

Landslip Warning System

Key Message: The Geotechnical Engineering Office (GEO) and the Hong Kong Observatory (HKO) jointly operate the Landslip Warning System to alert the public to the landslide danger during periods of heavy rainfall.

Introduction

Most landslides in Hong Kong are caused by heavy rainfall. By using a combination of real-time rainfall data and rainfall forecasts from the HKO, and based on the GEO's study on the rainfall-landslides relationship, the GEO is able to identify instances when the landslide danger is high and when it would be appropriate to issue the Landslip Warning through the media. The purpose of the Landslip Warning is to alert the public to reduce their exposure to possible danger from landslides. The issuing of the Landslip Warning also triggers an emergency system within government departments, which mobilizes staff and other resources to deal with landslide incidents.

The Landslip Warning is issued when it is predicted that numerous landslides will occur. Isolated landslides may occur from time to time when the Landslip Warning is not in force.

Based on past records, on average three Landslip Warnings are issued and approximately 300 landslides are reported to the GEO each year. Most of the landslides are small, but occasionally large ones occur. Landslides, particularly where they are large, can cause casualties, property damage and road blockage.

The Landslip Warning draws the public's attention to the potential landslide danger. It is different from the Amber, Red and Black Rainstorm Warnings that are issued by the HKO to alert the public to the heavy rain which has fallen or is expected to fall.

Considerations for Issuing the Landslip Warning

Decisions as to whether and when to issue or cancel the Landslip Warning are made jointly by the HKO and the GEO. The Landslip Warning will be issued by the HKO if the 24-hour rainfall is expected to be heavy enough to trigger numerous landslides. The criterion for the issue of the Landslip Warning is related to the rainfall area, the rainfall intensity and the number of slopes affected by rainfall. The latest weather information available, including rainfall nowcast, is also considered.

The GEO operates an extensive network of automatic raingauges, which collects real-time rainfall data to support the operation of the Landslip Warning System. The network has been continuously enhanced and upgraded, to improve coverage and reliability, over the years since its establishment in 1984. The current network comprises about 90 raingauges located throughout Hong Kong. Each GEO raingauge station consists of a tipping bucket rainfall measuring unit and a data logger powered by solar energy. Real-time rainfall data of the GEO raingauges are transmitted to the cloud servers via mobile phone networks at 1-minute intervals. Additional rainfall data from automatic raingauges operated by the HKO and the Drainage Services Department are also used in the Landslip Warning System.

In order to issue timely warnings to the public, the HKO keeps a continuous watch on the weather in and around Hong Kong. In addition to data from raingauges, the HKO uses Doppler weather radars to monitor continuously the movement and development of rain-bearing clouds. High-resolution meteorological satellite images also provide information on cloud patterns around Hong Kong.

Neither weather forecasting nor landslide prediction is exact. There will inevitably be occasions when the Landslip Warning is in force and not many landslides occur. Equally, if heavy rain develops suddenly and unexpectedly, landslides could occur before the Landslip Warning is issued. The criteria for the issue and cancellation of the Landslip Warning are reviewed regularly to take account of the gradual improvement in slope safety with time.

When the Landslip Warning is in Force

When the Landslip Warning is issued, local radio and television stations are notified and requested to broadcast the Warning to the public at regular intervals, together with advice on the precautions that should be taken by the general public. The Hong Kong Slope Safety Website (<http://hkss.cedd.gov.hk>), the HKO's MyObservatory mobile application and the GEO Facebook page (<https://www.facebook.com/hkss.geo>) also publish the warning message and the number of landslide incidents reported to the GEO at regular intervals.

When the Landslip Warning is in force, the public should keep away from slopes. People should cancel non-essential appointments and stay at home or in a safe shelter, and pay attention to news of weather and other warnings. For residents close to slopes, stay in rooms on higher floors and/or furthest away from slopes. People should keep vigilant and watch out for signs of landslide danger. Pedestrians should stay away from slopes and motorists should avoid using roads with landslip warning signs. Otherwise, one should drive through with safe speed and do not stop unnecessarily. If people have been notified by rescuers to evacuate, or if people believe that their home could be endangered by landslide risks, they should leave immediately if condition permits. They should escape by using an exit away from slopes and stay temporarily at a safe shelter (e.g. temporary shelter provided by the District Offices or voluntary agencies).

An update on the situation with respect to weather warnings can be accessed by the public through the HKO's Dial-a-weather service (187 8200), website (<http://www.weather.gov.hk>) or MyObservatory mobile application.

**Geotechnical Engineering Office
Civil Engineering and Development Department
November 2022**