(4) Currently, "main burst hotspot" water mains improvement works are being carried out in various districts. During the period of 2021 to 2023 (as of November 30), the WSD has completed a total of 21 "main burst hotspot" improvement projects. The number of hotspots and the distribution of improvement works by district are tabulated in Annex 4. Regarding the construction period, some hotspots located at busy road sections and in the vicinity of residential areas involve relatively complex temporary traffic arrangements and different construction constraints (e.g. time window for construction and arrangements for water supply suspension), hence requiring longer time for planning and construction. Based on past records, the shortest time for planning and construction was around two years, the longest was around seven years, with an average of some four years.

(5) The WSD has all along been making reference to and adopting globally prevailing advanced leakage detection measures and technologies for continuous monitoring of the situation of water main leakage, including the application of acoustic investigation for leakage detection, installing noise loggers, at busy road sections and important water mains.

Besides, the WSD has conducted on-site tests at specific locations on in-line inspection robot, utilising image processing algorithms and ultrasonic probes to inspect the interior water main surfaces for assessing the health conditions of the water mains. In addition, the WSD is collaborating with the research team of local university to explore feasible ways to enhance the robotic technologies for inspection of water mains, including a more convenient and efficient approach for enabling robots to enter water mains, as well as incorporating artificial intelligence for automating the inspection of the water main surfaces, so as to enhance the efficiency of leakage detection.