LCQ3: Assessment and forecast of and coping with extreme weather

Following is a question by the Hon Chung Kwok-pan and a reply by the Secretary for the Environment, Mr Wong Kam-sing, in the Legislative Council today (August 18):

Question:

It has been reported that Zhengzhou City of Henan Province was hit by once-in-a-millennium rainstorms last month, resulting in the roads and underground railway conduits at a number of places being inundated and inflicting heavy casualties; and a number of European countries have also been devastated recently by floods of the century, which caused heavy casualties and economic losses. Regarding the Government's work on assessment and forecast of, and coping with, extreme weather, will the Government inform this Council:

(1) whether the rainfall and frequency of rainstorms in Hong Kong in the past five years have shown an upward trend; if so, of the details;

(2) whether the Hong Kong Observatory (HKO) has plans to enhance its capability of forecasting extreme weather (especially severe rainstorms) so that HKO can issue alerts to members of the public as early as possible, and whether the relevant government departments will strengthen the liaison among themselves in order to make good preparations for coping with the disasters caused by extreme weather; whether it has assessed the trend of extreme weather occurring locally in future and the risks of underground facilities and coastal buildings being inundated; and

(3) given that HKO will issue the Black Rainstorm Signal when it has recorded or expects very heavy rain with rainfall of or exceeding 70 millimetres in an hour, but the rainfall of the rainstorms hitting Zhengzhou City exceeded 200 millimetres in an hour, whether the existing public facilities in Hong Kong such as the public stormwater drainage systems can cope with rainstorms of the latter's magnitude; whether the Government will allocate additional resources to enhance the flood prevention capacity of public facilities and expedite the elimination of the existing four flooding blackspots in the territory?

Reply:

President,

In consultation with the relevant bureaux and departments, I provide a reply to the various parts of the question as follows:

(1) According to the data of the Hong Kong Observatory (HKO), in the past five years, i.e. 2016 to 2020, the annual average total rainfall in Hong Kong

was about 2 500 millimetres (mm). The highest rainfall of around 3 000 mm was recorded in 2016, while the lowest rainfall of around 2 100 mm was recorded in 2018. The annual average number of days with heavy rainfall, i.e. days with hourly rainfall exceeding 30 mm, was about six. The annual rainfall figures and the number of heavy rain days in the past five years do not indicate an upward or downward trend. On the other hand, the number of heavy rain days per year has been on the rise since records were available from 1884 up to 2020.

(2) and (3) In the long run, extreme weather conditions are expected to become more frequent due to climate change. The HKO currently makes use of its nowcasting system to forecast rainstorms. The nowcasting system has been upgraded continuously through the adoption of various technologies, including artificial intelligence, with a view to enhancing its forecasting capability. Since 2020, the HKO has provided real-time automatic nowcast of regional heavy rain to the Drainage Services Department (DSD). In addition, the HKO plans to make use of more advanced computing facilities to provide more detailed local weather forecasts with a view to further enhancing its capability in forecasting extreme weather conditions.

The HKO has been disseminating rainfall-related information through multiple channels to facilitate preparation by the public. Relevant weather alerts include Rainstorm Warnings, Special Weather Tips, Probability of Significant Rain and Nine-Day Weather Forecast. In May this year, the HKO launched the Localised Heavy Rain Advisory service which advises the public of localised heavy rain in advance based on recorded rainfall and rainfall forecasts from the nowcasting system.

Separately, the Government will act in preparedness, response and recovery in accordance with the Contingency Plan for Natural Disasters to guard against the natural disasters by enhancing situation assessment at the early stage, devising the response strategy and plan as well as redeploying resources and manpower in a timely manner. In the event of torrential rainstorm or severe flooding where extensive Government emergency response operations are required, the Emergency Monitoring and Support Centre will be activated to provide a more comprehensive response.

After Super Typhoon Mangkhut battering Hong Kong in September 2018, the Government has conducted an inter-departmental review of the handling mechanism to improve Hong Kong's preparedness, emergency response and recovery efforts for future super typhoons or other natural disasters of a substantial scale. One of the new measures is that in the event of a super typhoon or other natural disasters of a substantial scale and if there are special circumstances and where necessary, an inter-departmental Steering Committee for Handling Super Typhoons or other natural disasters of a substantial scale chaired by the Chief Secretary for Administration will be set up to ensure that all stages are co-ordinated and supervised by one single high-level body, and to set priorities in a co-ordinated manner so that the available resources can be effectively utilised. The Security Bureau also holds an inter-departmental desk-top exercise annually after the review of Super Typhoon Mangkhut, which is conducive to better preparedness and

enhanced collaboration among bureaux, departments and relevant organisations.

There is a distinct difference in geographical environment between Hong Kong and Zhengzhou which is located inland. Hong Kong is a coastal city, and it usually takes only a few hours for rain water to be quickly discharged into the sea. It is less likely for severe flooding to last for several days even if there are torrential rainstorms. The flood protection standards in Hong Kong are formulated with reference to international standards and are subject to review in tandem with latest developments. Such standards are used for the planning and design of the public stormwater drainage systems in Hong Kong, and are adopted having regard to factors such as land use, socio-economic needs, consequences of flooding and benefit-cost analysis of flood mitigation measures.

In order to reduce the risk of inundation of facilities and buildings, the DSD has conducted various flood control strategy studies since the 1990s, and has completed the drainage master plan studies and the drainage studies in phases. A number of drainage improvement projects have also been implemented, which have substantially improved our flood control capacity. To cope with latest land developments in various districts, the change of land use and the challenges brought by climate change, the DSD has been conducting studies in phases since 2008 to formulate and review the drainage master plans of major districts and has implemented a series of drainage projects.

The DSD adopts a "three-pronged approach" of "stormwater interception at upstream", "flood storage at midstream" and "drainage improvement at downstream" to formulate flood prevention measures, and improvement works of major drainage have been duly completed. They include the four stormwater drainage tunnels located at Hong Kong West, Lai Chi Kok, Tsuen Wan and Kai Tak which adopts the approach of "stormwater interception at upstream"; the four stormwater storage schemes located at Tai Hang Tung, Sheung Wan, Happy Valley and On Sau Road which adopt the approach of "flood storage at midstream"; and a total of over 100 kilometres of river training works in the New Territories with 27 flood protection schemes for low-lying villages. All are aimed at minimising the threat of heavy rainstorms and flooding in Hong Kong.

The Government continues to allocate resources for drainage infrastructure. The DSD is conducting nine stormwater drainage projects, with another 19 stormwater drainage projects under planning and design, including the Drainage Improvement Works in Tsim Sha Tsui, Yuen Long Barrage Scheme and various drainage improvement projects in different districts.

Since 1995, the DSD has eliminated 127 flooding blackspots. Currently, there are only four flooding blackspots in Hong Kong. Among them, construction works of the drainage improvement works at Pokfulam Village in Southern District have commenced and are expected to complete in 2024. Drainage improvement works for the remaining three blackspots located at Shek Wu Wai in San Tin, Yuen Long; Lam Tsuen Valley Basin in Tai Po and Chatham Road South in Tsim Sha Tsui are at the planning and design stage. Upon completion of the relevant planning and design, we will implement the

improvement works as soon as possible. We will closely monitor the drainage conditions of these blackspots during rainstorms, and these blackspots could likely be removed after the completion of drainage improvement works.

Thank you.