

LCQ15: Stepping up monitoring of underground water mains

Following is a question by the Hon Leung Man-kwong and a written reply by the Secretary for Development, Ms Bernadette Linn, in the Legislative Council today (February 26):

Question:

It is learnt that there has been a rising trend in the number of road subsidence incidents on public roads occurred between 2021 and 2023. In addition, a few major road subsidence incidents also occurred in 2024, and in one such incident which took place at Lai Chi Kok Road in Cheung Sha Wan, a taxi fell into a pit and almost caused casualties. In this connection, will the Government inform this Council:

(1) of the total number of road subsidence incidents recorded in the whole year of 2024, as well as the location, cause and number of persons affected in each incident;

(2) given that two serious road subsidence incidents occurred in Sham Shui Po District between May and September 2024, whether the authorities have assessed if the district is a high-risk area for road subsidence; whether the authorities conducted inspections and repairs for the underground water mains at the locations of the road subsidence incidents 12 months prior to the occurrence of the two incidents;

(3) given that the Water Supplies Department completed the Risk-based Improvement Programme of Water Mains in 2015 to replace and rehabilitate aged water mains of about 3 000 kilometres, and has implemented the risk-based asset management programme for water mains since 2015 to replace or rehabilitate specific sections of water mains assessed to be of higher risk, whether the underground water mains at the locations of the two road subsidence incidents mentioned in (2) have been included in the latter programme; if not, whether the authorities will include the underground water mains concerned in the latter programme in the future for replacement and rehabilitation; and

(4) given the frequent occurrence of extreme weather in recent years, whether the authorities have stepped up the monitoring of underground water mains facilities in the past year?

Reply:

President,

Generally speaking, the main causes of road subsidence include damage to underground pipes (e.g. water mains and drainage pipes), resulting in soil

surrounding the pipes being washed away or soil and water flowing into the pipes through cracks and being carried away respectively; and improper handling of foundation works in sites adjoining roads (in particular those sites involving deep excavation and lowering of groundwater level), resulting in soil and water of the road base flowing into the excavation area of the works, creating voids. If the filled materials are not properly backfilled and compacted after road excavation works, the road surface may subside as a result of settlement of the underlying soil after being driven over by vehicles.

In consultation with the Transport and Logistics Bureau and the relevant departments, the reply to various parts of the question raised by the Hon Leung is as follows:

(1) In 2024, the Highways Department (HyD) received a total of 19 cases of road subsidence on public roads, a decrease compared to 2023. Details of the cases are shown in the Annex. In response to road subsidence incidents affecting road traffic, the relevant departments had promptly arranged temporary traffic measures and repaired the damaged road surfaces so as to resume the traffic to normal as soon as possible, minimising the impact of the incidents on the public.

(2) Regarding the road subsidence cases that occurred in Sham Shui Po District last year, as shown in the Annex, they were caused by individual factors leading to the subsidence. Therefore, it does not necessarily indicate the presence of the same road subsidence risk in the underground environment of that district.

The Water Supplies Department (WSD) would inspect the underground water mains under its maintenance approximately every 18 months. Based on the inspection results, maintenance works would be carried out in a timely manner to reduce the risk of water mains burst or leak.

Two road subsidence incidents occurred in Sham Shui Po District on May 31 and September 29, 2024 at Hai Tan Street and Lai Chi Kok Road respectively. As there was no underground water mains managed by the WSD and in service at the road subsidence location at Hai Tan Street, the WSD did not conduct inspection or maintenance works for any water mains there in the preceding 12 months before the incident. As for the road subsidence location at Lai Chi Kok Road in Sham Shui Po, the WSD inspected the underground water mains in April 2024 and no irregularities were identified during the inspection.

(3) 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 kilometres long aged water mains (including fresh and salt water mains), raising the operational effectiveness of water supply networks.

Since 2015, the WSD has implemented multi-pronged measures, including implementation of risk-based asset management programme for water mains by assessing the risk of water mains based on a number of factors such as period

of usage, material, past burst or leak records, surrounding environment and consequence resulting from burst or leak, to replace or rehabilitate individual pipe sections with higher risk progressively, continue to enhance the overall healthiness of the water supply networks, and reduce the risk of water main bursts or leaks. As at December 2024, a total of approximately 540km long water mains have been included in the programme in which approximately 235km long water mains have been replaced or rehabilitated.

As mentioned in item (2) above, there was no underground water main managed by the WSD and in service at the location of road subsidence at Hai Tan Street. Regarding the road subsidence incident at Lai Chi Kok Road, the subject water main was a 300mm diameter cast iron pipe laid at a depth of about 1.5 metres below the ground in the 1960s. There have been no record of burst and leak in the past, and the inspection conducted by the WSD in April 2024 did not reflect any abnormalities. Therefore, this water main has not been included in the programme and accorded with a higher priority for replacement in the past.

The WSD has reviewed the mechanism of the programme to assess the weighting of the factors contributing to the risk of water main burst or leak. Specifically, we will increase the weighting assigned to factors involving the aged pipe materials (including cast iron pipes and pipes used more than 60 years), and the severity of the consequences for incidents occurring in water mains located at the major road sections, and reassess the risk of all water main bursts or leaks. This reassessment aims to prioritise the replacement or rehabilitation of the water mains at risk of bursting or leaking, expediting the replacement or rehabilitation of the above-mentioned cast iron water pipes commonly used in older designs. This proactive approach aims to avoid serious impact on traffic in the event of pipe burst.

In addition, to speed up the implementation of the works, the WSD set up an inter-departmental task force under the chairmanship of the Director of Water Supplies at the end of last year. The task force includes representatives from various relevant departments such as the Development Bureau, the WSD, the Transport Department, the HyD, the Hong Kong Police Force, the Environmental Protection Department, and the Home Affairs Department. They collaborate to discuss and formulate temporary traffic arrangement schemes and implementation programme, etc, related to the replacement of water mains, and formulate contingency plans earliest to minimise the potential impact of the projects on traffic and the public.

(4) In general, if the road surface and road base are in normal condition, heavy rain itself will not cause road subsidence or interference with underground water mains. Nevertheless, the WSD is establishing approximately 2 400 Water Intelligent Network (WIN) district metering areas (DMAs) within the fresh water distribution networks in the territory (covering appropriately 80 per cent of the fresh water distribution networks) which facilitate detection of leakage of water mains and adjustment of the water pressure of the water mains to reduce the risks of water main burst or leak. As of end December 2024, the WSD has completed the establishment of about 2 360 DMAs and the remaining works are anticipated to be completed by the first

quarter of 2025.

The WSD has commenced the enhancement of WIN, focusing on the following two aspects:

- (i) The WSD will expand the monitoring area of WIN to include fresh water trunk mains and the remaining part of the fresh water distribution mains (covering appropriately 20 per cent of the fresh water distribution networks) that are currently not covered by WIN by adding sensors to monitor water flow and pressure at strategic locations to provide more comprehensive coverage of the fresh water supply network.
- (ii) On the other hand, the WSD has started upgrading the functions of the existing WIN, which includes upgrading the sensors used for monitoring the water flow and pressure in phases to collect real-time data with a view to speeding up detection of any abnormal conditions in the pipe network.

The above expansion and upgrading work are expected to be completed in phases starting from the second quarter of 2025, with the entire project scheduled for completion by 2027.

The WSD would also study the use of advanced technologies, such as acoustic detection and optical fiber, to monitor underground water mains to facilitate early detection of leakage situations.

In addition, the WSD has strengthened emergency management of water supply incidents. The WSD has strengthened its communication mechanisms with various stakeholders through setting up instant messaging platforms to enhance communication with relevant departments and local parties including District Offices, District Council members and Care Teams. In the event of significant water supply incidents, timely updates on the latest information regarding the incident, temporary water supply locations, as well as the locations of water tanks and water wagons, can be rapidly disseminated. The WSD has also developed clear internal guidelines that outline specific factors to be considered for emergency repair of water mains and associated time required, ensuring more accurate communication of anticipated water resumption time and allowing local residents to make appropriate preparations.