

**Government of India
Ministry of Mines**



**Geological Survey of India
State Unit: Tamil Nadu and Puducherry**

**A note on preliminary assessment of landslides at TNEB colony, Emerald,
Nilgiri District, Tamil Nadu**

1. Introduction:

The Nilgiri district of Tamil Nadu receives rainfall both in southwest and northeast monsoons. The southwest monsoon is more active contributing nearly 50 percent in the west and 40 percent in the east. The northeast monsoon is moderate, contributing nearly 40 percent. The precipitation of rainfall gradually decreases from west to east of the district. The main triggering factor for landslides in Nilgiri is heavy rainfall.

During 6th August 2020, an earth flow has taken place near the TNEB colony, Emerald, Kundah Taluk after a spell of heavy rainfall of about 34.6 cm (for the period ending 24 hrs. on 7th August 2020). Four houses were damaged as a result of the debris flow. The video clip of these slides were covered in various vernacular new media channel and shared in the social networking sites (https://youtu.be/56Hvfq_OuwE).

In response to this, a team of geologists viz. S/Shri. A. Asrar Ahmed, Sr. Geologist; Gaurav Chand, Geologist from GSI, SU:TNP has made preliminary assessment of the said landslide incidence after interaction with the concerned officials and local dwellers. In this regard 42-point geo parametric landslide inventory datasheet has been prepared (attached as annexure-I). As part of the Experimental Landslide Early Warning Bulletin being issued by GSI to the DDMA from 27th July 2020, the Kundah taluk was indicated as the 'High' forecast level (Orange) which has "High possibility of occurrences of landslides in one or many locations (localised)" from 5th to 7th August 2020. As indicated by GSI, many small scale landslips were recorded amidst this one at Emerald. But as the SW monsoon has more influence on the western slopes of Nilgiris, these incidences were mostly restricted to this rainfall regime and its watershed areas.

2. Location:

The study area falls in Survey of India Toposheet Nos. 58A/11, Kundah Taluk, Nilgiri District, Tamil Nadu. It is located to the north of Emerald Bazaar.



(Fig: Location map of study area showing landslide location area in google image)

3. Geology of the area:

The Nilgiri massif is occupied by high grade metamorphic rocks of Archaean age. Garnetiferous charnockites and garnetiferous hornblende biotite gneiss are the predominant rock types exposed in the area, overlain by thick overburden of lateritic soil. Minor concordant enclaves of metabasites and quartz magnetite schists occur within these rocks, which are considered to be equivalents of Sargur Group of rocks of Karnataka. The regional foliation trends in ENE-WSW direction with steep dips on either side. The joints trends are generally N40° to 60° E - S 40° to 60°W with dip 80° towards S30° to 50° E.

4. Observations and causative factors:

The slide is a complex type of slide, which initiated as cut slope failure and the subsequently leading to the earth flow. Ground cracks ranging from 5-10 cm were observed in the close vicinity of the slide, which also indicates chances of future reactivation, if untreated. Ground subsidence of about 1 m was observed in the slide zone. The slope forming material is mainly lithomargic clay/soil having a thickness of about 5-6 m



Fig: Ground crack observed in the slide vicinity



Fig. Subsidence in the slide area

5. History of events

Landslides are frequently occurring incidence in the Nilgiri District, which occur during both north east and south west monsoon, after spells of eavy rainfall. In November 2009, the district received a rainfall of 547 mm, which is the highest rainfall recorded in a period of thirty years, during this month which induced 163 slides. During August 2019 the the Emerald area in particular witnessed 6 nos. of landslides, which were the outcome of heavy rainfall during south west monsoon. Two slides were recorded very near the same location at Emerald colony.

6. Recommendations:

The following suitable recommendations were made after the thorough field investigations:

1. Diversion of the drainage - by Lined toe drainage
2. Benching of the slopes

3. Construction of retaining wall with weep holes

42-point Geo-parametric attributes of landslide incidence

No	Field	
1	Slide No (LS .No.)	TN/EMD/58A11/2020/01
2	State	Tanmil Nadu
3	District	Niulgiri
4	Toposheet	58A/11
5	Name of the slide	Emerald TNEB slide
6	NH/SH/Locality	TNEB colony, Emerald, Kundah
7	Latitude	11.320817
8	Longitude	76.625373
9	Length	10 m
10	Width	90 m
11	Height	7 m
12	Area	80 m ²
13	Depth	1.5-2 m
14	Volume	100 m ³
15	Run out distance	180-200 m
16	Type of Material	Earth/ soil
17	Type of movement	Flow
18	Rate of movement	Moderate
19	Activity	Suspended
20	Distribution	Enlarging
21	Style	Complex
22	Failure mechanism	Shallow rotational
23	History	6 th August 2020 (initiation)
24	Geomorphology	Moderately dissected slope
25	Geology	Charnockite
26	Structure	Indistinct
27	Land use/ Land cover	Settlement, fallow land
28	Hydrological condition	Wet


29	Triggering Factor	Heavy rainfall
30	Death of persons	Nil
31	People affected	Nil
32	Live-stock loss	Nil
33	Communication	Cracks developed in approach road to the top of the slide
34	Infrastructure	4 nos. of houses (TNEB quarters) fully damaged.
35	Agriculture/forest/Barren	Agriculture
36	Causes	1. Heavy rainfall 2. Anthropogenic activity (steep cutting of slope)
37	Remedial measures	1. Construction of retaining wall with weep holes 2. benching of the slopes 3. lined toe drainage
38	Remarks, if any	This is a complex slide. Initiated as cut slope failure, then followed by soil/earth flow.
39	Photos. Sketch of Plan & section of the slide	
40	Summary/Abstract	An earth flow has taken place in TNEB colony, Kundah, Nilgiris on 6 th August 2020, leading to the total damage to 4 nos. of houses. the slide is a complex type, which initiated as cut slope failure and the subsequently leading to the earth flow. Ground cracks were observed in the close vicinity of the slide, with are indications of chances of future reactivation, if untreated. The slope forming material is mainly lithomargic clay/soil having a thickness of about 5-6 m. Suitable remedial measures in the form of benching ogf the slope, followed by provision of retaining wall with weep holes and lined toe drainage has been suggested for the slide.
41	Pdf	Attached
42	Landslide category	II



Fig: Panoramic view of the slide area

References:

1. “A preliminary note on Post Disaster Landslide Studies occurred during august 2019 in Nilgiri District, Tamil Nadu”, 2019-20, Rajkumar M, Jeevarathinam K, Asrar Ahmed A, Senior Geologist's & Souvik Acharya, Geologist
2. “A report on Macro scale (1:50,000) landslide susceptibility mapping in parts of toposheets no. 58A/7, 11, 12 & 15, Coimbatore and Nilgiri Districts, Tamil Nadu”, FS:2015-16, Rajkumar M., & Souvik Acharya, Geologists