

Exploring a Waste Dump Site Failure – Possible Causes and Prevention Measures

D.H. Zou

Dalhousie University, Halifax, Canada

Abstract: Construction wastes are normally stored in areas away from urban cities. If the pile of the dumped wastes becomes too high, there will be a stability concern in addition to environmental issues. As an example to address this concern and to avoid possible failure of a waste site, this paper explores the recent slide failure of a construction waste dump site near a city in southern China. Information is gathered from online sources, news reports and Google earth images. Based on the available information, the pre-failure profile of the waste site is re-constructed. The stability of the waste pile is analyzed with numerical modelling based on simplified models of various scenarios. The intention is to explore the most influential factors which may cause failure on a dump site and to provide suggestions for prevention of failure in similar conditions. The analysis identified slope angle and height of a waste pile and water condition onsite as the most influential factors. General prevention measures are recommended.

Keywords: slide failure, quarry, construction dump site, satellite imagery analysis, numerical modelling

1 The Slide Failure in December 2015

A few days before Christmas in December 2015, a slide failure occurred on a construction waste dump site near a city in southern China (called WDS slide hereunder for simplicity). The slide destroyed and buried industrial and residential buildings in a nearby industrial park. Casualties and missing people were reported ([Sina News 2015](#), [Wangyi News 2015](#), [Wikipedia 2015](#)).

According to a geological report by the Ministry of Land and Resources of China (MLR 2015), waste materials generated from construction work elsewhere had been dumped on the site of a former quarry. It was the pile of construction wastes that collapsed and the natural hill did not.

The event of failure occurred quickly and travelled a distance of over 750 m to an industrial park down the hill, as illustrated in [Fig. 1](#). It buried everything on its way and destroyed a few buildings in the industrial park ([Xinhua News](#)

[2015](#), [Watkins 2015](#)). Rescue activities lasted for several days to search for survivors and involved use of many excavators.

There have been numerous reports on this event by various media after it occurred. Those reports were mostly about the event itself and not much on the technical aspects of the slide. This paper intends to fill this gap by looking at the event from a scientific point of view. Efforts have been made to collect as much and as accurate data as possible about the slide site before the failure. Because of very limited accesses to the site and engineering documents, information is mostly collected from online sources and satellite images. As a result, caution must be exercised in use of the information and the results generated.

Activities which led to the event and the site conditions are also reviewed. A conceptual model of the slide is created and the stability of the dump site is evaluated with consideration of factors which were likely to exist before the slide.

* Corresponding Author: D.H. Zou, Email: steve.zou@dal.ca, Tel: (902) 494-3977