

Inspection note on recent visit to the JNM Axis Road at Mile Stone-8:

1st BN Sikkim Scouts

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Field visit was made on 16th August 2018 and preliminary report on the observation made in the area between unit location of 1st BN Sikkim Scouts and the road stretch (JNM axis) ahead of MS-8, suggests that the area mainly lies on a slope which appears to be a major “paleo-landslide” (Fig. 1). The area around unit location of 1st BN Sikkim Scouts and the road stretch (JNM axis) ahead of MS-8, belongs to Kanchanjunga gneiss / Darjeeling gneiss of Central Crystalline Gneissic complex. However, in-situ rocks were nowhere observed in the entire studied area. The field observation when analysed along with the Google imagery and topographic map of the area shows that the area is dissected by major drainage lines i.e. D1, D2, D3 & D4 (Fig.2). Major evidences of subsidence were mainly observed between drainage line D1 and D2, running roughly parallel to the streams. Recent landslide has been observed between D2 and D3, which has interrupted the traffic on strategically important Gangtok-Nathu La road. The area exposes unsorted and unconsolidated debris material consisting of big and giant boulders, as clearly observed in the road widening going ahead of MS-8 (Fig.3). The stream path along D1 is marked by presence big boulders (Fig. 4). Majority of the field evidences indicative of active subsidence in the form of cracks developed in the culvert, floor, or roads show vicinity to drainage line D1 and D2 or lies in the area between drainage line D1 and D2 (Fig. 5). However, to the west of D1, at present no significant subsidence activity was noticed except some tilting of plants along the road side, which was not seen in the plants on the upper slope. It was also observed that the water flowing along the drains was also muddy, indicating that the fines present in the debris material of the paleo-slide are being rapidly dissolved making the area more unstable.

Heavy rainfall in the area might have increased the flow along the old drainage lines present in the area, which otherwise may not be so prominently seen due to debris cover/big boulders present along its path (Fig.4). Percolation of water in between D1 and D2 in the paleo-slide zone may have activated the subsidence activity in the area. On the basis of preliminary observation it is suggested that the area between drainage line D1 and D2 is not at all suitable for habitation. Although the area to the west of drainage line D1 is also a part of the same paleo-slide, but at present do not show any significant evidence of subsidence.

The present unit location of 1st BN Sikkim Scouts lies on both sides of D1. The establishment to the eastern part of D1 needs immediate evacuation. However, the establishment on western side of D1 can be maintained with proper support to the slope by constructing Gabion wall in steps with maintaining a safe distance of about 10m from stream D1. This will arrest the loss of solid particles being drained in the streams, especially in D1.



Fig. 1. Rolled boulders in the camp area located over paleo-slide.



Fig. 2: Perennial streams passing through the camp area of 1st BN Sikkim Scouts and the road stretch (JNM axis) ahead of MS-8 (Shown over Google Image).



Fig. 3: Unsorted and unconsolidated debris material exposed along the road cutting (JNM axis) ahead of MS-8.

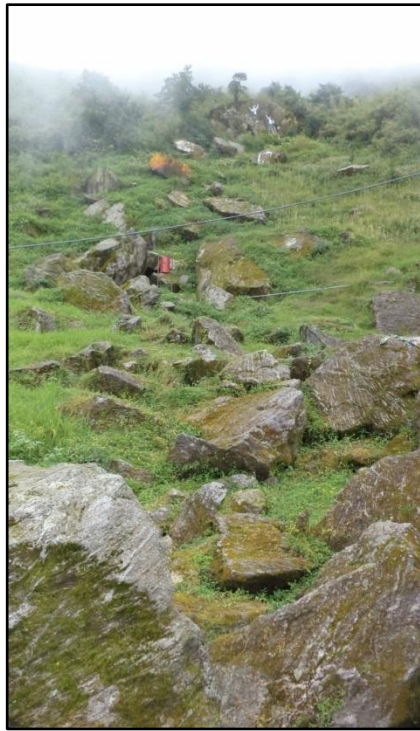


Fig. 4: Rolled boulders covering the path of stream D1.



Fig. 5: Photographs showing disposition of surface evidences of active subsidence in the form of cracks developed in the culvert, floor and roads.

42-Point Geo-parametric attributes of Landslides (Causes, Remedial Measures & Others)

No	Field	Description
1	Slide No (LS .No.)	<i>State: Sikkim/district: East District/toposheet: 78A/11/year: 2018/serial no.</i>
2	State	Sikkim
3	District	East District
4	Toposheet	78A/11
5	Name of the slide/ Subsidence	1 st BN Sikkim Scouts and the road stretch (JNM axis) ahead of MS-8
6	NH/SH/Locality	State Highway; near 8 th Mile
7	Latitude	27°22'13''N
8	Longitude	88°40'25''E
9	Length of cracks	<i>10-20m at different locations</i>
10	Width	NA
11	Height	<i>1-3 ft at different locations</i>
12	Area	NA
13	Depth	NA
14	Volume	NA
15	Run out distance	NA
16	Type of Material	<i>Debris</i>
17	Type of movement	<i>Subsidence</i>
18	Rate of movement	<i>Slow</i>
19	Activity	<i>Active</i>
20	Distribution	<i>Advancing</i>
21	Style	<i>Multiple</i>
22	Failure mechanism	<i>Subsidence</i>
23	History	<i>Date of initiation: August 2018 subsequent reactivations ----</i>
24	Geomorphology	The affected area is a part of paleoslide with moderately dissected having sparse to moderate vegetation cover
25	Geology	The rocks of the surrounding area belong to Kanchanjunga gneiss of CCGC (Central Crystalline Gneissic Complex) as basement rock, covered entirely with paleoslide material.
26	Structure	NA
27	Land use/ Land cover	<i>Sparse to moderate vegetation</i>
28	Hydrological condition	<i>Flowing perennial stream</i>
29	Triggering Factor	<i>The area is dissected by perennial streams. The downstream direction is marked by steep escarpment. Excess rain water percolated in the paleoslide zone, creating hydrological pressure, resulting in the subsidence.</i>
30	Death of persons	<i>Nil</i>
31	People affected	<i>None</i>
32	Live stock loss	<i>Nil</i>
33	Communication	<i>Road (blocked/damaged)</i>
34	Infrastructure	<i>Cracks in the wall of settlement</i>
35	Agriculture/forest/Barren	<i>Sparse to moderate forest</i>
36	Geo-scientific Causes	<i>Combination of variety of failures with pore water pressure</i>

37	Remedial measures	<i>Evacuation from the area lying in between the flowing streams, making arrangement for proper drainage and diversion of flowing stream, erecting gabion wall</i>
38	Remarks, if any	<i>Cracks appeared on the road and along the settlement.</i>
39	Photos. Sketch of Plan & section of the slide	<i>Attached with note.</i>
40	Summary/Abstract	<i>Attached with note.</i>
41	Pdf	<i>Attached</i>
42	Landslide Category	<i>Type.....</i>