

DRONE SURVEY OF LANDSLIDE AREA NEAR TAWANG MONASTERY

INTRODUCTION:

Tawang, a military town on the China border is a major tourist destination and Buddhist pilgrimage centre located in Arunachal Pradesh State. Tawang is perched at about 2700 meters above sea level, on Eastern Himalayas. A Catastrophic landslide occurred on 20.04.2016 near Tawang Monastery. The work of analyzing the cause of landslide and providing mitigation measures for same is being carried out by Indian Institute of Science, Bangalore. To gain better understanding and aerial view of the landslide and its topography PWD and Indian Institute of Science, Bangalore required a drone survey of landslide area to be conducted. PWD Tawang awarded Genstru to carry out drone survey for landslide affected area near Tawang Monastery. An aerial image of Tawang Monastery has been shown in **Fig.1**



Fig.1

BRIEF OF WORK DONE:

⇒ Drone survey

The drone survey was carried out to prepare 3D image of the area. The drone survey has been carried out for the area of about 1.05 Km². The length of the area surveyed is about 1500m along N-S and the width of the area is about 750m along E-W direction. The entire area has been surveyed in four different flights and the 3D model for entire area has been prepared by combining the data from all four flights. **Fig.2** shows the aerial view of landslide affected area.



Fig.2

⇒ Mapping

Mapping with drone is done using a technique called Photogrammetry.

⇒ Flight Planning

Planning a mapping mission entails, a number of considerations. A first-order decision is whether the flight will be done under autonomous control between GPS waypoints or will be controlled manually. In either case, it is important to analyze the area to be mapped before liftoff.

As the area of Tawang to be surveyed was large, it was not possible to carry the survey in single flight. In such cases it is necessary to divide the area into the parts and carry out the survey for each individual part. In this case the drone survey is carried out with four flights. **Fig 3** shows typical path followed by the drone during survey and **Fig 4.** shows 3D model generated after drone survey.

⇒ **Landslide Zone**

The image captured from the drone survey has been processed and 3D model was created. **Fig 5.** shows the aerial view of the landslide site and total area affected due to landslide. The length of the area surveyed is about 1500m along N-S and the width of the area is about 750m along E-W direction as shown in **Fig. 6.** The elevation difference observed between the flat area above the crest of the landslide and the toe of the mountain is about 560m. The inclination of slope varies from 35° to 40° .

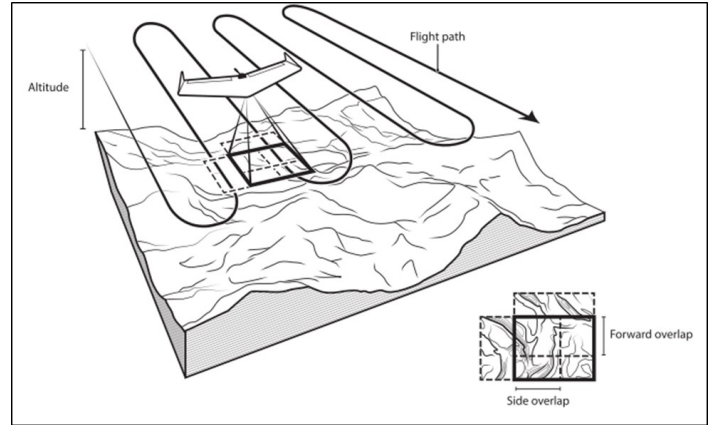


Fig.3

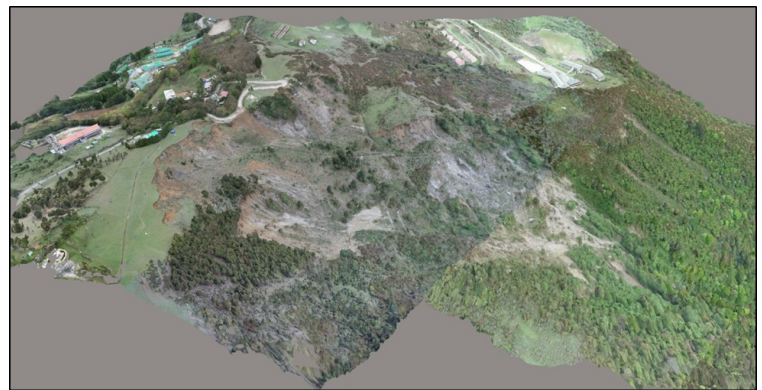


Fig.4

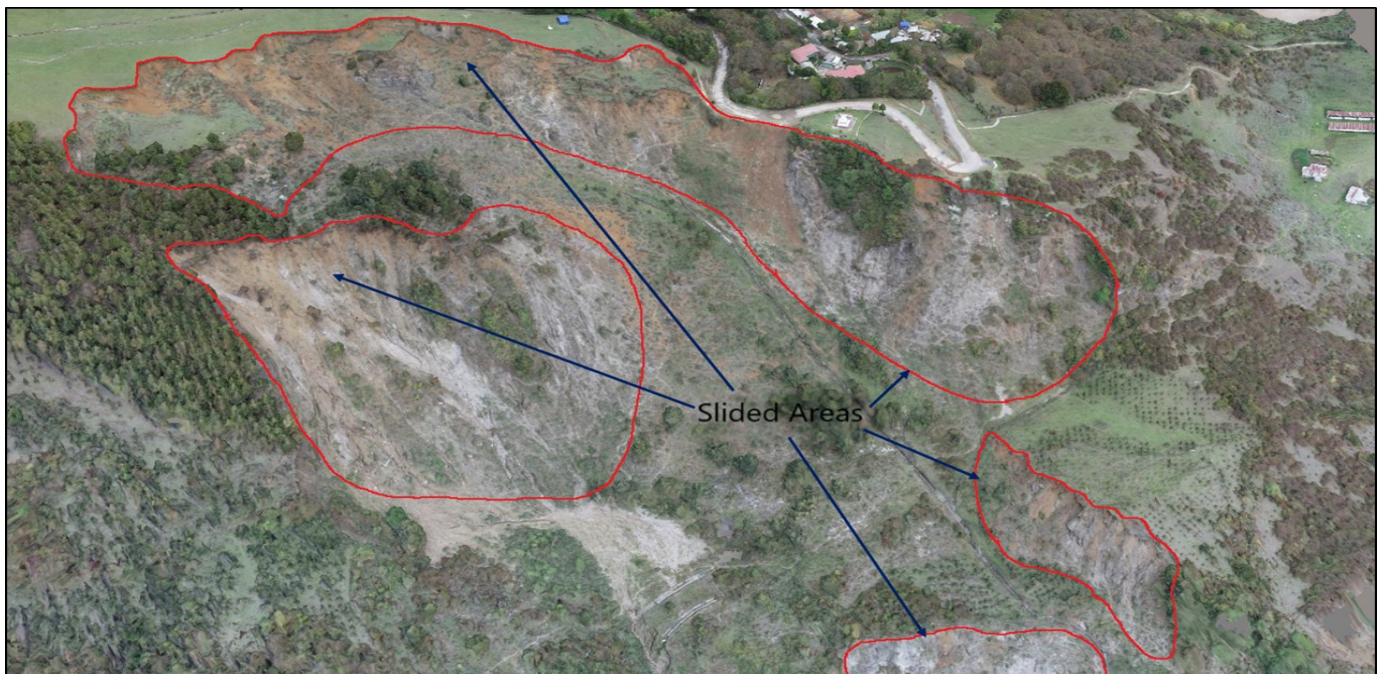


Fig.5

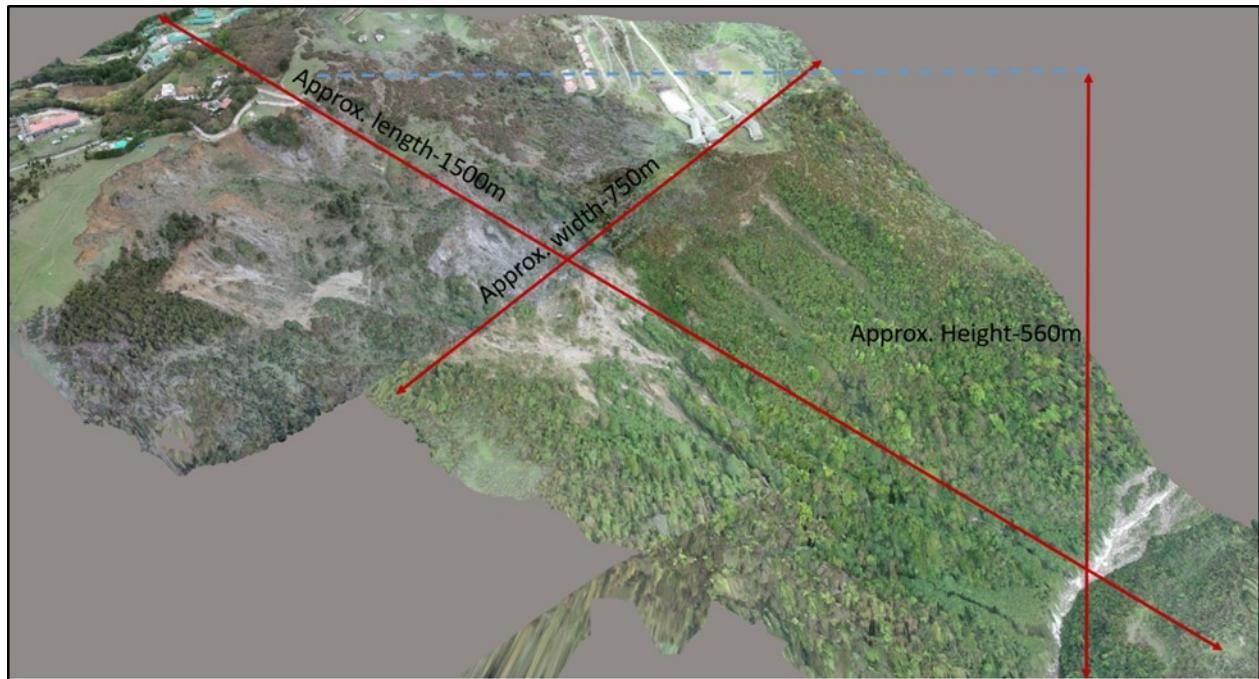


Fig.6

Other Details:

- ◇ **Client:** PWD Tawang, Arunachal Pradesh
- ◇ **Time Period:** 10th May, 2018– 12th May, 2018